Regional Threat Assessment – Freshwater Fishes

Horizons Regional Council

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horizons
REGIONAL COUNCIL

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Executive Summary

A regional threat classification was completed for freshwater fishes in the Horizons (Manawatū-Whanganui) Region. Population size and trend criteria were used to determine the regional conservation status of indigenous species; the assessment was informed by both monitoring data and expert knowledge. Exotic and non-resident species were also recognised and listed according to this methodology.

Thirty-eight species were identified as occurring (currently or historically) in the Horizons Region. Indigenous (native) species were assigned the following conservation statuses:

- nine Regionally Threatened (Critical=1, Endangered=3, Vulnerable=5);
- six Regionally At Risk (Declining=4, Naturally Uncommon=2);
- six Regionally Not Threatened;
- one Regionally Extinct;
- four Data Deficient; and
- one Non-resident Native (Regional Coloniser=1).

Eleven species were classified as Introduced and Naturalised, all of which are Regionally Persistent.

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1 Introduction

1.1 Regional Threat Classification

Threat classification assessments play an important role in the protection and management of New Zealand's indigenous flora and fauna. The Department of Conservation | Te Papa Atawhai (DOC) undertakes national threat assessments in which species are assigned a conservation status based on their risk of extinction. National threat assessments are completed as per the New Zealand Threat Classification System manual 2022 (NZTCS) (Rolfe et al., 2022). The NZTCS is a criteria-based system that uses population size and trend criteria to determine a species' conservation status. The results of the national assessments are used to inform the prioritisation of species protection, management, and monitoring at the national scale.

DOC is the lead central government agency with functions addressing the conservation of indigenous species. Additionally, the Resource Management Act 1991 (RMA) requires regional councils to maintain biodiversity at the regional scale. Furthermore, these statutory obligations require that significant habitats of indigenous flora and fauna are protected, including the habitats of threatened species. Carrying out regional threat assessments for the Horizons Region will identify regionally threatened species, enabling more effective prioritisation of species and habitat management by Horizons Regional Council (HRC), partners and other stakeholders. This will facilitate effective natural resource management so that indigenous biodiversity is maintained and significant habitats are preserved.

For this purpose, a regional threat assessment was completed for freshwater fishes in the Horizons Region.

1.2 Freshwater Fish

New Zealand's freshwater environments host a range of indigenous biodiversity. Freshwater fishes are an important aspect of this aquatic biodiversity and play a vital role in freshwater communities. However, many indigenous fish species have experienced considerable decline in recent times due to a range of largely anthropogenic pressures. As a result, 22 freshwater fish species in New Zealand are currently classified as Threatened and 17 as At Risk of extinction (Dunn et al., 2018).

A regional threat assessment was completed for freshwater fishes in the Horizons Region. An expert panel completed the assessment following the draft Regional Threat Classification System (RTCS) (Department of Conservation, 2014). The RTCS method is based on the national NZTCS approach and uses many of the same criteria. Population size and trend criteria are applied to regional populations to determine regional conservation status, which reflects the risk of a species being lost from the region (regional extirpation). The conservation statuses produced are designed in a hierarchical way, ranging from most to least threatened (Appendix B).

The RTCS methodology was in draft format at the time of this assessment. Upon its publication, any significant differences between the draft and published versions will be identified. If it is necessary, a review of this report and its findings will be undertaken.

In this regional threat assessment, four large aquatic invertebrate species have been included alongside the freshwater fish: kōura, freshwater shrimp, and two species of kākahi (freshwater mussel). These species were included in the assessment as they are commonly encountered by conventional fish monitoring techniques and have similar regional monitoring datasets to fish. Additionally, the threats driving the decline of these species are similar to those of freshwater fish, particularly for kākahi species whose glochidia (larval) phase relies on freshwater fish as hosts. Consequently, it was considered appropriate that these invertebrate species be included in this assessment. Throughout this report, all taxa assessed (fish and large invertebrates) will be referred to collectively as freshwater fish for simplicity.

2 Methodology

The assessed species were selected based on their known presence (current or historic) in the Horizons Region. All indigenous species were assigned a conservation status as per the RTCS flow chart (Appendix A). Species with large regional populations (>2000 mature individuals or >1000ha area occupancy) and a predicted stable or increasing population trend were classified as Regionally Not Threatened. However, species with national stronghold populations, where the regional population constitutes more than 20% of the total national population, as well as species that did not meet the other criteria for being Regionally Not Threatened, were assigned a conservation status by applying the national NZTCS criteria at the regional scale. Additionally, all exotic, non-resident and extinct species were identified and categorised accordingly.

An expert panel completed the assessment in a one-day workshop in May 2024. The panel comprised Nicholas Dunn (DOC), Cindy Baker (NIWA), Michael Patterson (WSP), Logan Brown (HRC), Laura Hickey (HRC) and Lorraine Cook (HRC). A combination of expert knowledge and monitoring data informed the assessment, enabling it to be completed despite the absence of definitive population size and trend data (as is typical for environmental monitoring datasets).

