

Nationally threatened and regionally uncommon species of the Waikato Region



Prepared by:
Elizabeth Overdyck

For:
Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
HAMILTON 3240

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Peer reviewed by:

Lara Reynolds, Department of Conservation

Date

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Approved for release by:

Mike Scarsbrook

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Cover: Coromandel or northern striped gecko (*Toropuku* "Coromandel"), endemic to the Waikato region, conservation status Nationally Vulnerable and taxonomically indeterminate. *Photo: Sara Smerdon, Mahakirau Forest Estate Society Incorporated.*

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Abstract

Waikato Regional Council has a role through the Regional Policy Statement to protect threatened indigenous habitats and species, safeguard remnant populations of indigenous species, and recreate ecological links for threatened species habitat. To better meet these obligations for biodiversity protection on private and public land, the council began an inventory for all nationally threatened and regionally uncommon species occurring within the Waikato region.

A database was created using the New Zealand Threat Classification System with data for selected taxonomic groups derived primarily from council Significant Natural Area datasets and Department of Conservation internal data sources. Attributes of the database include: conservation status; species translocations; regional endemism; data sensitivity; habitat; ecosystem classification; international conservation status; and occurrence in territorial authorities.

Currently, 305 threatened, at risk and data deficient species are recorded as occurring in the region including: vascular plants (196); birds (50); herpetofauna (20); invertebrates (23); freshwater fish (10); marine mammals (4); and terrestrial mammals (2). Additionally, 60 species are recognised as recently lost from the region while 109 species are recorded as regionally uncommon. The Waikato has at least 16 regionally endemic species, including 11 invertebrates, three plants, one frog and one lizard, and is a stronghold for breeding populations of several other threatened species.

The database requires regular updating to maintain accurate conservation status and spatial information, and allow addition of further taxonomic groups. Ultimately, this will enable the council and territorial authorities to more effectively monitor, protect and restore habitat for threatened species in a collaborative manner with other landowners/mangers.

Executive summary

Waikato Regional Council (the council) has a role through the Regional Policy Statement (RPS) to protect threatened indigenous habitats and species, safeguard remnant populations of indigenous species, and recreate ecological links for threatened species habitat. In 2015 the council began a stock take for all threatened species recorded as occurring within the Waikato region in order to better meet its obligations for biodiversity protection on private and public land.

Using data accessible to the council a nationally threatened and regionally uncommon species database was created for the region based on the New Zealand Threat Classification System (NZTCS) (Townsend *et al.* 2008) and the most recent classification lists for selected species groups. Data were derived primarily from the council Significant Natural Area (SNA) datasets and Department of Conservation (DOC) internal data sources. This report provides a current snapshot of the threatened and uncommon species dataset and elaborates on all attributes of the database including: NZTCS status, regionally lost species; regionally uncommon species; species translocations; Waikato endemics; data sensitivity; habitat; ecosystem classification; international conservation status and occurrence in territorial authorities and predator free 2050 zones.

Results from analysis of the dataset are presented and discussed, with 305 native threatened species currently known to occur in the region (including NZTCS statuses Threatened, At Risk and Data Deficient). The majority are vascular plant species (196) followed by birds (50), herpetofauna (20), invertebrates (23), freshwater fish (10), marine mammals (4) and terrestrial mammals (2). Sixty species have been recognised as recently lost from the region (52 vascular plant and 8 animal species) while a total of 109 species are recorded as regionally uncommon (90 vascular plant and 19 animal species). The Waikato has at least 16 known endemic species (naturally occurring only in the Waikato region) including eleven invertebrates, three plant species, one frog and one lizard. It is also a stronghold for populations of several other threatened species including Australasian bittern/matuku (*Botaurus poiciloptilus*), Pycroft's petrel (*Pterodroma pycrofti*), North Island kōkako (*Callaeas wilsoni*), Māui dolphin (*Cephalorhynchus hectori maui*) and several plant species.

The database will require regular updating to maintain accuracy of information and to keep up with changes in species conservation status. Ultimately this database will enable Waikato Regional Council and territorial authorities to more effectively monitor, protect and restore habitat for threatened species in a collaborative manner with DOC on public conservation land, private landowners including Iwi, and other agencies or groups.

Recommendations for future management of the database include:

- A full update and analysis of the Waikato threatened and uncommon species dataset should be undertaken every 3 years to incorporate all new publications and information available in national or international databases.
- Where possible the dataset can be updated on an ad hoc basis as new information and publications become available.
- Further taxon groups which are not currently included should be added as more comprehensive information (including regional occurrence/ presence data and conservation status) becomes available, e.g. non-vascular plants: hornworts and liverworts (de Lange *et al.* 2015) and mosses (Rolfe *et al.* 2016), fungi and lichenised fungi (de Lange *et al.* 2018a), marine fish, marine invertebrates (Freeman *et al.* 2014) and marine plants.

- Ecosystem classification for threatened species habitat in the database could be expanded from indigenous ecosystems to include highly anthropogenically influenced ecosystems (e.g. Singers *et al.* 2017 for Auckland Council) where threatened species can occur and is often applicable for private land such as exotic forest or pasture.
- Access to more comprehensive spatially-referenced species population data would support accuracy of the current threatened and uncommon species dataset.
- Iconic species could be used more by the council to raise the profile of threatened species and/or ecosystems within territorial authorities or ecological districts. This could highlight links with relevant and important ecological issues: e.g. freshwater quality and shortjaw kōkopu in Waipa District; or wetland habitat and bittern/ matuku, giant wire rush and Fred the thread in Waikato District; or support a particular focus of community groups e.g. coastal habitat and ōi/ grey faced petrel (*Pterodroma macroptera*) at Raglan.
- Consider broadening the meaning of iconic species to include cultural, ecological and community value-based perspectives, and the associated implications this may have on the future focus of the database.

1 Introduction

1.1 Purpose and objectives

The purpose of this report is to provide a summary and preliminary analysis of Waikato Regional Council's (the council) threatened and uncommon species¹ dataset. The report and associated dataset will support the council and territorial authorities' biodiversity management, including habitat and species protection and the prevention of extinctions on private and public administered land. The dataset has also been created with the objective of contributing to a more collaborative and complementary approach to species protection with the Department of Conservation (DOC) and other landowners/managers including Iwi and community groups.

