Native fishery species of significance in the Taranaki region

Review of the Regional Freshwater Plan for Taranaki

Taranaki Regional Council

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1. Introduction

1.1 Purpose

The purpose of this technical report is to document the Taranaki Regional Council's (the Council) rationale, assumptions and other supporting information applied to identify native aquatic freshwater fauna (fish and molluscs) identified as regionally significant.

The report will be used to inform the development of the Council's section 32 report and contributes to the review of the *Regional Fresh Water Plan for Taranaki* (the Freshwater Plan) and the *Regional Soil Plan for Taranaki* (the Soil Plan).

1.2 Background

Taranaki has 20,000 kilometres of waterways and no less than 530 named rivers and streams. Taranaki also has 19 lakes with an area greater than eight hectares and over 1,200 wetlands.

Eighteen native freshwater fish species are known to inhabit freshwater ecosystems in the Taranaki region for all or part of their life-cycle. However, in relation to 'native fishery habitat' some fish and mollusc species are particularly significant to Taranaki due to their status as nationally threatened (based on the Department of Conservation threat classification) or because they have been identified as 'regionally distinctive'.

Under the Resource Management Act 1991, regional council functions include the "…*establishment and implementation of objectives, policies and methods for maintaining indigenous biodiversity*"(s30(1)(ga)).

The Council is currently reviewing its freshwater and soil plans. As part of the development of a proposed Freshwater and Land Management Plan for Taranaki, the Council is likely to include Plan provisions (policies and rules) and a schedule that seek to identify and better protect habitat for native fish and mollusc species.

Table 1 overleaf identifies fish species recorded in Taranaki to date (as per the national freshwater fish database), including their threat status.

Taranaki's landscape is dissected by more than 20,000 kilometres of rivers and streams.

Table 1: Native and introduced freshwater fish species recorded as present in Taranaki

Common name	Scientific name	Threat classification (Goodman *et al* 2013)
Giant kokopu	*Galaxias argenteus*	At risk (Declining)
Banded kokopu	*Galaxias fasciatus*	Not threatened
Shortjaw kokopu	*Galaxias postvectis*	Threatened (Nationally vulnerable)
Koaro	*Galaxias brevipinnis*	At risk (Declining)
Inanga	*Galaxias maculatus*	At risk (Declining)
Longfin eel	*Anguilla dieffenbachii*	At risk (Declining)
Shortfin eel	*Anguilla australis*	Not threatened
Common smelt	*Retropinna retropinna*	Not threatened
Torrentfish	*Cheimarrichthys fosteri*	At risk (Declining)
Lamprey	*Geotria australis*	Threatened (Nationally vulnerable)
Black flounder	*Rhombosolea retiaria*	Not threatened
Common bully	*Gobiomorphus cotidianus*	Not threatened
Bluegill bully	*Gobiomorphus hubbsi*	At risk (Declining)
Giant bully	*Gobiomorphus gobioides*	Not threatened
Redfin bully	*Gobiomorphus huttoni*	At risk (Declining)
Crans bully	*Gobiomorphus basalis*	Not threatened
Upland bully	*Gobiomorphus breviceps*	Not threatened
Brown mudfish	*Neochanna apoda*	At risk (Declining)
Yellow-eyed mullet	*Aldrichetta forsteri*	Not threatened
Grey mullet	*Mugil cephalus*	Not threatened
Brown trout	*Salmo trutta*	Introduced and naturalised
Rainbow trout	*Oncorhynchus mykiss*	Introduced and naturalised
Perch	*Perca fluviatilis*	Introduced and naturalised
Goldfish	*Carassius auratus*	Introduced and naturalised
Rudd	*Scardinius erythrophthalmus*	Introduced and naturalised
Koi carp	*Cyprinus carpio*	Introduced and naturalised
Gambusia	*Gambusia affinis*	Introduced and naturalised

Key*

Diadromous fish	Non migratory	Marine wanderer	Sports fish	Pest fish

* Table excludes freshwater mussels, which are aquatic molluscs.

Giant kokopu, nationally 'at risk' and 'regionally distinctive'

1.3 Scope and methodology

The scope of this report addresses native aquatic freshwater fauna identified as regionally significant for their biodiversity values in the Taranaki region and for which draft policies and rules are recommended to manage adverse effects on their distribution and/or abundance in Taranaki.

In determining 'significance' the report considers those fauna species that are present in Taranaki and which are:

- nationally threatened (based on the Department of Conservation threat classification), or
- 'regionally distinctive' – species identified as locally significant to the Taranaki region in terms of its population uniqueness, value, health and wellbeing, irrespective of their national threat status.

'Regionally distinctive' includes species that are locally important and particularly vulnerable in Taranaki to adverse effects associated with freshwater use and development.

As with many regions in New Zealand, freshwater ecosystems in Taranaki are under-surveyed in terms of their native fishery habitat.

For the purposes of this report, presence/abundance of native fish and mollusc species were assessed based upon information from the New Zealand Freshwater Fish Database plus Council database information recording the presence of native species. Although this has provided an indication of the range of each species, there are few repeat surveys conducted at sites, and no standard survey methodology used. Therefore, this data provides little information in terms of any temporal change in communities. Furthermore, no size class information was available, and this means that no assessment can be made regarding whether a species is recruiting effectively. The Council is currently increasing fishery monitoring in the region as part of its state of the environment programme.

Set out in the sections that follow is an explanation of the rationale, assumptions and other supporting information applied to identify native aquatic freshwater fauna identified as regionally significant. The species identified to be regionally significant for their biodiversity values are:

- Banded kokopu (*Galaxias fasciatus*)
- Brown mudfish (*Neochanna apoda*)
- Freshwater mussel (*Echyridella sp.*)
- Giant kokopu (*Galaxias argenteus*)
- Inanga (*Galaxias maculatus*)
- Koaro (*Galaxias brevipinnis*)
- Lamprey (*Geotria australis*)
- Longfin eels (*Anguilla dieffenbachii*)
- Shortjaw kokopu (*Galaxias postvectis*).

Other native species (i.e. common bully, common smelt, crans bully, grey mullet, redfin bully, shortfin eel, torrentfish, upland bully and black flounder) are more locally abundant, have a large spawning and habitat range and/or are less vulnerable to freshwater use and development. Bluegill bully has rarely been recorded in Taranaki. Managing adverse effects on these species will still be achieved by general Plan provisions safeguarding the life supporting capacity and ecosystem health of freshwater.