The taxonomic names and naming authorities used are consistent with those listed in Eschmeyer's Catalog of Fishes as of May 2024 (Fricke et al., 2024), and the NZTCS species list. All species assessed are taxonomically determinate, meaning they are generally accepted as distinct from other species. However, there is some uncertainty around whether the northern and southern variants of dwarf galaxias (*Galaxias divergens*) are two distinct species (taxonomically unresolved).

Qualifiers provide supplementary information about a species' conservation status. This information can relate to the assessment process, biological attributes, pressure management, population state, population trend, and regional considerations. Qualifiers were assigned according to the national and regional qualifier list (Appendix C). They are typically expressed as acronyms; refer to Appendix C for full qualifier definitions.

The regional monitoring dataset was used to help the experts determine the approximate size of regional fish populations. The dataset includes data collected using various monitoring techniques (electrofishing, spotlighting, trapping and eDNA) by HRC and external parties. The data was sourced from several locations:

- the New Zealand Freshwater Fish Database (NZFFD), administered by the National Institute of Water and Atmospheric Research (NIWA);
- the Discover DNA portal administered by Wilderlab;
- iNaturalist New Zealand/Mātaki Taiao, administered by the New Zealand Bio-Recording Network Trust (filtered to be research-grade and unobscured); and
- internal HRC databases.

Data from the various sources were combined to form a regional fish monitoring dataset, which was used to produce species distribution maps in ArcMap. Modelled species presence (Crow et al., 2014) was displayed on the distribution maps, alongside the monitoring data. The distribution maps were used to assist in the approximation of regional population size, area occupancy and number of subpopulations.

While the monitoring dataset provided valuable insight into regional population size, it did not provide information on population trends (declining, stable, or increasing) due to very few sites being monitored regularly over time. Consideration was given to the national population trends (White et al., 2022), the extent and severity of pressures on regional populations, and field sampling observations to determine regional trends.

Using best professional judgement from the expert panel to supplement the available data was beneficial, as it overcame the information gaps in the monitoring dataset and enabled more robust

conclusions to be drawn. However, due to the nature of quantifying populations, some uncertainty remained. Throughout the assessment process, when certainty on population size or trend was low, a conservative approach was taken; this was applied consistently across all species.

3 Results

Thirty-eight freshwater fish species were identified as occurring (currently or historically) in the Horizons Region and are included in this threat classification (Figure 1). Indigenous species were assigned the following conservation statuses (Table 1):

- nine Regionally Threatened (Critical=1, Endangered=3, Vulnerable=5);
- six Regionally At Risk (Declining=4, Naturally Uncommon=2);
- six Regionally Not Threatened;
- one Regionally Extinct;
- four Data Deficient; and
- one Non-resident Native (Regional Coloniser=1).

Eleven species were classified as Introduced and Naturalised, all of which are Regionally Persistent (Table 2).