The threatened and uncommon species dataset comprises:

- An inventory for all threatened (including 'At Risk'), data deficient and regionally uncommon species (including taxonomically indeterminate or undescribed entities) as historically or currently recorded in the Waikato region.
- Identification of the current conservation status of the above species at international, national and regional levels as applicable.
- Habitat descriptions and ecosystem types in which each threatened and uncommon species occurs.
- Nationally threatened and regionally uncommon species distributions across territorial authorities and predator free 2050 zones.
- Further information on data sources, translocation, regional endemism, data sensitivity and relevant notes.
- A format which enables accessibility to and the regular updating and monitoring of species distribution or conservation status over time.

1.2 Background

The Waikato region is a unique biodiversity stronghold with a variety of indigenous ecosystems from coast to high mountain lands, including forest, scrub, wetland, freshwater, marine, dune, geothermal and karst habitat. However, large areas of these ecosystems, and therefore the biodiversity they support, are threatened by introduced plant and animal pests or disease, intensification and/or expansion of pastoral farming, horticulture and forestry, land modification and overall development of the region. The council has a role in contributing to the safeguarding of these habitats and the indigenous species they support.

Biodiversity decline or loss was highlighted in the Ministry for the Environment's 1997 State of the Environment Report, and consequently the New Zealand Biodiversity Strategy (Department of Conservation 2000) set a primary goal of 'halting the decline'. The strategy sought to maintain and restore the *full range* of remaining natural habitats and ecosystems to support viable populations of all indigenous species and subspecies *across* their natural range, requiring initiatives on both public conservation land and land in private or other tenure. In 2007, a Statement of National Priorities for the protection of rare and threatened biodiversity on private land presented four national priorities to guide and strengthen biodiversity work on private land (Ministry for the Environment and Department of Conservation 2007). More recently a National Biodiversity Action Plan 2016-2020 included national targets to support landowners to protect more rare and threatened habitats and ecosystems; and at the regional level achieve multiple

¹ 'Threatened' and 'At Risk' categories (Townsend *et al.* 2008) are considered to be threatened species for the purposes of this report, while 'Not Threatened' species are only included if considered as regionally uncommon species.

benefits for biodiversity and ecosystem services through greater coordination, integration, collaboration and information sharing (Department of Conservation 2016).

Under the Resource Management Act (1991) the council can regulate land use for biodiversity gains, e.g. water management and freshwater biodiversity, and it has powers under the Biosecurity Act (1993) to undertake pest control operations in order to achieve biodiversity outcomes. Waikato Regional Policy Statement (2016) Objective 3.19 relates to ecological integrity and indigenous biodiversity. It states that 'the full range of ecosystem types, their extent *and the indigenous biodiversity that those ecosystems can support*, exist in a healthy and functional state'. Council policies which address this objective include (refer to RPS chapter 11): 1. Maintain or enhance indigenous biodiversity; 2. Protect significant indigenous vegetation and significant habitats of indigenous fauna; 3. Collaborative management; and 4. Safeguard coastal/marine ecosystems.

The identification of threatened species habitats through the Significant Natural Areas (SNA) process is described in the operative Waikato Regional Council Policy Statement, Criterion 3 as-

Vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are:

- *classed as threatened or at risk, or*
- *endemic to the Waikato region, or*
- *at the limit of their natural range.*

Two recent reports have reviewed the role of regional councils in biodiversity management (Willis 2017; 2014). Amongst other recommendations they emphasise the need for more effective collaboration and partnership between all agencies involved in managing threats to biodiversity and the need for better information sharing and integration for effective decision-making. The Willis (2017) report concludes that, despite many localised and species-specific successes, we are still losing indigenous habitat and nationally around 40% of indigenous plant and animals species are threatened or at risk of extinction with the extinction risk worsening for a greater number of species than for those improving. These findings are supported by the Ministry for the Environment (2018) which recently reported a continued loss of indigenous land cover since 1996, resulting in an ongoing threat to indigenous biodiversity and ecosystems.

1.3 Waikato region database

In order to effectively protect and restore habitat for threatened species in a collaborative manner with DOC and other landowners/managers across the region, the council realises that it needs to have species information that is as accurate as possible and that is accessible and geographically referenced. The council's SNA project assesses and identifies remnant and potential habitat for threatened indigenous plant and animal species. The SNA process primarily involves gathering existing information, supported by limited ground-truthing, and provides valuable information for prioritisation in biodiversity management.

In 2015 the council began a stock take of those threatened and uncommon species that had been recorded in spatial datasets either held by (e.g. SNA assessments) or accessible to (e.g. DOC BioWeb) the council. The New Zealand Threat Classification System (Townsend *et al.* 2008) and most recent conservation status lists for species groups have been used to create a threatened and uncommon species database for the Waikato region. Conservation status lists are updated on a 5-year cycle thus the threatened species database will require regular updating as species may be reclassified due to changes in species populations, threats or better knowledge. Attributes currently included for the dataset are: NZTCS status, regionally lost species; species translocations; Waikato endemic species; IUCN classification; data sensitivity; data sources; habitat information; ecosystem classification; and species occurrence in territorial authorities and predator free 2050 management zones. Additional information for regionally

uncommon species has been added to the database from SNA assessments or similar reports across the region.

2 Methodology

2.1 Source spatial datasets and databases

Initially this involved collating and standardising species spatial datasets and subsequently joining to a threat classification table to give the most recent conservation status for each species recorded within the Waikato Regional Council boundary (see map Appendix 1). Additionally, taxa recently lost from the region were included from recorded communications with Department of Conservation staff through the Significant Natural Area (SNA) assessment process. Peter de Lange (DOC Principal Science Advisor at the time) reviewed the dataset in 2015 and provided comments. This review showed that some of the threatened species had now either been extirpated from the region or the initial records were in doubt and particular species had never been in the Waikato in the first place; these species have either been retained as regionally lost species (52 taxa) or they have been excluded from the dataset (87 plant taxa² were considered to have never been present).