1.4 Structure

This report has four sections.

Section 1 introduces the report, including its purpose, background, scope and structure.

Section 2 summarises information relating to native aquatic freshwater species identified as regionally significant. In relation to each species, information on their habitat, distribution, known range, potential range, threats and recommendations are presented.

Section 3 sets out discussion on other species considered but not identified as regionally significant.

Section 4 sets out a discussion on pressures affecting populations of native aquatic freshwater species identified as regionally significant.

2. Species of interest

2.1 Banded Kokopu (*Galaxias fasciatus*)

Banded kokopu are most common on the northern ring plain, but are also present south of the mountain, and the eastern and northern hill country. Banded kokopu are diadromous, and their preferred habitats are small muddy-bottomed forested streams. An example of a stream that supports a healthy banded kokopu population is tributary of the Katikara Stream, which has an upstream catchment of less than 25 hectares (Figure1). This provides some perspective as to how small suitable streams can be.

Known range

In Taranaki, banded kokopu records (Figure 2 overleaf) extend as far as 58 kilometres inland, and as high as 510 metres in altitude. However, over three quarters of records in Taranaki are from less than 200m altitude, and over 85% are from less than 25km from the coast. It should be noted that these records may include a number of duplicates, which may skew results. They have the highest population densities in well-shaded streams, with this shading usually provided by trees (as opposed to rank grass).

Figure 1: A large banded kokopu in a very small stream

Likely range

It is anticipated that with the maturation of the riparian planting programme, the amount of suitable banded kokopu habitat will increase. If this consequently results in an increased population, then it is conceivable that banded kokopu could be removed from the 'regionally distinctive' category in the future.

The habitat that is preferred by banded kokopu consists primarily of small streams and wetland areas. In Taranaki, banded kokopu have been recorded in numerous streams that have upstream catchment areas of less than 25 hectares. Although this species prefers streams with an intact forest canopy, good populations have also been observed in streams that are heavily overgrown by bankside vegetation, including reed sweet grass (*Glyceria maxima*) e.g. the Mangati Stream.

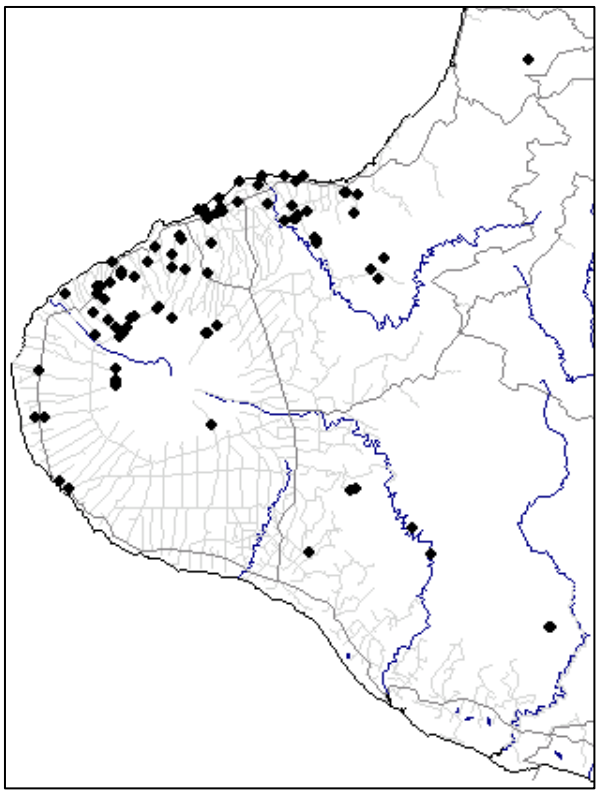

Figure 2: NZFFD records for banded kokopu in Taranaki (114)

Threats

It is considered that the primary threat to banded kokopu populations is that of habitat loss and modification. This includes the loss of access to habitat caused by poorly installed culverts for example.

The habitat that is preferred by banded kokopu is at threat from stream modification activities such as stream piping and straightening. Piping will remove all banded kokopu habitat in the affected reach, and potentially can create a barrier to upstream passage, while straightening will remove much of the preferred habitat, being pools, which generally form on bends and meanders. Where such activities are undertaken under a resource consent, the consent often requires the consent holder to provide a degree of financial contribution, as mitigation for this effect. The size of this contribution is usually determined by assessing the value of the reach to be modified.

Reason for inclusion

Although nationally this species is classified as 'not threatened' (Goodman *et al*, 2013), there are relatively few Taranaki streams that are known to support a significant banded kokopu population, especially when compared with the amount of potential banded kokopu habitat that exists. Despite the relatively small population base, this species is a significant contributor to the Taranaki whitebait fishery (Allen Stancliff, *pers. comm*.). In Taranaki, regardless of its national threat classification, it is recommended that this species be identified and protected as a regionally distinctive species.

2.2 Brown mudfish (*Neochanna apoda*)

Brown mudfish have been recorded from a small number of locations in Taranaki, with most records coming from the Ngaere Swamp area. Brown mudfish are not diadromous, and maintain landlocked populations that can be self-sustaining, but isolated from each other. Their typical habitats are pools in swamp forest, raupo wetlands, weedy/overgrown creeks, unmaintained drains, and wetlands around podocarp forests (McDowell, 2000).

Mudfish can aestivate when the water dries up, enabling them to survive in locations where eels cannot. An example of a wetland that supports a healthy brown mudfish population is the Mudfish 1 wetland in the Waingongoro River catchment (Figure 3).

Known range

There are relatively few records (65) for brown mudfish in Taranaki, and this includes a number of duplicate records (Figure 4 overleaf). This is due to its limited range, a direct result of habitat loss. Some of these records are now historical, as the streams in which they were located have since been piped, resulting in the loss of that population. This species was likely present throughout Taranaki, but land drainage reduced its range to what are now considered remnant populations.

Figure 3: Pools in swamp forest

Likely range

It is unlikely that maturation of the riparian planting programme will have an impact on brown mudfish populations. However, rules protecting wetlands and active management, such as the implementation of biodiversity plans, and the reintroduction of mudfish to suitable habitat, or creation of new suitable habitat, could lead to a recovery in population. This species may be present in other remnant wetlands that have not yet been surveyed.