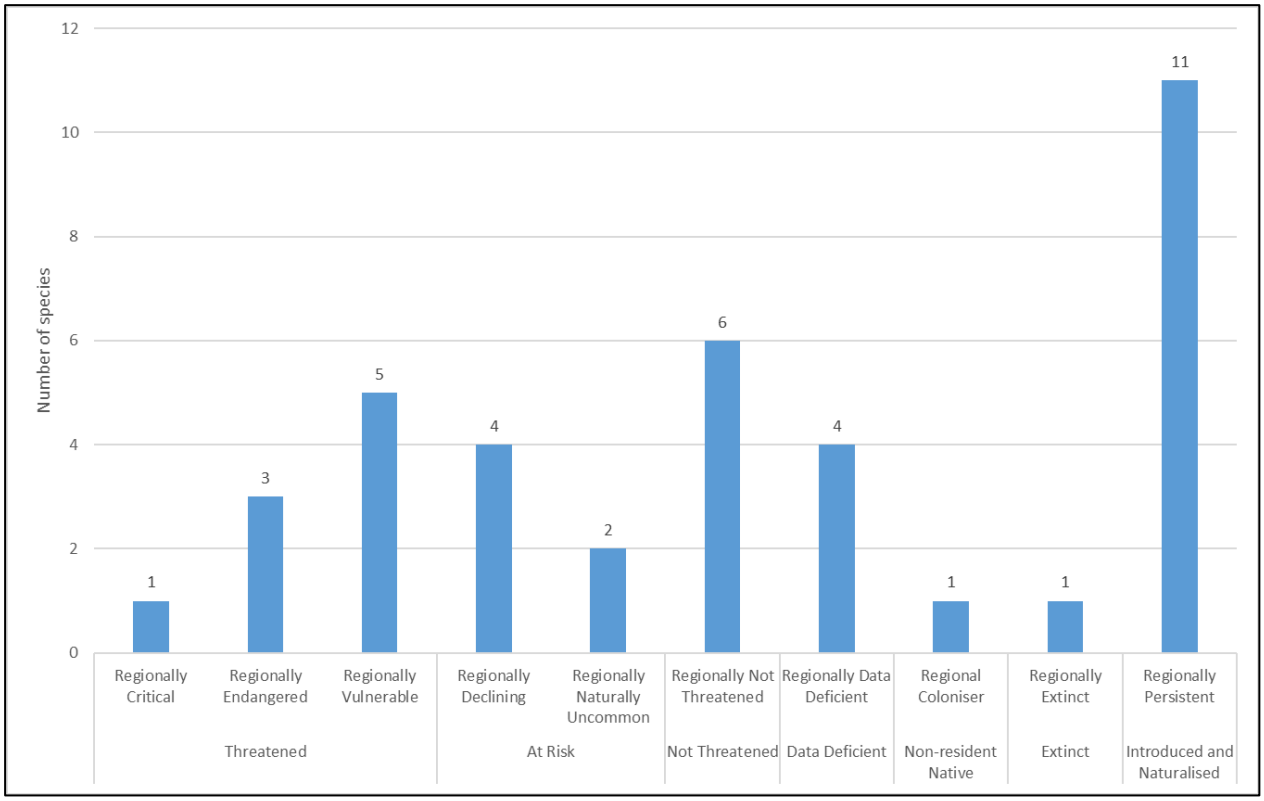

Figure 1. Regional conservation status of freshwater fishes in the Horizons Region.

3.1 Species Exclusion

The bluegill bully (*Gobiomorphus hubbsi*) was excluded from this assessment despite being recorded in the region. This species has been recorded in the Whanganui and Ōhau River catchments from five electrofishing monitoring sites (NZFFD), between 1989 and 1993.

Subsequent targeted fish surveys carried out by HRC, including at the previously identified sites, have failed to locate bluegill bully in the region. Additionally, it has not been detected through eDNA sampling, despite this having been undertaken extensively throughout the region. Based on data collected over the past 30 years and expert knowledge, the panel determined that this species is unlikely to be truly present in the region. Instead, the existing records are likely

misidentifications of other bully species. Consequently, bluegill bully was excluded from the threat assessment.

3.2 Regional Conservation Status – Indigenous Species

Table 1 – Regional conservation status of indigenous freshwater fishes in the Horizons Region.

Common Name	Māori Name	Name and Authority	Regional Conservation Status	National Conservation Status[1]	Regional Criteria	Regional Population Size	National Stronghold	Regional Population Trend	Regional Qualifiers[2]
Extinct									
Regionally Extirpated									
Grayling	Upokoro-koro	*Prototroctes oxyrhynchus* Günther, 1870	Extinct	Extinct					
Regionally Threatened									
Regionally Critical									
Giant kōkopu	Kōkopu	*Galaxias argenteus* (Gmelin, 1789)	Threatened – Regionally Critical	At Risk – Declining	A(1)	<250 mature individuals	No	-	CD, CI, DPS, Sp
Regionally Endangered									
Shortjaw kōkopu	Kōkopu	*Galaxias postvectis* Clarke, 1899	Threatened – Regionally Endangered	Threatened – Nationally Vulnerable	A(2/1)	<5 subpopulations; <300 mature individuals	No	Decreasing 10-50%	CD, CI, DPS, DPT, Sp
Pouched lamprey	Piharau	*Geotria australis* Gray, 1851	Threatened – Regionally Endangered	Threatened – Nationally Vulnerable	A(3/1)	Area occupancy ≤10 ha (spawning adults)	No	Decreasing 10-50%	CD, CI, CR, DPS, DPT, S?O (Chile), Sp, TO (Aus)
Giant bully		*Gobiomorphus gobioides* (Valenciennes, 1837)	Threatened – Regionally Endangered	At Risk – Naturally Uncommon	A(1/1)	250-1000 mature individuals	No	Decreasing 10-50%	DPR, DPS, DPT, Sp

[1] (Dunn et al., 2018; Grainger et al., 2018).

[2] As listed in Appendix C.

Regionally Vulnerable									
Torrentfish		*Cheimarrichthys fosteri* Haast, 1874	Threatened – Regionally Vulnerable	At Risk - Declining	C(1/1)	1000-5000 mature individuals	No	Decreasing 10-50%	CR, DPS, DPT
Kōaro	Kōaro	*Galaxias brevipinnis* Günther, 1866	Threatened – Regionally Vulnerable	At Risk – Declining	C(1/1)	1000-5000 mature individuals	No	Decreasing 10-50%	CD, CI, DPS, DPT, Sp, TO
Dwarf galaxias (northern)		*Galaxias* aff. *divergens* "northern"	Threatened – Regionally Vulnerable	At Risk - Declining	C(3/1)	≤100 ha area occupancy	No	Decreasing 10-50%	CD, CI, DPS, DPT, PF, Sp
Banded kōkopu	Kōkopu	*Galaxias fasciatus* Gray, 1842	Threatened – Regionally Vulnerable	Not Threatened	B(1/1)	1000-5000 mature individuals	No	Stable ±10%	CI, DPS, DPT
Brown mudfish		*Neochanna apoda* Günther, 1867	Threatened – Regionally Vulnerable	At Risk - Declining	C(2/1)	<15 subpopulations; <500 mature individuals	No	Decreasing 10-50%	CD, CI, DPS, DPT, PF, RR, Sp
Regionally At Risk									
Regionally Declining									
Longfin eel	Tuna	*Anguilla dieffenbachii* Gray, 1842	At Risk – Regionally Declining	At Risk - Declining	B(1/1)	20,000-100,000 mature individuals	No	Decreasing 10-50%	CD, CI, DPS, DPT
Īnanga	Īnanga	*Galaxias maculatus* (Jenyns, 1842)	At Risk – Regionally Declining	At Risk - Declining	B(1/1)	20,000-100,000 mature individuals	No	Decreasing 10-50%	CD, CI, DPS, DPT, S?O
Common smelt	Pōrohe	*Retropinna retropinna* (Richardson, 1848)	At Risk – Regionally Declining	Not Threatened	A(1/1)	5000-20,000 mature individuals	No	Decreasing 10-30%	CI, CR, DPS, DPT
Kākahi, freshwater mussel	Kākahi, Kāeo	*Echyridella menziesii* (Gray, 1843)	At Risk – Regionally Declining	At Risk - Declining	B(1/1)	20,000-100,000 mature individuals	No	Decreasing 10-50%	CI, CR, DPR, DPS, DPT, RF