All species information in the database was updated in 2017-2018 and reassessed to determine if species were likely to still exist in the Waikato region. Information for threatened and regionally uncommon species was updated from SNA assessments (Beadel *in prep.*; Beadel *et al.* 2016, 2014, 2009a, 2009b; Cornes *et al.* 2012; Deichmann *et al.* 2012; Kessels *et al.* 2010a, 2010b; Millar I (personal communication, 2019); van der Zwan *et al.* 2017; Wilcox *et al.* 2012) and similar reports (e.g. Stewart 2017, 2016), and an internet search of online databases was completed to find relevant Waikato region specific information.

It is acknowledged that the application of te ao Māori perspectives and interpretations, and the utilisation of any associated mātauranga Māori remains relevant for threatened species management but this has been deemed 'out of scope' for the purposes of the current report. Some comments relating to cultural significance have been included in the database particularly in relation to species distributions. However, an opportunity is recognised for greater inclusivity of te ao Māori perspectives which is acknowledged in the database limitations and future recommendations.

Spatial datasets and databases used include:

- Waikato Regional Council 2012 Boundary (GIS_ALL.POL_2012_REGIONAL_AUTH_EW_L1).
- Waikato Regional Council Terrestrial and Wetland Significant Natural Areas (SNA) datasets.
- DOC BioWeb database 2012.
- DOC BIMs (Biodiversity Information Management system) 2011-2015.
- NZ Threat Classification System (NZTCS) database (nztcs.org.nz) updated August 2018.
- New Zealand Freshwater Fish database (nzffdms.niwa.co.nz) (Crow 2017) updated 2018.
- New Zealand Birds Online (nzbirdsonline.org.nz) accessed June 2017 to November 2018.
- New Zealand Plant Conservation Network dataset (nzpcn.org.nz) including species occurrence data from the National Vegetation Survey database (NVS). Accessed June 2017 to August 2018.

² Taxa are named groups of distinct organisms that can be represented by a species, subspecies, form, or variety. Some groups of taxa such as invertebrates have many taxa that have not yet been assessed and are still poorly understood and may be unnamed or 'taxonomically indeterminate'.

- Ngā Tipu o Aotearoa - New Zealand Plants (<https://nzflora.landcareresearch.co.nz/>) combines data from the Plant Names Database (Manaaki Whenua Landcare Research) and the Allan Herbarium Specimen Database (Distribution data not as comprehensive as NZPCN). Quarterly reports available for any name changes.
- Rare Species: guidance for managing rare species in plantation forests (rarespecies.nzfoa.org.nz).
- iNaturalistNZ (inaturalist.nz) formerly NatureWatchNZ, accessed June 2018.
- New Zealand Mollusca -freshwater invertebrates (www.mollusca.co.nz) accessed March 2018.
- Species reintroductions and translocations –
Doug Armstrong http://www.massey.ac.nz/~darmstro/nz_translocationdatabase.htm,
NZ Reintroduction Projects database <http://www.rsg-oceania.squarespace.com/nz>
and McHalick (1998), Sherley *et al.* (2010) and DOC internal database information provided by O. Overdyck November 2018.
- The IUCN (International Union for Conservation of Nature) Red List of Threatened Species. Version 2017-3. <<http://www.iucnredlist.org>>. Downloaded on 25 March 2018.
- Atlas of living Australia www.ala.org.nz (including NZ and Australia Virtual Herbarium <http://avh.chah.org.au>).
- Waikato Herbarium, access to type specimen information through curator T. Cornes.

2.2 Data sensitivity

While locations for any threatened species should always be distributed with caution, some species may have a higher risk of collection or poaching for illegal purposes. Some species locations may also be on private land and/or have been collected for a particular purpose outside of this database and/or by a third party. Therefore, access to the threatened species dataset is restricted and some data has been tagged as highly sensitive due to vulnerability to collection, e.g. CITES-listed species (Convention on International Trade in Endangered Species), or because of a location on private land which requires liaison with landowners prior to any further use of the data.

2.3 New Zealand Threat Classification System (NZTCS)

The council database follows the New Zealand Threat Classification System (NZTCS) developed in 2002 by Molloy *et al.* and revised in 2008 by Townsend *et al.* (see Appendix 2 for comparison of the two classification systems). NZTCS publications are led by the Department of Conservation (DOC) and involve groups representing the scientific community including universities, research institutions, other government departments and non-government organisations. This national system allows a conservation status to be assigned to all native taxa based on the risk of extinction faced. The criteria can be equally applied to taxa from freshwater, terrestrial and marine habitats. Assessments of taxon groupings (birds, vascular plants, freshwater fish, etc.) are undertaken by independent expert panels and reassessed approximately every 5 years. Due to the nature of threatened species, taxa are often reclassified based on better knowledge (e.g. taxonomic, morphological or field research) or a genuine increase or decrease in population abundance or range in response to changes in management or threats. This report follows the latest available classification listing for the selected species groups at the time (November 2018).

Using classification categories from Townsend *et al.* (2008) native taxa are placed in one of four main categories in descending order of severity of risk: Extinct, Threatened, At Risk or Not Threatened. Threatened taxa are considered to be facing imminent extinction, while At Risk taxa are in trouble but are not considered at imminent risk of extinction. Taxa are further classified into the conservation statuses listed below (Table 1) including Data Deficient taxa, which are yet to be formally assessed due to a lack of information, and the categories of Native Non-resident (Migrant, Vagrant and Coloniser) and Not Threatened taxa.

Table 1. NZTCS categories used in this report for native biota following Townsend et al. (2008)

Category	Conservation status
Extinct	-
Threatened	Nationally Critical Nationally Endangered Nationally Vulnerable
At Risk	Declining Recovering Relict Naturally Uncommon
Data Deficient	Data Deficient
Non-resident	Migrant Vagrant Coloniser
Not Threatened	Not Threatened

For the purposes of this report taxa in the Threatened and At Risk categories are considered to be 'threatened species', with Data Deficient taxa included where stated to allow these lesser known taxa to be acknowledged separately until formally assessed. Not Threatened taxa are included only where applicable as regionally uncommon species.

The NZTCS qualifiers (see Appendix 3) provide additional information to support classification for each threatened taxon including population status and management and have been included in this database development.