Threats

By far the largest threat to this species is habitat loss, through the draining of wetlands. The remnant Taranaki populations are all located in areas that used to be dominated by swampland, but drainage activities have since converted this into productive farmland.

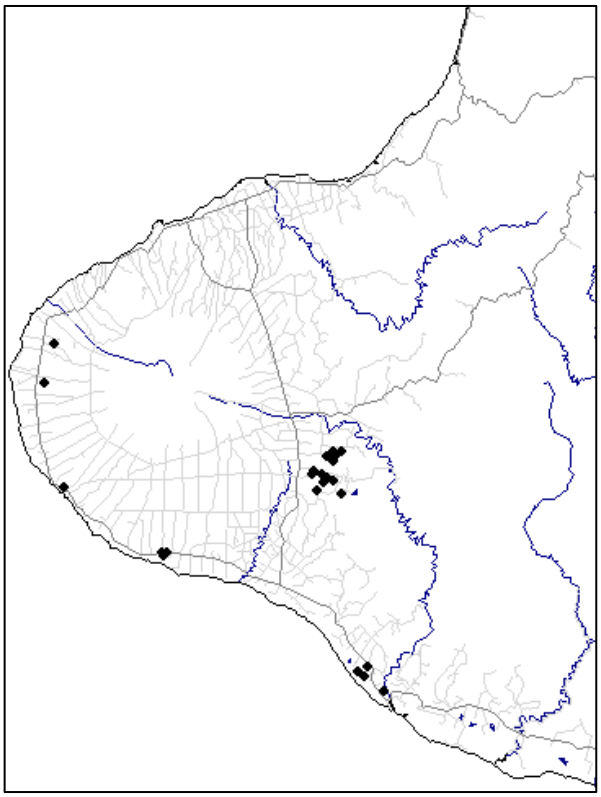

Figure 4: NZFFD records for brown mudfish in Taranaki (65)

Reason for inclusion

Brown mudfish are classified as being in decline, which places them in the 'at risk' category (Goodman *et al*, 2013). There has been a significant decline in wetland habitat over time, and as a result, there are only a small number of isolated populations. Any newly discovered populations deserve protection, to preserve genetic diversity, and to make for a more resilient population.

The habitat that is preferred by brown mudfish is significantly threatened by drainage of wetlands, and the piping of streams that have been modified into drains. It is therefore recommended that this species be identified and protected as a regionally distinctive species.

2.3 Freshwater mussel (*Echyridella* sp.)

Freshwater mussel, otherwise known as kakahi, is a relatively discreet species. Unless specifically searched for, the presence of freshwater mussels often goes unnoticed. These bivalves, have a relatively complicated life cycle that is as yet not fully understood, but is known to include an association with fish. Freshwater mussels use the fish to disperse their larvae, which are about the size of a grain of sand, although it has not been determined which species they are associated with. Koaro are thought to be important, although juvenile mussels have also been found on eels, bullies and trout. No one currently knows where or when these juveniles develop into adults, with the smallest freshwater mussel recorded being about 5 mm long (McEwan, 2015).

Freshwater mussel inhabit stream and lake beds, including Lake Rotorangi (Figure 5), where they are embedded within soft sediments, and filter out their food, being small pieces of organic matter such as bacteria and algae. They are important to Iwi and were highly regarded as mahinga kai (McDowall, 2011). Only one species has been confirmed as being present in Taranaki, being *Echyridella menziesii*. This species is classified as being 'in decline', which places them in the 'at risk' category (Grainger *et al*, 2013).

Figure 5: Lake Rotorangi

Another species (*Echyridella aucklandica*) has been recorded in a number of locations in the North Island, including

around Auckland, but also in Lake Wairarapa. Therefore, it is possible that this species may be present in Taranaki. This species is classified as 'nationally vulnerable', which places them in the 'threatened' category (Grainger *et al*, 2013).

Known Range

Although there have been a number of anecdotal reports, there are only 16 sites known to have freshwater mussels in Taranaki (Figure 6).

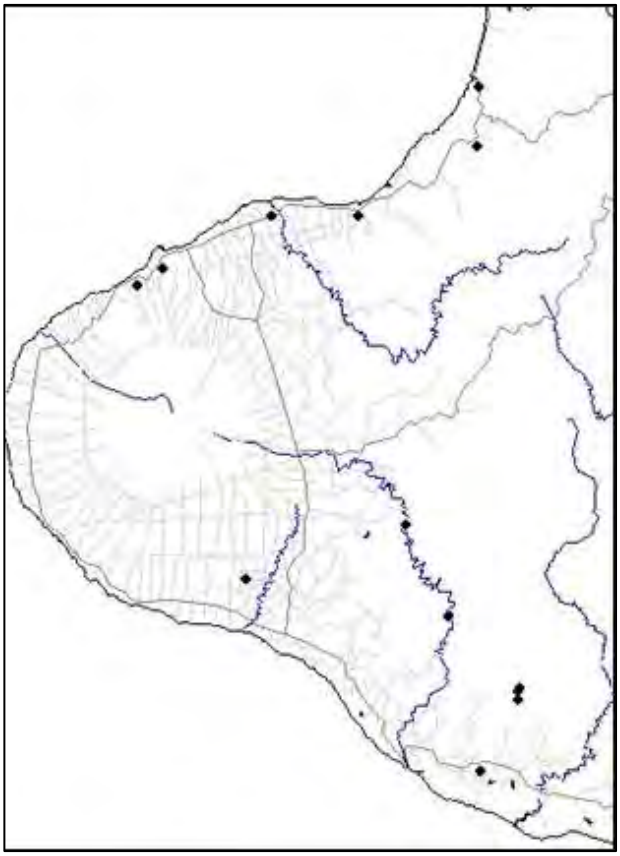

Figure 6: NZFFD and TRC records for freshwater mussel in Taranaki (16)

Likely Range

It is thought that the range of freshwater mussels has reduced significantly, and that this reduction could be due to excessive sedimentation, and/or a reduction in numbers of fish on which the larvae are parasitic. The maturation of the riparian programme should lead to reduced sediment inputs, and a greater focus on fish passage should improve the general distribution of fish. As such, it is possible that the freshwater mussel range may increase in time, provided there are still adults remaining in the catchment, to facilitate recruitment.