Naturally Uncommon									
Kaharore bully		*Gobiomorphus mataraerore* Thacker, Geiger & Shelley, 2023	At Risk – Naturally Uncommon	Not Threatened[3]	A	Naturally small, scattered populations	Yes	Stable ±10%; increasing >10%	DPR, DPT, NStr
Dinah's bully		*Gobiomorphus dinae* Thacker, Geiger & Shelley, 2023	At Risk – Naturally Uncommon	N/A[4]	A	Naturally small, scattered populations	Yes	Stable ±10%; increasing >10%	DPR, DPT, NStr
Regionally Not Threatened									
Regionally Not Threatened									
Shortfin eel	Tuna	*Anguilla australis* Richardson, 1841	Regionally Not Threatened	Not Threatened		>2000 mature individuals; >1000 ha area occupancy	No	Stable ±10%	CI
Common bully	Toitoi	*Gobiomorphus cotidianus* McDowall, 1975	Regionally Not Threatened	Not Threatened		>2000 mature individuals; >1000 ha area occupancy	No	Stable ±10%	
Redfin bully		*Gobiomorphus huttoni* (Ogilby, 1894)	Regionally Not Threatened	Not Threatened		>2000 mature individuals; >1000 ha area occupancy	No	Stable ±10%	-
Black flounder	Pātiki mohoao	*Rhombosolea retiaria* Hutton, 1874	Regionally Not Threatened	Not Threatened		>2000 mature individuals; >1000 ha area occupancy	No	Stable ±10%	DPS, DPT
Kōura, freshwater crayfish	Kōura	*Paranephrops planifrons* White, 1842	Regionally Not Threatened	Not Threatened		>2000 mature individuals; >1000 ha area occupancy	No	Stable ±10%	CI, DPT
Freshwater shrimp		*Paratya curvirostris* (Heller, 1862)	Regionally Not Threatened	Not Threatened		>2000 mature individuals; >1000 ha area occupancy	No	Stable ±10%	DPS, DPT

[3] Kaharore bully had not been taxonomically recognised at the time of the most recent national threat assessment. However, the northern sub-population of upland bully (North Island, West Coast of the South Island), which has since been recognised as being Kaharore bully, was classified as Nationally Not Threatened.

[4] Dinah's bully had not been taxonomically recognised at the time of the most recent national threat assessment.

Data Deficient									
Regionally Data Deficient									
Yellow-eye mullet	Aua	*Aldrichetta forsteri* (Valenciennes, 1836)	Data Deficient	Not Threatened					DPS, DPT
Estuarine triplefin		*Forsterygion nigripenne* (Valenciennes, 1836)	Data Deficient	Not Threatened					DPS, DPT
Grey mullet	Kanae	*Mugil cephalus* Linnaeus, 1758	Data Deficient	Not Threatened					DPS, DPT
Kākahi, Freshwater mussel	Kākahi, Kāeo	*Echyridella aucklandica* (Gray, 1843)	Data Deficient	Threatened – Nationally Vulnerable					CI, CR, DPR, DPS, DPT, RF
Non-resident Native									
Regional Coloniser									
Speckled longfin eel		*Anguilla reinhardtii* (Steindachner, 1867)	Coloniser	Regional Coloniser					

3.3 Regional Conservation Status - Exotic Species

Table 2 – Regional status of introduced and naturalised species in the Horizons Region.

Common Name	Name and Authority	National Conservation Status	Regional Conservation Status	Legal Status[5]
Brown trout	*Salmo trutta* Linnaeus, 1758	Introduced and Naturalised	Introduced and Naturalised – Regionally Persistent	Sports fish
Rainbow trout	*Oncorhynchus mykiss* Walbaum, 1792	Introduced and Naturalised	Introduced and Naturalised – Regionally Persistent	Sports fish
Tench	*Tinca tinca* (Linnaeus, 1758)	Introduced and Naturalised	Introduced and Naturalised – Regionally Persistent	Sports fish
Brook char	*Salvelinus fontinalis* (Mitchill, 1814)	Introduced and Naturalised	Introduced and Naturalised – Regionally Persistent	Sports fish
Chinook salmon	*Oncorhynchus tshawytscha* (Walbaum, 1792)	Introduced and Naturalised	Introduced and Naturalised – Regionally Persistent	Sports fish
Perch	*Perca fluviatilis* (Linnaeus, 1758)	Introduced and Naturalised	Introduced and Naturalised – Regionally Persistent	Sports fish
Rudd	*Scardinius erythrophthalmus* (Linnaeus, 1758)	Introduced and Naturalised	Introduced and Naturalised – Regionally Persistent	Noxious fish (in the Horizons Region)
Koi/Amur carp, European carp	*Cyprinus rubrofuscus* Lacepède, 1803[6]	Introduced and Naturalised	Introduced and Naturalised – Regionally Persistent	Noxious fish and unwanted organism
Gambusia	*Gambusia affinis* (Baird and Girard, 1854)	Introduced and Naturalised	Introduced and Naturalised – Regionally Persistent	Unwanted organism