2.4 Translocation of species

Many threatened species are actively managed through translocation programmes (movement of a living organism from one area to another) which if successful can increase the number or size of extant populations and expand the current range of a species, therefore reducing risk of extinction. All species in the Waikato dataset have been classified as comprising naturally occurring remnant populations and/or introduced populations. Technically this can include 'introduction' which is moving an organism outside its historically known native range; 'reintroduction' which is moving an organism into part of its native range from which it has disappeared; and 're-stocking' which is movement of individuals to build up an existing population (Sherley *et al.* 2010). The type of translocation is noted where possible within the database, however, sometimes the native range or former distribution of species can be unclear making the distinction between introduction and reintroduction not possible.

Data on translocations comes from McHalik (1998), Sherley *et al.* (2010), two online databases described in sources above and personal communications with O. Overdyck, DOC (2018). It is possible some historical translocations for the Waikato region may not have been recorded and liaison with DOC is required for up to date information on any new translocations.

2.5 Habitat and ecosystem classification

Habitat information was gathered during collation of species information from datasets and online databases. Additionally, two indigenous ecosystem classifications have been included for the dataset as described below.

All species were classified into one of nine broad native ecosystem types as described for the Waikato region in the Regional Policy Statement (2016). A primary ecosystem was identified where possible for each species from the following types:

- a) Native forest and scrub;
- b) Swamps and bogs;
- c) Streams, rivers and lakes;
- d) Beaches and dunes;
- e) Marine and estuarine ecosystems;
- f) Coastal islands;
- g) Geothermal ecosystems;
- h) Karst ecosystems; and
- i) High mountain lands.

For terrestrial species a more detailed ecosystem classification was made following Singers and Rogers' (2014) classification of New Zealand's indigenous terrestrial ecosystems. Marine and freshwater species were also classified using any relevant terrestrial ecosystem unit utilised e.g. seabird nesting sites or freshwater fish with a preference for forested stream habitat. The 19 ecosystem units and code abbreviations used are described below in Table 2. While each taxon will only have a single primary ecosystem assigned in the dataset, as above, all ecosystem units that a species is known to or likely to occur in were included. A taxon may be recorded in multiple ecosystem units within most of the primary ecosystems above e.g. high mountain lands may consist of cool forest and scrub (CLF, CDF), alpine (AL, AH), wetland (WL), cliff (CL), scree (SC) or vegetation succession (VS) units. Also, the same ecosystem unit may occur in a number of different primary ecosystems e.g. warm forest (WF) may occur in native forest and scrub, coastal islands or karst ecosystems.

Table 2. Terrestrial ecosystem classification as applied following Singers and Rogers (2014)

Ecosystem Unit:	Code:	Continued	
Subtropical forest	SF	Active coastal sand dunes	DN
Warm forests	WF	Erosion pavements	EP
Mild forests	MF	Cliffs	CL
Cool forests	CLF	Scree and boulderfields	SC
Cold forests and scrub	CDF	Braided rivers	BR
Low alpine	AL	Saline	SA
High alpine	AH	Ultramafic	UM
Cold air inversion	TI	Geothermal	GT
Wetlands	WL	Cave	CV
		Fire- and volcanic activity- induced vegetation succession	VS

2.6 Territorial authorities and predator free 2050 zones

The presence or absence of all threatened and uncommon species is recorded within eleven territorial authorities and for six predator free 2050 management zones across the Waikato Region (see Table 3 and Map Appendix 1).

Following the New Zealand Government commitment to remove possums, rats and stoats from New Zealand by 2050, six 'predator free' management zones have been identified within the Waikato Region. Each zone encompasses existing pest control operations by various agencies and community groups which could be linked to help meet the Predator Free 2050 goal.

Table 3. Waikato Regional Council boundaries used to assess threatened species presence

<u>WRC Territorial Authorities</u>	<u>WRC Predator Free 2050 zones</u>
Hamilton City	Arapuni to Taupiri
Hauraki District	Awakino to Port Waikato
Matamata-Piako District	Coromandel to Te Aroha
Otorohanga District	Te Aroha to Mokaihaha
Rotorua District	Rangitoto Range to Ruapehu
South Waikato District	Wetlands
Taupō District	
Thames-Coromandel District	
Waikato District	
Waipa District	
Waitomo District	
Area Outside Territorial Authority*	

*applies to some marine species

2.7 Regionally uncommon species

The dataset includes regionally uncommon species; those which are not nationally threatened and may have secure populations elsewhere but have been identified through the Significant Natural Area (SNA) or similar processes as uncommon or a genetically distinct population within the Waikato Region. These species are important at the regional level and may also have potential to be elevated to nationally threatened status if their populations are placed under stress and so are useful to include in a regional database. Conversely, if species are removed from threatened conservation status they may become classed as regionally uncommon, although no longer threatened with extinction nationally.

No current formal assessments are known to exist for Waikato's regionally uncommon or regionally threatened species although DOC and the council have been involved in early stages of a pilot project to develop a regional classification system in the future. Thus, a precautionary approach has been taken during the SNA process to capture data relating to species that could reasonably be considered as 'regionally uncommon' and the regional rarity of species has been supported with literature references or personal communications where available. Such an assessment should be justified by several well-qualified and experienced ecologists familiar with the species and ecology of the Waikato Region.

This species list is not exhaustive as regionally uncommon species have not always been specifically identified in the SNA process, e.g. not included for Waikato District (van der Zwan *et al.* 2017), Hamilton City (Cornes *et al.* 2012) and Hauraki District (Kessels *et al.* 2010a), and in some cases species have been included as uncommon within the district, rather than region e.g. Rotorua (Beadel *et al.* 2016). Some extrapolation between districts has been made by the author where species distribution information is available, however, currently the regional classification lacks the formal assessment process which the national threat classification system provides.

2.8 Regionally lost species

Some taxa are included in this report as having been recently lost from the region as records suggest they were present and possibly still are present in the Waikato Region. These records may either be quite old e.g. made between 20-70 years ago, and/or need to be verified in the field. This excludes species with records greater than 70 years old in the Waikato region unless there is reason noted that they are possibly still present. These species represent potential species for survey effort or for reintroduction to the region as a management tool to support the wider population.

2.9 International (IUCN) conservation status

The International Union for Conservation of Nature (IUCN) assesses the conservation status of taxa on a global scale in order to highlight taxa threatened with extinction and promote their conservation. This ranking is assessed independently from the NZTCS status.