Threats

Freshwater mussels are predated upon by birds, fish and people. There is also a parasite, which can cause deformations of the shell. In terms of threats from development, the channelisation of streams through straightening, the cleaning out of streams by digger, and a reduction in water quality especially with regards to sedimentation can all negatively impact on freshwater mussel populations.

Reason for Inclusion

As stated previously, both species of freshwater mussel found in the North Island are experiencing a reduction in population. In addition, freshwater mussels were and may still be an important food supply for Iwi. It is possible that *E. aucklandica* may be present but not yet detected in Taranaki. Accordingly all species under the *Echyridella* genus, regardless of their national threat status, are locally important and it is recommended that they be identified and protected as a regionally distinctive species.

2.4 Giant Kokopu (*Galaxias argenteus*)

Giant kokopu can be found around the hill country, but most records are from the northern and western ring plain. Giant kokopu are diadromous, and their preferred habitats are small to medium sized streams.

Throughout New Zealand they are most often found in overgrown, weedy/boggy streams (McDowell 2000). There are numerous records in Taranaki of giant kokopu inhabiting swift bouldery streams, such as the Katikara Stream. When recorded in such streams however, it is always from the large, deep, slow moving pools. An example of a stream that supports a healthy giant kokopu population is the Mangahewa Stream, a tributary of the Onaero River (Figure 7). This provides some perspective as to how small suitable streams can be.

Known range

In Taranaki, giant kokopu records (Figure 8 overleaf) extend as far as 115 kilometres inland, and as high as 400 meters in altitude. However, over three quarters of records in Taranaki are from less than 150m altitude, and almost 80% are from less than 20km from the coast. It should be noted that these records may include a number of duplicates, which may skew results. They have the highest population densities in well-shaded streams, with this shading usually provided by trees (as opposed to rank grass).

Figure 7: The Mangahewa Stream

Likely range

It is anticipated that with the maturation of the riparian planting programme, the amount of suitable giant kokopu habitat will increase. If this consequently results in an increased population, then it is conceivable that giant kokopu could be

removed from the 'regionally distinctive' category in the future.

Giant kokopu are also typically found in small streams, but are almost exclusively found in streams that contain deep pools and good instream cover. Intact riparian margin areas are also important.

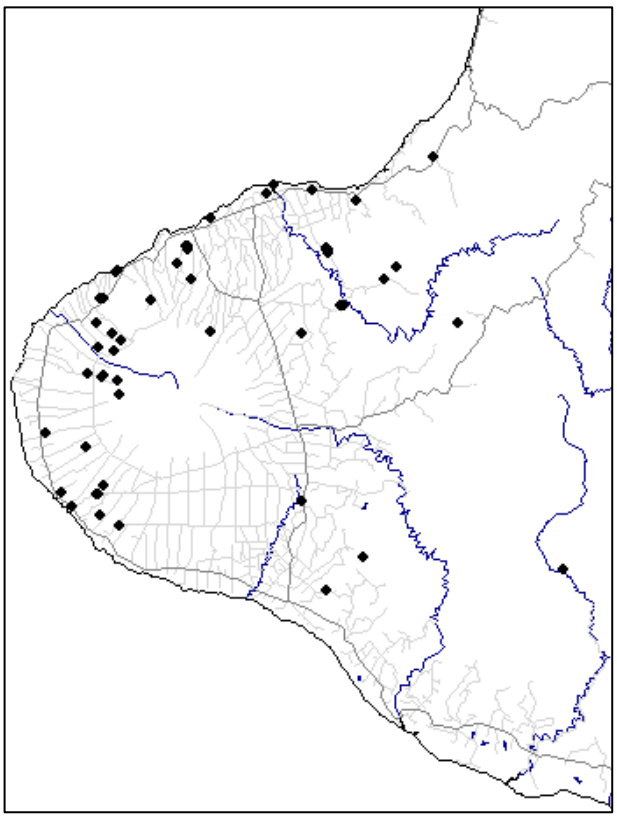

Figure 8: NZFFD records for giant kokopu in Taranaki (58)

Threats

Poorly designed culverts and other barriers to fish passage can restrict access to upstream habitats for this species. This is because although juvenile giant kokopu are moderate climbers, they are unable to negotiate perched culverts for example. In addition, the habitat that is preferred by giant kokopu is at threat from stream modification activities such as straightening, and to a lesser degree piping. Straightening will remove much of the preferred habitat, being pools. The deepest pools, most preferred by giant kokopu, generally form on bends and meanders. Restricted access past poorly designed culverts and bed control structures has also contributed to their decline.

Reason for inclusion

Giant kokopu are classified as being in decline, which places them in the 'at risk' category (Goodman *et al*, 2013). There are few streams that are known to support significant giant kokopu populations, especially when compared with the amount of small stream habitat that exists. Habitat loss and modification may be contributing to the decline of this species. Therefore, it is recommended that this species be identified and protected as a regionally distinctive species.

2.5 Inanga (*Galaxias maculatus*)

Inanga are found throughout Taranaki, in a range of habitats, including small weedy streams and large cobble bedded rivers. This species is the principal contributor to the whitebait run, and good populations have been recorded in (for example) the Patea River downstream of the Patea dam, but also in the Haehanga Stream (Figure 9).

Inanga are considered a taonga by Iwi. This species has long been considered an important food source, being the primary contributor to the whitebait run.

Figure 9: The Haehanga Stream

Known range

In Taranaki, inanga records extend as far as 44.6 kilometres inland, and as high as 210 metres in altitude (Figure 10 overleaf). However, almost 90% of records in Taranaki are from less than 100m altitude and 75% from less than 10km from the coast. It should be noted that these records may include a number of duplicates, which may skew results.

Likely range

It is possible that with the maturation of the riparian planting programme, the amount of suitable inanga habitat will increase. It is likely that stock fencing has already led to an improved inanga population within Taranaki, especially where spawning areas are protected.