[5] According to the Biosecurity Act 1993 and the Freshwater Fisheries Regulations 1983.

[6] Genetic analysis found no evidence that the European lineage of koi carp (*Cyprinus carpio*) is present in New Zealand; the Asian lineage (*Cyprinus rubrofuscus*) may be a more accurate taxonomic classification (Smith & McVeagh, 2005).

Brown bullhead catfish	*Ameiurus nebulosus* (Lesueur, 1819)	Introduced and Naturalised	Introduced and Naturalised – Regionally Persistent	N/A
Goldfish	*Carassius auratus* (Linnaeus, 1758)	Introduced and Naturalised	Introduced and Naturalised – Regionally Persistent	N/A

4 Discussion

Of the indigenous freshwater fish species in the Horizons Region, 60% are classified as Regionally Threatened or At Risk. Nine species are Regionally Threatened, prone to being lost from the region (regional extirpation). Of these, four species are in the two most threatened categories: Regionally Critical and Regionally Endangered. These species are the giant kōkopu, shortjaw kōkopu, pouched lamprey and giant bully. The giant kōkopu is the most threatened species, with the regional population thought to contain less than 250 mature individuals. The future protection and management of these threatened species and their critical habitats will be imperative to ensure extirpation does not occur.

All nine Regionally Threatened species have a more threatened regional conservation status than their national status. This finding highlights the importance of completing a regional threat assessment, to identify species that are more threatened regionally than nationally and to enable targeted conservation management for these species to preserve regional biodiversity.

Two species were identified as having national stronghold populations in the Horizons Region: Kaharore bully and Dinah's bully. Both species exhibit a limited national distribution in the mid to lower North Island (and the top of the South Island for Kaharore bully). The Horizons Region accounts for much of this distributional area and, based on the population estimates, holds a significant proportion of the national populations of these species. Consequently, if the regional populations were to decline or be lost, there would be a serious adverse effect on the total (national) populations.

Four species could not be assigned a conservation status due to insufficient data and knowledge of population size and trends. Three of these species are marine wanderers: grey mullet, yellow-eye mullet and estuarine triplefin. Limited sampling has been carried out in estuarine and tidally influenced freshwater environments in the Horizons Region, resulting in a lack of records for these species. The fourth Data Deficient species is the less common of the kākahi species, *Echyridella aucklandica,* which is thought to be restricted to the far north of the region. Difficulty distinguishing this species from the more common *E. menziesii* has resulted in limited monitoring records and a poor understanding of its occurrence in the region. The Data Deficient status aims to stimulate targeted monitoring of these species to enable regional conservation status assignments in the future.

The majority of species were assigned a data poor qualifier, indicating that confidence in the allocated conservation status is low due to knowledge gaps relating to:

- population size (data poor size: DPS);
- population trend (data poor trend: DPT); or
- species recognition[7] (data poor recognition: DPR).

More than 80% of the species assessed were assigned one or more data poor qualifiers. This outcome highlights the need for more comprehensive and long-term fish monitoring in the Horizons Region.

Five species were assigned the conservation research needed qualifier (CR): pouched lamprey, torrentfish, common smelt, and two kākahi species (*E. aucklandica* and *E. menziesii*). This qualifier indicates that the regional drivers of decline for these species are not well understood.

[7] The species recognition qualifier (DPR) was applied considering only adult fish. This is consistent with the classification criteria, which are based on the number of mature individuals. However, it is recognised that several species with distinct adult forms are difficult to identify in their juvenile phase.

Investigation into the causes of decline and conservation management solutions is needed to facilitate their regional recovery.

4.1 Causes of Decline

Many freshwater fish species in the Horizons Region have experienced and continue to experience population decline. Human activities, including intensive land use (urban, rural and industrial), channel disturbance and modification, point source discharges and natural resource use, have resulted in a range of anthropogenic pressures on fish populations. These populations are often threatened by multiple pressures simultaneously, leading to cumulative adverse effects and the decline or loss of local populations.

The drivers of decline vary for each species, and many populations suffer from site-specific and species-specific threats. In saying this, a suite of 'general' pressures exist that impact many species. These 'general' pressures tend to be widespread across the region, impacting large areas of habitat. They are largely accredited as the drivers of the historic and ongoing decline of Regionally Threatened and At Risk fish species in the Horizons Region.