The IUCN Red List of Threatened Species™ is a comprehensive, objective global approach for evaluating the conservation status of plant and animal species. The Red List comprises nine levels of threat status (see Appendix 4) with three categories for threatened species (vulnerable, endangered or critically endangered), two categories for not threatened species (least concern or near threatened), two for extinct species (extinct in the wild or extinct entirely) and data deficient or not evaluated taxa. Some species are categorised as lower risk (conservation dependent or near threatened) and needing an updated assessment by IUCN.

The IUCN Red List has been applied to the Waikato Region species dataset to indicate where an international level threat status has been allocated to species present in the region. It should be noted, however, that many New Zealand threatened species have yet to be assessed for the IUCN Red List and are categorised as 'not evaluated', thus the absence of an IUCN threat ranking is not necessarily indicative of a low threat of extinction (IUCN 2016).

3 Results

3.1 Threatened species (NZTCS)

The database lists 305 threatened native species as occurring in the Waikato region currently (as at June 2019), including data deficient and taxonomically indeterminate entities. Of these, 295 are Threatened or At Risk taxa and 10 are classed as Data Deficient (Table 4).

Table 4. NZTCS classification for all currently recorded threatened taxa in the Waikato Region

Threat category	Conservation status	Species/Taxon count
Threatened	Nationally Critical	34
	Nationally Vulnerable	53
	Nationally Endangered	15
At Risk	Declining	74
	Naturally Uncommon	78
	Recovering	18
	Relict	23
Sub total		295
Data Deficient	Data Deficient	10
Total		305

Waikato region's currently recognised 305 threatened and data deficient species are presented by taxon group below alongside the number of threatened taxa in each group across New Zealand (Table 5). Appendix 5 contains a full list of Waikato's threatened taxa.

Table 5. Waikato region threatened taxa relative to number of threatened taxa nationally within taxon groups (includes Threatened, At Risk and Data Deficient status)

Taxon group	Waikato threatened taxa	NZ threatened taxa
Birds	50	188
Freshwater fish	10	39
Herpetofauna		
• Frogs	2	3
• Reptiles	18	89
Invertebrates		
• Freshwater	7	245
• Terrestrial	16	2173
Mammals (bats)	2	6
Marine mammals	4	8
Vascular plants	196	1361
Total	305	4112

A large number of Threatened or At Risk bird taxa (50) occur in the Waikato region, this is around one quarter of the total 188 bird taxa considered Threatened or At Risk nationally (Robertson *et al.* 2017) (Figure 1). Fifteen bird species in the Waikato have Threatened status and the remaining 34 are considered At Risk. The four birds in the Waikato with the highest conservation status, Nationally Critical, are bittern/ matuku (see Plate 1), white heron/kōtuku (*Ardea modesta*), black stilt/kakī (*Himantopus novaezelandiae*) and black-billed gull/tarāpuka (*Larus bulleri*). The latter three being seasonal visitors to harbours and estuaries, while bittern/matuku have important breeding populations in Waikato's wetlands.

Of the 39 Threatened or At Risk resident native freshwater fish taxa in NZ, one quarter (10 taxa) occur in the Waikato Region (Figure 1) (Dunn *et al.* 2018). Two of the Waikato species are considered Threatened: shortjaw kōkopu (*Galaxias postvectis*) and lamprey/piharau (*Geotria australis*), while the other eight species are considered At Risk of extinction.

Two of three extant native frog species occur in the Waikato region (Figure 1), all three native frog species are considered threatened species (Burns *et al.* 2018). Archey's frog (*Leiopelma archeyi*, see Plate 2) and Hochstetter's frog/ pepeketua/peketua (*Leiopelma hochstetteri*) share the threat status At Risk Declining and the former is found only in the Waikato region.

Of the 114 extant native reptile taxa assessed in Hitchmough *et al.* (2016) a high proportion, 89 (78%), are considered to be Threatened or At Risk and a further seven are Data Deficient. Eighteen of these occur in the Waikato Region (many are located on Coromandel's offshore islands) including 17 lizard taxa (3 Threatened and 14 At Risk) and the At Risk tuatara (*Sphenodon punctatus*). The three lizard species with Threatened status are Nationally Endangered Whitaker's skink (*Oligosoma whitakeri*) and the Nationally Vulnerable small-scaled skink (*Oligosoma microlepis*) and Coromandel or northern striped gecko (*Toropuku* "Coromandel", see cover image). Loggerhead turtle (*Caretta caretta*) has been recorded off the Waikato's west coast and are classified as Non-resident Vagrant rather than threatened, although they hold a Vulnerable threat status under IUCN.