Threats

It is considered that the primary threat to inanga populations relates to barriers to their upstream passage as juveniles. Inanga are considered one of the poorer swimmers and climbers of all the native fish species and they are unable to negotiate poorly designed culverts. This even includes those culverts that are not perched but contain a swift flow. This species is also threatened through habitat loss and modification, especially relating to their spawning locations. The habitat that is preferred by inanga is varied. However, this species spawns in a very specific location, upstream of the saltwater wedge, in tidal areas, and during or immediately following the highest spring tides. If this habitat was modified or lost, it would result in little to no successful inanga recruitment from that catchment. As this species is also known to inhabit small streams, they are vulnerable to stream modification works like piping and realignment.

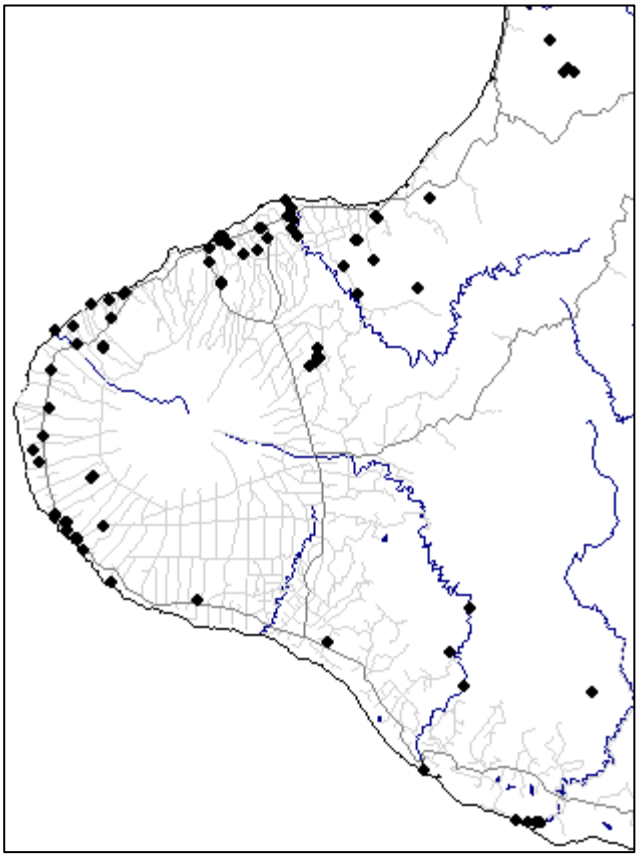

Figure 10: NZFFD records for inanga in Taranaki (114)

In addition, the loss of access to habitat caused by poorly designed culverts for example has also affected this species. Habitat that is frequently utilised by inanga is at threat from stream modification activities such as stream piping and straightening. Piping will remove all habitat in the affected reach, and potentially can create a barrier to upstream passage, while straightening will remove much of the preferred habitat, being pools, which generally form on bends and meanders.

Reason for inclusion

Inanga are classified as being in decline, which places them in the 'at risk' category (Goodman *et al*, 2013). This species is relatively widespread in Taranaki, but is generally restricted to lowland streams, and is the principal contributor to the whitebait run. It is therefore recommended that this species be identified and protected as a regionally distinctive species.

2.6 Koaro (*Galaxias brevipinnis*)

Koaro have been predominantly found around the ring plain, with only a handful of records from the hill country. Koaro are diadromous, and their preferred habitats are small to moderate, stable, boulder-cobble streams, that flow through forest (McDowell, 2000). Examples of streams that support a healthy koaro population are the Otakeho Stream and the Piakau Stream, a tributary of the Maketawa Stream (Figure 11). This species is considered an important contributor to the whitebait run.

Known range

In Taranaki, koaro records (Figure 12 overleaf) extend as far as 138 kilometres inland, and as high as 800m in altitude. However, 68% of records in Taranaki are from higher than 300m altitude, with 39% at above 400m (near the National Park), and over 75% are from more than 15km from the coast. It should be noted that these records may include a number of duplicates, which may skew results.

Figure 11: The Piakau Stream

Likely range

It is anticipated that with the maturation of the riparian planting programme, the amount of suitable koaro habitat may increase. If this consequently results in an increased population, then it is conceivable that koaro could be removed from the 'regionally distinctive' category in the future. However, it is possible that the range of koaro is unlikely to expand significantly, as the majority of suitable habitat is near the

National Park. Whether this is due to water quality, or other factors such as altitude or upstream catchment vegetation is unclear.

Threats

As with shortjaw kokopu, this species is likely to have been affected by historical deforestation. Competition with and predation by introduced species may have also led to their decline. The habitat that is preferred by koaro is not as threatened by stream modification activities as that utilised by giant and banded kokopu. This is because the majority of koaro are present in larger ring plain streams, near or in the National Park.

Reason for inclusion

Koaro are classified as being in decline, which places them in the 'at risk' category (Goodman *et al*, 2013). This species is relatively widespread in Taranaki, but not more than a few kilometres from the National Park, and is a significant contributor to the whitebait run.

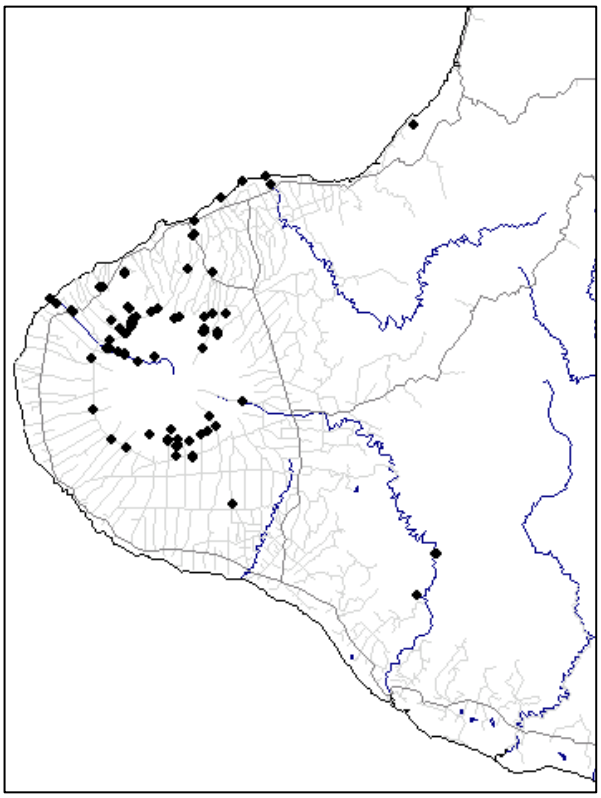

Figure 12: NZFFD records for koaro in Taranaki (108)

There is currently little activity in terms of stream modification in larger ring plain streams near the National Park (their preferred habitat). However, habitat loss as a result of stream modifications does represent a risk. Therefore, it is recommended that this species be identified and protected as a regionally distinctive species.