Table 3 below provides a broad overview of the general pressures on fish in the Horizons Region and identifies the primary drivers of decline for each Regionally Threatened species. A caveat of this synopsis is that the drivers of fish decline and the significance of each pressure are not fully understood. However, addressing these primary drivers of decline will be vital for restoring the populations and habitats of threatened species.

While this list offers a useful overview of threats in the region, it is not a complete list, and other pressures may exist. Additionally, where a threat is not identified as a primary driver of decline for a species, this does not mean that there is no negative effect. Instead, this indicates that the species is less vulnerable to the threat compared to other species and, that other drivers of decline have had a more considerable impact on the population.

Table 3. An overview of the 'general' pressures on regional fish populations and identification of the primary causes of decline of Regionally Threatened freshwater fish species in the Horizons Region (✓).

		R-Critical	Regionally Endangered			Regionally Vulnerable				
Cause of decline	**Impacts (brief overview)**	Giant kōkopu	Shortjaw kōkopu	Pouched lamprey	Giant bully	Torrent-fish	Kōaro	Dwarf galaxias	Banded kōkopu	Brown mudfish
Water quality degradation	Degrades habitat; chronic and acute toxicity effects; reduces macroinvertebrate food source; and dissolved nutrients drive nuisance periphyton and macrophyte growth, resulting in habitat alteration and dissolved oxygen fluctuations. Turbidity (suspended sediment) impacts visual feeders; blocks receptors of non-visual senses (lateral line and olfaction); and clogs the gills of macroinvertebrates and fish.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Loss of riparian vegetation	Reduces shade and associated regulation of high water temperatures in summer; reduces organic input (food source and instream cover); reduces attraction of terrestrial invertebrates (food source); and limits suitable galaxias spawning habitat (margin/bankside spawners).	✓	✓	✓			✓		✓	✓
Deposited fine sediment	Alters bed substrate composition; fills in interstitial spaces, impacting benthic cover and spawning habitat; alters macroinvertebrate communities; and reduces instream cover for small benthic fish species.	✓	✓			✓	✓	✓	✓	
Channelisation	Reduces flow type variation; loss of flood plain connectivity which provides access to feeding and spawning opportunities; may alter substrate composition over time; and overall loss of habitat heterogeneity.	✓	✓	✓	✓	✓	✓	✓	✓	
Fish passage	Limits inter-population movements and gene flow; limits recolonisation of habitats; and disrupts the migration of diadromous species, limiting fish (and kākahi) access to upstream habitats.	✓	✓	✓	✓	✓	✓		✓	
Water abstraction	Reduces habitat area; reduces flow type diversity; and can increase water temperatures. Greatest effect occurs during summer low flows. High velocity flow types, shallow riffles, backwaters and marginal habitats are the most vulnerable.			✓		✓	✓	✓		
Exotic fish	Predation on larvae and juveniles, reducing population recruitment; and competition with adults for food source and habitat.	✓	✓	✓			✓	✓	✓	✓
Drain clearance	Significant habitat disturbance; loss of critical habitat features including instream cover, spawning habitat and habitat heterogeneity; water chemistry modification; and mortality via stranding or injury.	✓		✓	✓				✓	✓

Wetland loss	Reduced habitat availability; degradation of remnant habitats; and reduced connectivity between wetlands and lotic systems.	✓							✓	✓
Loss of instream cover	Loss of critical habitat features such as large woody debris, undercut banks and aquatic macrophytes, impacting species for which these are a critical habitat requirement. Loss of instream cover displaces fish and increases vulnerability of individuals to predation or disturbance (e.g. floods).	✓	✓	✓	✓		✓	✓	✓	✓
Spawning disturbance	Physical disturbance during the spawning period reduces spawning success and population recruitment; and disturbance or degradation reduces availability and suitability of spawning habitat (year-round risk).	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gravel extraction / over extraction	Habitat disturbance; death and displacement of macroinvertebrates and fish; release of fine sediment resulting in water quality degradation and excess deposited fine sediment; loss of gravel barforms and their function, altering channel morphology; reduction in channel meander; and homogenisation of flow and substrate, leading to reduced habitat diversity.			✓		✓	✓	✓		

4.2 Next steps

Freshwater protection, management and enhancement initiatives have increased in the Horizons Region over the last 10 years as the plight of the region's freshwater habitats has become more widely recognised. Initiatives implemented by HRC, alongside landowners, include:

- water quality targets set in the regional One Plan;
- protection of critical habitats based on the presence of significant fish species (Sites of Significance – Aquatic);
- identification and remediation of fish passage barriers;
- funding provided for riparian fencing and planting;
- sediment management through the Sustainable Land Use Initiative (SLUI); and
- management of key wetlands through the Priority Habitats Programme.

Mana whenua, communities, landowners, catchment care groups, DOC and other agencies are also undertaking valuable work to improve environmental outcomes for the region's freshwater.

These efforts to date have benefited waterways around the region, improving ecosystem health and enhancing habitat quality for the region's freshwater fish species. However, nine fish species are identified as Regionally Threatened, highlighting that further actions are needed to allow these species to recover and thrive in the region.