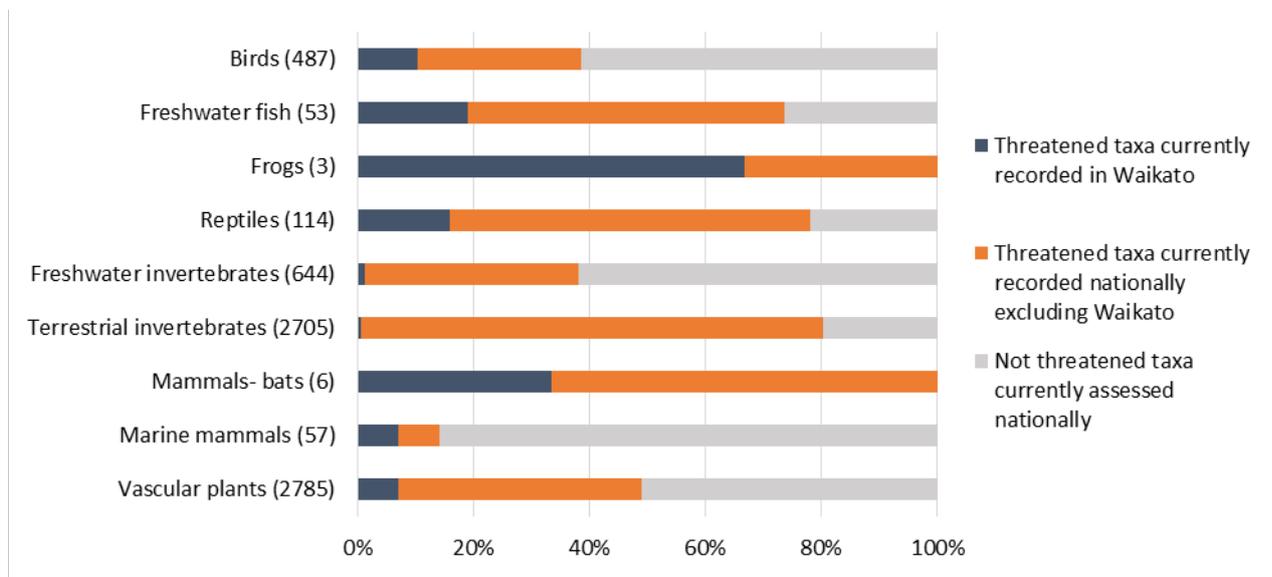


Figure 1. Proportion of threatened and data deficient taxa recorded in Waikato region (blue) and total threatened and data deficient taxa across NZ (blue and orange) as a proportion of all native taxa (including not threatened) assessed by NZTCS (grey). For each taxon group brackets include the total number of native taxa assessed nationally; data for the invertebrate groups in particular should be viewed as incomplete with many taxa not assessed or undescribed as yet.

Many invertebrate groups have a large number of taxa that remain data deficient or undescribed, thus the number of taxa threatened and described nationally is a current best estimate (Figure 1). In the Waikato Region there are three threatened freshwater snails *Potamopyrgus troglodytes*, *P. doci* and *Leptopyrgus manningi* all recorded in association with karst caves and soda spring habitat. There is also a threatened freshwater crab *Amarinus lacustris* and mussel *Echrydella menziesii* and a Data Deficient freshwater snail *Austropeplea tomentosa* and caddisfly *Oxyethira* (*Trichoglène*) *kirikiriroa* (Grainger *et al.* 2018).

For terrestrial invertebrates in the Waikato region, there are two threatened species of Lepidoptera (Hoare *et al.* 2017) *Caloptilia* sp. “*Teucridium*” is a Nationally Vulnerable moth found in the At Risk native shrub *Teucridium parvifolium* and ‘Fred the thread’ (*Houdinia flexilissima*) an At Risk moth found in larval stage in the At Risk giant wire rush (*Sporadanthus ferrugineus*), see Plate 3. Three threatened wētā species (Trewick *et al.* 2016) occur in the Waikato Region, all considered to have At Risk conservation status: Moehau wētā (*Hemiandrus "elegans"*), Mercury Island tusked wētā (*Motuweta isolata*) and Mahoenui giant wētā (*Deinacrida mahoenui*). Seven Coleoptera taxa (Leschen *et al.* 2012) are recorded for the Waikato Region: Moehau stag beetle (*Geodorcus alsobius*), Te Aroha stag beetle (*G. auriculatus*) and the weevil *Anagotus* sp. 3 “Moehau”, each being considered Nationally Vulnerable, At Risk and Data Deficient respectively. A further 4 ground beetles are found associated with karst cave ecosystems; two *Duvaliomimus* subspecies and two *Neanops* species, the latter currently considered endemic to the Waikato region (Millar I, personal communication 2019). Other At Risk terrestrial invertebrates include the bird louse *Anaticola* sp. (Buckley *et al.* 2012), katipō spider (*Latrodectus katipo*) (Sirvid *et al.* 2012) and New Zealand bat fly (*Mystacinobia zelandica*) (Andrew *et al.* 2012). A carnivorous land snail *Rhytida webbi*, recorded from the Otorohanga district, has Nationally Critical status (Mahlfeld *et al.* 2012).

Two of New Zealand’s six native bat species occur in the Waikato Region (all native bats being threatened species, see Figure 1): the long-tailed bat/pekapeka-tou-roa (*Chalinolobus tuberculatus*), considered Nationally Critical, and the central lesser short-tailed bat (*Mystacina tuberculata rhyacobia*) (O’Donnell *et al.* 2018). The latter has At Risk Declining status and is known only from Pureora Forest (Otorohanga District) in the Waikato where it is known to be an important pollinator for the Nationally Vulnerable root parasite pua o te reinga/woodrose (*Dactylanthus taylorii*).

Out of 57 marine mammal taxa (including 26 non-resident natives) assessed by Baker *et al.* (2016) eight (14%) are considered Threatened or At Risk. Of these taxa, four visit coastal waters around the Waikato region: Māui dolphin, bottlenose dolphin (*Tursiops truncatus*), Bryde's whale (*Balaenoptera edeni brydei*) and orca (*Orcinus orca*) (Figure 1).

The largest group of threatened species comes from the 2,785 naturally occurring vascular plant taxa assessed, of which 1,361 are considered to be threatened or data deficient species. Of these, 189 threatened plant taxa, and seven data deficient, occur in the Waikato region (Figure 1). Eighteen Waikato plant taxa are considered to be Nationally Critical, facing the greatest risk of extinction. They include six taxa threatened by myrtle rust³: *Syzygium maire*, *Korthalsella salicornioides* (see Plate 4), *Lophomyrtus bullata*, *L. obcordata*, *Neomyrtus pedunculata* and *Leptospermum* aff. *scoparium* "Waikato peat bog". The other 12 Nationally Critical plant taxa are: one tree *Olearia pachyphylla*; five shrubs *Pimelea orthia* subsp. *orthia*, *Pomaderris apetala* subsp. *maritima* (see Plate 5), *Pomaderris phyllicifolia*, *Hibiscus diversifolius* subsp. *diversifolius* and *Veronica* aff. *bishopiana* (a) (AK 202263; Hikurangi Swamp); the ground herbs *Hypericum minutiflorum*, *Scandia rosifolia* and *Lagenophora montana*; two orchids *Corybas carsei* and *C. aff. rivularis* (AK 251833; Kaitarakihi); two ferns *Ophioglossum petiolatum* and *Pellaea* aff. *falcata*; and wetland plants *Utricularia australis* and *Schoenus carsei*. These Nationally Critical plant taxa occur across forest and scrub, beach sand dune and swamp/bog habitats, ranging from coastal to high mountain land environments.

3.1.1 Waikato endemic species

Sixteen species are recorded as endemic to or occurring only in the Waikato region. A further three plant species are endemic to the Waikato and Great Barrier or Little Barrier Islands (Table 6). Conservation status (NZTCS) for these species varies from Nationally Critical for four taxa: the swamp helmet orchid *Corybas carsei*, and two freshwater snails and a cave beetle found associated with karst ecosystems, to Data Deficient for the weevil *Anagotus* sp. 3 "Moehau". The Coromandel or northern striped gecko is taxonomically indeterminate but has been included here as it may be a distinct species, pending formal classification (Hitchmough *et al.* 2016).