2.7 Lamprey (*Geotria australis*)

Lamprey have been sporadically recorded in Taranaki, with most records coming from the Waitara and Kapuni catchments. Lamprey are diadromous, and the adults enter rivers and streams in winter and spring and spawn six to fourteen months later. Their juvenile forms live in burrows in sandy/silty substrates along stream margins, before migrating to sea at four to five years of age (McDowell, 2000). This species is an important taonga species for iwi o Taranaki. An example of a stream that supports a healthy juvenile lamprey population is the Matau Stream, a tributary of the Waitara River (Figure 13).

Known range

There are relatively few records (40) for lamprey in Taranaki (Figure 14 overleaf). As a result, knowledge of its range is limited. The records for lamprey in Taranaki collected to date extend as far as 131 kilometres inland, and as high as 255m in altitude. However, 98% of records in Taranaki are from less than 200m altitude, and 75% are from less than 20km from the coast. It should be noted that these records may include a number of duplicates, which may skew results.

Figure 13: The Matau Stream

Likely range

It is unclear what impact maturation of the riparian planting programme may have on lamprey populations. It is apparent from early surveys that lamprey extended into the headwaters of the Patea Catchment (Figure 14), but due to the Patea Dam, these populations have since died out. The operator of the Patea Dam (Trustpower) is currently investigating ways to restore this population.

Lamprey have been recorded in small to medium sized streams in Taranaki, where the juveniles live in sediment, and feed on organic sediment that has settled on the stream bed.

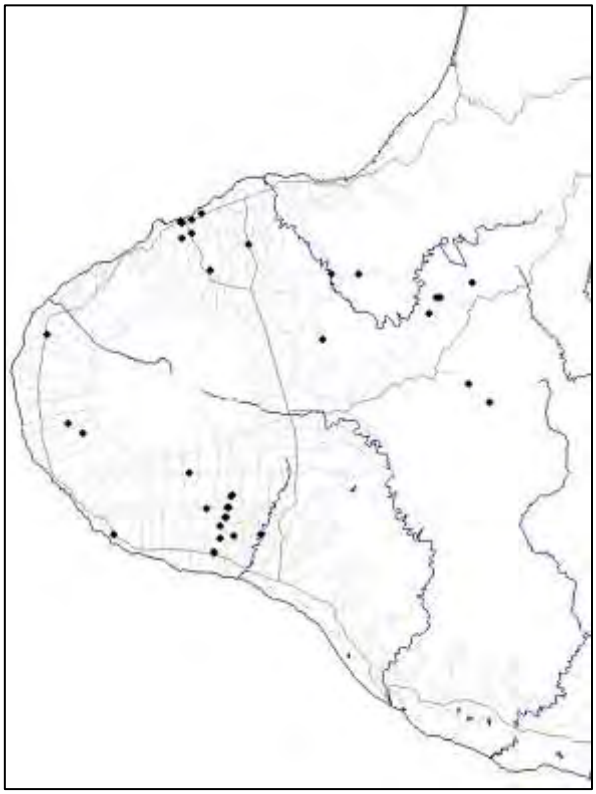

Figure 14: NZFFD records for lamprey in Taranaki (40)

Threats

The habitat that is preferred by lamprey is potentially threatened by stream modification activities such as stream piping or straightening, primarily through loss of physical habitat i.e. reduced stream length. Stock access can also impact on juvenile rearing habitat, by causing bank slumping.

The ecology of this species is still relatively unknown. In addition, there are few sites known to support lamprey, so any loss of this habitat could have a large impact on the Taranaki population.

Reason for inclusion

Apart from being a taonga species, lamprey are classified as being 'nationally vulnerable', which places them in the 'threatened' category (Goodman *et al*, 2013). It is clear that this species has declined significantly in Taranaki, as described in McDowell (2011). Given its national threat classification, lamprey is a regionally significant species and should be protected accordingly.

2.8 Longfin eel (*Anguilla dieffenbachii*)

Longfin eel are widespread throughout Taranaki, and are not significantly restricted in terms of altitude or distance inland. Longfin eel are diadromous, and are very long lived, possibly in excess of 100 years (Jellyman, 1995). They only spawn once, migrating out to sea in late summer to early winter.

Longfin eel are more abundant (per/m^2) in small streams compared with large rivers, and this was well illustrated during a fish salvage undertaken in relation to a realignment of a small stream (Figure 15). About 120m^2 of streambed was salvaged, with 32 longfin eel and 102 unidentified juveniles retrieved. Included in the community were a number of large (>500mm) longfin eels, which would have been more than twenty years old. Had no fish salvage been performed, it would have resulted in the loss of a community that had taken in excess of twenty years to develop, i.e. it could have taken at least twenty years for the community to recover.

It is also noted that longfin eel are an important taonga species for all Taranaki Iwi.

<u>Known range</u>

In Taranaki, longfin eel records (Figure 16 overleaf) extend as far as 140.6 kilometres inland, and as high as 550 metres in altitude. However, almost 75% of records in Taranaki are from less than 310m altitude, and less than 42.5km from the coast. It should be noted that these records may include a number of duplicates, which may skew results.

Figure 15: Unnamed tributary pre-realignment

Likely range

It is unlikely that the maturation of the riparian planting programme will see an expansion in the range of longfin eel. However, the reduced sediment input will reduce the filling of interstitial spaces (the gaps within the gravels), which is important habitat for juvenile eels. Therefore, the planting programme may lead to improved juvenile habitat within Taranaki's streams and rivers.