The results of this regional threat classification will enable regional partners and stakeholders, including Horizons Regional Council, to more effectively prioritise species protection, habitat enhancement and population monitoring. Addressing the primary drivers of decline will be key to the conservation of Regionally Threatened species. This work will require significant time and resources and will be most effective when actions are implemented at a wide scale. Collaboration between stakeholders will be imperative to achieve this.

It is recommended that the success of future management actions is monitored and documented in future regional threat assessments. This assessment should be updated every five years, to be consistent with the approximate interval for the national threat assessments.

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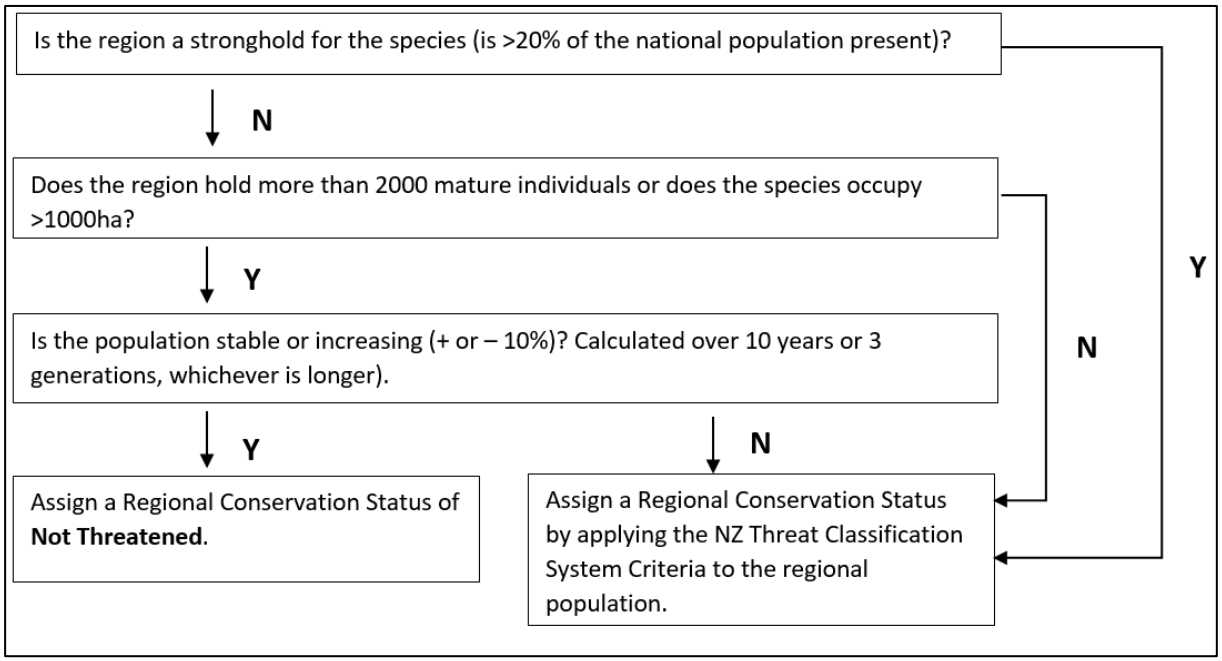
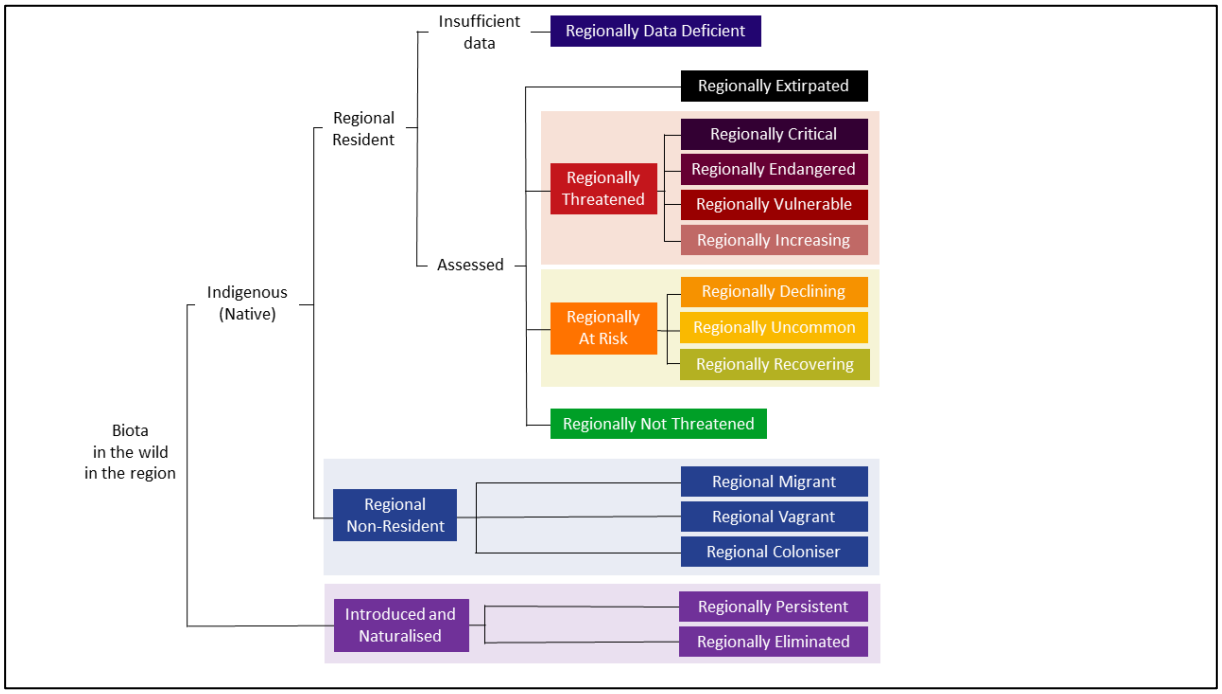
Appendix A: RTCS methodology flowchart