Table 6. NZTCS conservation status for species which occur naturally only in the Waikato region

Taxon group	Species/taxa	Common name	NZTCS status
Herpetofauna			
	<i>Leiopelma archeyi</i>	Archeys' frog	Declining
	<i>Toropuku</i> "Coromandel"	Coromandel striped gecko	Nationally Vulnerable
Invertebrates			
	<i>Anagotus</i> sp. 3 "Moehau"	Weevil	Data Deficient
	<i>Deinacrida mahoenui</i>	Mahoenui giant wētā	Recovering
	<i>Geodorcus auriculatus</i>	Te Aroha stag beetle	Relict
	<i>Geodorcus alsobius</i>	Moehau stag beetle	Nationally Endangered
	<i>Hemiandrus "elegans"</i>	Moehau wētā	Naturally Uncommon
	<i>Houdinia flexilissima</i>	Fred the thread	Relict
	<i>Leptopyrgus manningi</i>	Freshwater snail	Nationally Critical
	<i>Motuweta isolata</i>	Mercury Island tusked wētā	Recovering
	<i>Neanops caecus</i>	Cave beetle	Naturally Uncommon
	<i>Neanops pritchardi</i>	Cave beetle	Nationally Critical
	<i>Potamopyrgus doci</i>	Freshwater snail	Nationally Critical
Vascular plants			
	<i>Corybas carsei</i>	Swamp helmet orchid	Nationally Critical

³ See Appendix 6 for a full list of Waikato species threatened by myrtle rust and kauri dieback disease.

<i>Sporadanthus ferrugineus</i>	Giant wire rush	Relict
<i>Veronica scopulorum</i>	Awaroa koromiko	Declining
<i>Coprosma dodonaefolia</i> ¹	-	Naturally Uncommon
<i>Dracophyllum patens</i> ²	Great Barrier inaka	Naturally Uncommon
<i>Epacris sinclairii</i> ²	Sinclair's tamingi	Naturally Uncommon

¹ Also occurs on Great Barrier and Little Barrier Islands

² Also occurs on Great Barrier Island

3.1.2 Translocated species

Currently 33 threatened species are recorded as having translocated populations in the Waikato region as a result of conservation management programmes (Table 7). These are predominantly species with existing remnant populations already in the Waikato (reintroductions or re-stocking), however, six species are recorded as not having extant remnant populations in the region (potentially introductions beyond their native range): Little spotted kiwi (*Apteryx owenii*), North Island weka (*Gallirallus australis greyi*), hihi or stitchbird (*Notiomystis cincta*), North Island tīeke or saddleback (*Philesturnus rufusater*), South Island takahē (*Porphyrio hochstetteri*) and *Veronica speciosa* (Table 7, shaded columns).

There are also records for three regionally uncommon species that have had populations translocated in the Waikato region: bellbird/korimako (*Anthornis melanura melanura*), yellow-crowned parakeet/kākāriki (*Cyanoramphus auriceps*) and Auckland tree wētā (*Hemideina thoracica*). These are reintroductions restoring the species to their former range in Hamilton City, Maungatautari sanctuary and Korapuki Island respectively.

Further translocations of not threatened species, e.g. skinks, associated with mitigation for land development and road construction have occurred (pers. comm. O. Overdyck 2018) but these have not been included here or in the dataset.

Table 7. Threatened and At Risk species by taxon group that have been translocated within the Waikato region (reintroduction and re-stocking existing remnant populations) or into the Waikato region (introduced new populations only)

Taxon group	Population re-stocking or reintroduction within the Waikato Region (22 species)		Species introduced into Waikato Region (6 species)	
	Species	Common name	Species	Common name
Birds				
	<i>Anas chlorotis</i>	Brown teal/pāteke	<i>Apteryx owenii</i>	Little spotted kiwi
	<i>Apteryx mantelli</i>	Nth. Is. brown kiwi	<i>Gallirallus australis greyi</i>	Nth. Is. weka
	<i>Callaeas wilsoni</i>	Nth. Is. kōkako	<i>Notiomystis cincta</i>	Hihi/ stitchbird
	<i>Cyanoramphus novaezelandiae</i>	Red-crowned parakeet/kākāriki	<i>Philesturnus rufusater</i>	Nth. Is. saddleback/ tīeke
	<i>Falco novaeseelandiae</i>	Bush falcon/ "bush"	<i>Porphyrio hochstetteri</i>	South Island takahē
	<i>Gallirallus philippensis</i>	Banded rail/moho pererū		
	<i>Mohoua albicilla</i>	Whitehead/ pōpokotea		
	<i>Nestor meridionalis septentrionalis</i>	Nth. Is. kākā		
	<i>Petroica longipes</i>	Nth. Is. robin/ toutouwai		
	<i>Pterodroma pycrofti</i>	Pycroft's petrel		
Freshwater fish				
	<i>Galaxias argenteus</i>	Giant kōkopu		
	<i>Galaxias postvectis</i>	Shortjaw kōkopu		

Taxon group	Population re-stocking or reintroduction within the Waikato Region (22 species)	Species introduced into Waikato Region (6 species)		
	Species	Common name	Species	Common name
Herpetofauna				
	<i>Leiopelma archeyi</i>	Archey's frog		
	<i>Oligosoma alani</i>	Robust skink		
	<i>Oligosoma moco</i>	Moko skink		
	<i>Oligosoma oliveri</i>	Marbled skink		
	<i>Oligosoma suteri</i>	Egg-laying skink		
	<i>Oligosoma whitakeri</i>	Whitaker's skink		
	<i>Sphenodon punctatus</i>	Tuatara		
	<i>Toropuku "Coromandel"</i>	Coromandel striped gecko		
Terrestrial Invertebrates				
	<i>Deinacrida mahoenui</i>	Mahoenui giant wētā		
	<i>Houdinia flexilissima</i>	Fred the thread		
	<i>Motuweta isolata</i>	Mercury Is. tusked wētā		
Vascular plants				
	<i>Dactylanthus taylorii</i>	Pua o te reinga/ woodrose	<i>Veronica speciosa</i>	Purple hebe/ tītīrangi/napuka
	<i>Calystegia marginata</i>	Small-flowered white bindweed		
	<i>Carmichaelia williamsii</i>	Giant-flowered broom		
	<i>Sporadanthus ferrugineus</i>	Giant wire rush		