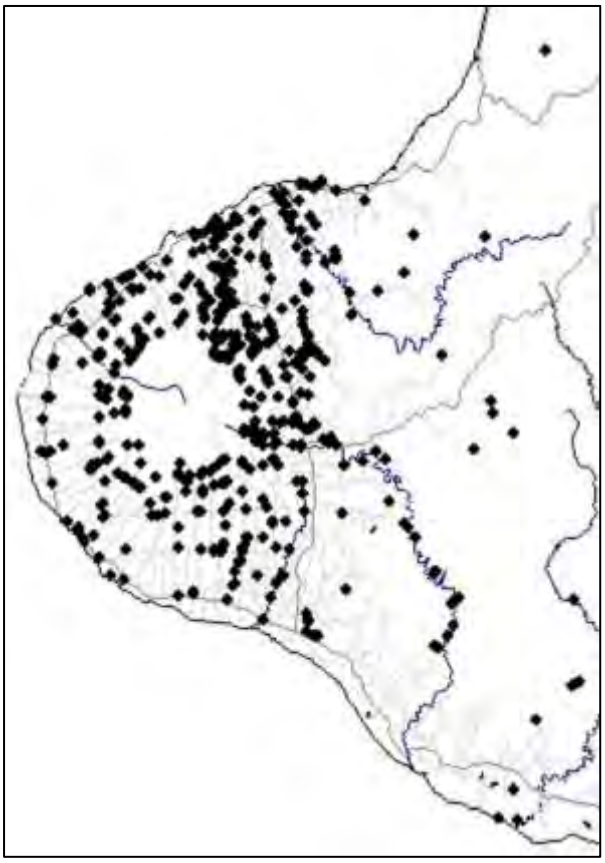

Figure 16: NZFFD records for longfin eel in Taranaki (8161)

Threats

The status of longfin eel has been well discussed in recent times. The Parliamentary Commissioner for the Environment released a report in 2013 concluding that this species was in trouble and concluded that habitat loss was contributing to this.

The report states, "*historical and current changes in land use continue to reduce eel habitat and put pressure on eel populations. For instance, eels love to live in bends in creeks under overhanging trees, so simply straightening out creeks to enable better drainage and clearing banks has an impact. But decisions on land use are very unlikely to be made with the protection of eels in mind*."

While there are other pressures on this species, such as commercial fishing, wetland drainage and land development have had a significant impact on the habitat of this species, and are also contributing to their on going decline.

Larger (>300mm) longfin eel prefer to inhabit deep pools and undercut banks. This habitat is usually present where a stream meanders, and it is the meanders that are removed when a stream is straightened. The new channel rarely has deep pools, and never has undercut banks. In addition, such works can release significant amounts of sediment, which can impact on adult and juvenile longfin eel habitat downstream. Not only does this result in the loss of habitat, but in cases where no fish salvage is undertaken pre-diversion, it may also result in the death of fish that could be decades old. The loss of these older representatives impacts on the ability of this species to reproduce.

Reason for inclusion

Longfin eel are classified as being in decline, which places them in the 'at risk' category (Goodman *et al*, 2013). In addition, they are considered a taonga species by all Iwi. A large-scale survey undertaken by the Taranaki Regional Council in 2012 found that the state of the population in the Waitara River catchment was worse than that recorded nationally (in terms of the proportion of juveniles in the population). This suggests that the Taranaki population is also experiencing a decline. Therefore, it is recommended that this species be identified and protected as a regionally distinctive species.

2.9 Shortjaw Kokopu (*Galaxias postvectis*)

Shortjaw kokopu have been predominantly found around the northern and eastern ring plain, with only a handful of records from the hill country. Shortjaw kokopu are diadromous, and their preferred habitats are small, stable, boulder streams, typically enclosed within dense forest (McDowell, 2000). An example of a stream that supports a healthy shortjaw kokopu population is the Mangamawhete Stream, a tributary of the Manganui River (Figure 17).

Known range

In Taranaki, shortjaw kokopu records (Figure 18 overleaf) extend as far as 166 kilometres inland, and as high as 670m altitude. However, over 75% of records in Taranaki are from higher than 200m altitude, with 29% at above 400m (near the National Park), and over 75% are from more than 15km from the coast. It should be noted that these records may include a number of duplicates, which may skew results.

Figure 17: The Mangamawhete Stream

Likely Range

It is anticipated that with the maturation of the riparian planting programme, the amount of suitable shortjaw kokopu habitat will increase. If this consequently results in an increased population, then it is conceivable that shortjaw kokopu could be removed from the 'regionally distinctive' category in the future. However, it is possible that the range of

shortjaw kokopu is unlikely to expand significantly, as the majority of suitable habitat is near the National Park. Whether this is due to water quality, or other factors such as altitude or upstream catchment vegetation is unclear.

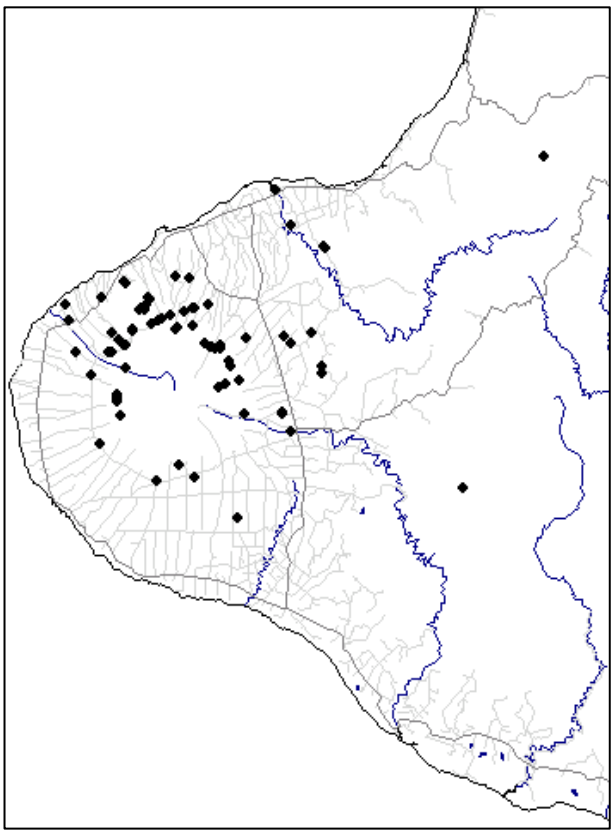

Figure 18: NZFFD records for shortjaw kokopu in Taranaki (95)

Threats

It is likely that the range of shortjaw kokopu has retracted significantly since pre-European times due to deforestation. Its known range in Taranaki is quite restricted and therefore any habitat modification could have significant effects on the population. The habitat that is preferred by shortjaw kokopu is not currently as vulnerable to stream modification activities as that utilised by giant and banded kokopu. This is because the majority of habitat is present in larger ring plain streams, near or in the National Park.