Appendix B: Regional Threat Classification System



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Appendix C: Qualifier List

Qualifier List and brief definitions		
NZTCS national qualifiers (to be applied to the regional assessment)		
Assessment Process Qualifiers		
DPR	Data Poor Recognition	Confidence in the assessment is low because of difficulties in determining the identity of the taxon in the field and/or laboratory
DPS	Data Poor Size	Confidence in the assessment is low because of a lack of data on population size
DPT	Data Poor Trend	Confidence in the assessment is low because of a lack of data on population trend
De	Designated	A taxon that does not fit within the criteria provided, and which the expert panel has designated the most appropriate listing without full application of the criteria
Biological Attribute Qualifiers		
Sp	Biologically Sparse	A taxon naturally consists of small and widely scattered sub-populations
IE	Island Endemic	A taxon whose natural distribution is restricted to one island archipelago
NS	Natural State	A taxon with a stable or increasing population that is presumed to be in a natural condition (i.e., it has not experienced a historical human-induced decline).
RR	Range Restricted	A taxon that is naturally confined to a specific substrate or habitat or a geographic area of less than 100 000 ha (1000 km^2)
Pressure Management Qualifiers		
CD	Conservation Dependent	A taxon that is likely to move to a worse conservation status over the longer of the next 10 years or three generations (maximum 100 years) if current management ceases
CI	Climate Impact	A taxon that is adversely affected by long-term climate trends and/or extreme climatic events
CR	Conservation Research Needed	The causes of population decline and/or solutions for its recovery are poorly understood and research is required
PF	Population Fragmentation	The gene flow between sub-populations is hampered as a direct or indirect result of human activity.
RF	Recruitment Failure	The age structure of the current population is such that a catastrophic decline is likely in the future
Population Trend Qualifiers		
EW	Extinct in the Wild	A taxon that is known only in captivity or cultivation or has been reintroduced to the wild but is not self-sustaining
EF	Extreme Fluctuations	A taxon that has an increased threat of extinction due to extreme unnatural population fluctuations or natural fluctuations overlaying human-induced declines

Inc	Increasing	A taxon has an ongoing or predicted population increase of > 10% taken over the longer of the next 10 years or three generations (maximum 100 years)
PD	Partial Decline	A taxon that is declining over most of its range but has one or more secure populations
PE	Possibly Extinct	A taxon that has not been observed for more than 50 years but for which there is insufficient evidence to support declaring it extinct
Population State Qualifiers		
NO	Naturalised Overseas	A taxon that is endemic to New Zealand but has been introduced (deliberately or accidentally) by human agency to another country and has naturalised there
OL	One Location	A taxon is found at one location (geographically or ecologically distinct area) in New Zealand that is less than 100,000 ha (1000 km^2)
Rel	Relict	A taxon whose population has declined since human arrival to less than 10% of its former range but has stabilised
SO	Secure Overseas	A taxon that is secure in the parts of its natural range outside New Zealand
SO?	Secure Overseas?	It is uncertain whether a taxon of the same name that is secure in the parts of its natural range outside New Zealand is conspecific with the New Zealand taxon
S?O	Secure? Overseas	It is uncertain whether the taxon is secure in the parts of its natural range outside New Zealand
TO	Threatened Overseas	A taxon is threatened in the parts of its natural range outside New Zealand
TO?	Threatened Overseas?	It is uncertain whether a taxon of the same name that is threatened in the parts of its natural range outside New Zealand is conspecific with the New Zealand taxon
T?O	Threatened? Overseas	It is uncertain whether the taxon is threatened in the parts of its natural range outside New Zealand
Regional qualifiers (specific to regional context only)		
FR	Former resident	Breeding population (existed for more than 50 years) extirpated from region but continues to arrive as a regional vagrant or migrant. FR and RN are mutually exclusive.
RN	Restored native	Reintroduced to the region after having previously gone extinct there.
IN	Introduced native	Introduced to the region, though not known to have previously occurred in it
TL	Type locality	The type locality of the taxon is within the region. (Ignore if the taxon is or has ever been regionally extinct)
NR	Natural range limit	The known range of the taxon meets it natural limit in the region
HR	Historical range limit	The inferred range of the taxon in pre-human times meets its natural limit in the region
NStr	National stronghold	More than 20% of the national population (breeding or resident for more than half their life cycle) is present in the region

RE	Regional Endemic	Known to breed only in the region

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