Reason for inclusion

Shortjaw kokopu are classified as being 'nationally vulnerable', which places them in the 'threatened' category (Goodman *et al*, 2013). This species is not widespread in Taranaki, and this, coupled with its threat classification, justifies its inclusion as a regionally distinctive species. There is currently little activity in terms of stream modification in larger ring plain streams near the National Park (their preferred habitat). However, habitat loss as a result of stream modifications does represent a risk.

3. Species considered, but not included

Eighteen native freshwater fish species are known to inhabit freshwater ecosystems in the Taranaki region for all or part of their life-cycle. Freshwater mollusc species are also present. Section 2 of this report has identified nine native fish and mollusc species to be regionally significant due to their status as nationally threatened or because they have otherwise been identified as 'regionally distinctive'.

For these regionally significant species, policies and rules are recommended in a revised Freshwater Plan to manage adverse effects on their distribution and/or abundance in Taranaki.

Three nationally 'in decline' species were not identified as regionally significant. These were the bluegill bully (*Gobiomorphus hubbsi*), redfin bully (*Gobiomorphus huttoni*) and torrentfish (*Cheimarrichthys fosteri*). These species were not identified as regionally significant for the following reasons:

- Habitat – the habitat for these species is largely not threatened in Taranaki. Although bluegill bully has rarely been recorded in Taranaki, it inhabits swiftest flowing broken rapids. They are most often found in larger braided gravelly rivers (McDowell, 2000), which are not a feature of Taranaki's streams. However, those habitats where it has been recorded in Taranaki, being riffles and rapids of streams on the ring plain, are currently not experiencing significant loss through land development (stream straightening and piping).
- Widespread and ubiquitous – redfin bully and torrentfish are commonly recorded in Taranaki. To protect the habitat of these species would be excessively restrictive on current activities, and current activities do not appear to have had a significant deleterious effect on their respective populations to date. However, in-stream activities do have a potential to impact on their communities, and therefore it is important that these species be still considered as part of any overall assessment of the impacts of instream activities e.g. water abstraction, installation of structures etc. In addition, their populations need to be considered when assessing water quality, as reduced water quality can impact the species' ability to utilise this habitat. A reduction in water quality could include organic enrichment, sedimentation and increased water temperatures.

Of note, managing adverse effects on native species not otherwise identified as regionally significant will still be achieved by general Plan provisions safeguarding the life supporting capacity and ecosystem health of freshwater.

Redfin bully

4. Threats to the abundance or distribution of species of interest

How the Taranaki Regional Council can manage the adverse effects of activities on the native fauna species of interest will vary according to the species.

For stream modification, the mitigation required may differ depending on what species are present. For example, if only longfin eel were present it is likely the effects of this activity could be adequately reduced by undertaking fish salvage. The modification of adult inanga habitat could potentially be offset through financial contributions promoting or enhancing inanga habitat or passage elsewhere, whereas the presence of juvenile lamprey may preclude the activity from occurring at all.

The one aspect that is common to all such activities is the need to know what is living in the reach to be modified, to enable an informed decision to be made.

Table 2 overleaf shows that habitat modification is likely the largest pressure on all species recommended for inclusion. It is unlikely that these species will be affected by water abstraction, as they either do not occur where large scale water abstraction is common, or utilise habitats that are less affected by water allocation. In addition, the draft proposed policies and rules relating to water abstraction and the retention on ecological flows should adequately protect these species. The same can be said about the rules and policies relating to activities that may influence water quality.

Therefore, it is unlikely that including these species as regionally distinctive species will change the way we currently manage water abstraction or the discharge of contaminants. It is likely to tighten up the management of stream and wetland modification activities, but this is reasonable, considering the species' decline is primarily due to the loss and modification of these habitats.

For inanga specifically, there is a need to protect their spawning habitat. This is because this habitat is very specific (bankside vegetation located upstream of the tidal salt wedge), and potentially at risk from river stabilisation works for example (e.g. gabion baskets at river/stream mouths).

Another significant contributor to the decline of Taranaki's native fish communities is the existence of poorly designed culverts, weirs and other instream structures. These structures can severely restrict the upstream passage of diadromous species, reducing the amount of habitat they can utilise. Fish passage must be restored at these structures, although this can be difficult to achieve, especially when a structure has no identifiable owner.

There are a number of pressures on native fisheries that are dynamic and interact with each other. For example, Table 2 also shows that predation (e.g. eels, trout, cormorants etc) is a pressure on native fisheries. Hence the Council's role to protect significant areas and habitats, while undertaking sustainable management of freshwater resources, is complex.

Note Table 2 is based primarily on Council officers' experience only, and lacks quantitative data as support. This table does not include historical pressures e.g. deforestation and considers direct impacts only (i.e. not the impact wetland drainage has on downstream flows).

In addition, there will be other factors that affect these species that have not been considered above. Some of these factors may have more of an influence in some localities than indicated in the Table below due to local pressures and circumstances (e.g. the scale of the activity). Finally, it should be noted that the threat of water abstraction was assessed based upon the new policies and rules in the draft *Freshwater and Land Management Plan for Taranaki*. These, of course, are still subject to the public Plan review process.

Table 2: Pressures that affect populations of threatened or regionally distinctive species in Taranaki

Species	Habitat modification						
	Stream modification	Wetland drainage	Loss of passage	Water abstraction	Water quality	Predation	Fishing
Banded kokopu	**1**	2	3	7	6	4	5
Giant kokopu	2	3	**1**	6	7	4	5
Shortjaw kokopu	**1**	7	2	6	4	3	5
Koaro	**1**	7	2	6	4	3	5
Inanga	2	3	**1**	6	7	4	5
Longfin eel	**1**	2	3	6	7	5	4
Lamprey	**1**	7	2	6	5	4	3
Brown mudfish	2	**1**	6=	5	4	3	6=
Freshwater mussel	**1**	2	5	4	3	7	6

1 = most important 7 =less important

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