3.1.3 Primary ecosystem classification

Waikato's threatened plant species are the only group to occur across the range of broad indigenous ecosystems of the region, although primarily in 'forest and scrub' and 'swamp and bog' ecosystems (Table 8). No other threatened species groups have been identified as specific to Waikato's geothermal or high mountain land environments, although threatened invertebrate taxa can be found occurring in all other native ecosystem types in the Waikato. Threatened bird taxa occur across a wide a range of ecosystems, while Waikato's threatened reptile species occur primarily in forest and scrub but also in beach and dune ecosystems and many are restricted to Coromandel's offshore islands. Forests are the primary habitat for all Waikato's threatened frog and bat species and are also important for many freshwater fish which prefer forested streams, rivers and lakes. Marine and estuarine ecosystems and streams, rivers and lakes are important for threatened whales, dolphins, freshwater fish and invertebrates, as well as many bird and plant species. One freshwater fish, black mudfish/waikaka/hauhau (*Neochanna diversus*), lives in swamps and bogs and is non-migratory while all other threatened freshwater fish, excluding dwarf galaxias (*Galaxias divergens*), are migratory utilising freshwater and marine ecosystems.

This classification includes indigenous habitat only, as do Singers and Rogers' (2014) terrestrial ecosystem units, however, it is acknowledged that threatened species can also occur in habitat dominated by exotic vegetation. For example, in the Waikato the long-tailed bat/pekapeka-tou-roa is known to roost in exotic trees as well as native trees and in karst caves, Mahoenui giant wētā can be found in farmland reverting to exotic gorse (*Ulex europaeus*) scrub and black mudfish may occur in willow (*Salix* spp.) dominated wetlands.

Table 8. Waikato threatened species taxon groups classified into primary broad ecosystem types they are most likely to occur within (including Threatened, At Risk and Data Deficient taxa)

Taxon group	Forest and scrub	Swamps and bogs	Streams, rivers, lakes	Beaches and dunes	Marine and estuarine	Coastal islands	Geothermal	Karst	High mountain lands	Total
Birds	9	7	5	6	14	9	-	-	-	50
Freshwater fish	-	1	9	-	-	-	-	-	-	10
Herpetofauna										
• Frogs	2	-	-	-	-	-	-	-	-	2
• Reptiles	10	-	-	2	-	6	-	-	-	18
Invertebrates										
• Freshwater	-	-	4	-	1	-	-	2	-	7
• Terrestrial	8	1	1	1	-	1	-	4	-	16
Mammals (bats)	2	-	-	-	-	-	-	-	-	2
Marine mammals	-	-	-	-	4	-	-	-	-	4
Vascular plants	85	38	3	26	4	10	6	5	18	195*
Total	116	47	22	35	23	26	6	11	18	304*

*One taxonomically indeterminate vascular plant taxa yet to be classified by ecosystem unit.

3.1.4 Territorial authorities and predator free 2050 zones

The occurrence of species across the region as shown by territorial authority is highly variable; Thames-Coromandel District (TCDC) has records for 154 different threatened species whereas Hamilton City has records for 31 threatened species (Table 9, also refer to map Appendix 3 for territorial authority boundaries). As an example for Hamilton City, Table 10 lists the recorded threatened species with likely habitat (primary broad ecosystem) and source of data included. Table 11 provides an example of the recorded threatened species occurring in swamp and bog habitat only for the Waipa District.

Table 9. Number of threatened species taxa recorded across Waikato region's 11 territorial authorities* (including Threatened, At Risk and Data Deficient taxa)

	TCDC*	Hauraki	Waikato	MPDC*	Hamilton	Waipa	Otorohanga	South			Rotorua	Area outside TA
								Waikato	Waitomo	Taupō		
Birds	31	15	21	4	4	17	20	9	19	14	19	0
Freshwater fish	9	8	9	4	5	8	9	3	9	2	2	0
Herpetofauna												
• Frogs	2	2	1	1	0	1	1	0	2	0	0	0
• Reptiles	12	6	4	2	0	6	6	3	10	7	0	0
Invertebrates												
• Freshwater	0	1	3	1	1	1	0	1	3	2	1	0
• Terrestrial	7	2	4	2	1	2	5	0	8	1	0	0
Mammals (bats)	1	1	2	0	1	1	2	0	2	1	0	0
Marine mammals	0	0	1	0	0	0	0	0	0	0	0	4
Vascular Plants	92	46	92	33	19	35	73	23	50	75	41	0
Total	154	81	137	47	31	71	116	39	103	102	63	4

*Territorial authority abbreviations used in table: Thames-Coromandel District (TCDC), Matamata-Piako District (MPDC), Territorial Authority (TA).

Table 10. Hamilton City threatened species records (and source) with primary broad ecosystem derived from known habitat (including Threatened, At Risk and Data Deficient taxa)

Taxon group	Common name	Primary Ecosystem	Source
Birds			
<i>Hydroprogne caspia</i>	Caspian tern/taranui	Beaches and dunes	Powlesland (2009), SNA
<i>Nestor meridionalis septentrionalis</i>	North Island kākā	Forest and scrub	DOC Bioweb
<i>Phalacrocorax carbo novaehollandiae</i>	Black shag/kawau	Streams, rivers and lakes	Biswell (2013), SNA
<i>Phalacrocorax sulcirostris</i>	Little black shag/kawau tūi	Streams, rivers and lakes	Powlesland (2009), SNA
Freshwater fish			
<i>Anguilla dieffenbachii</i>	Longfin eel/tuna	Streams, rivers and lakes	NIWA Freshwater Fish Database, SNA
<i>Cheimarrichthys fosteri</i>	Torrent fish/panoko	Streams, rivers and lakes	NIWA Freshwater Fish Database, SNA
<i>Galaxias argenteus</i>	Giant kōkopu	Streams, rivers and lakes	NIWA Freshwater Fish Database, SNA
<i>Galaxias maculatus</i>	Inanga	Streams, rivers and lakes	NIWA Freshwater Fish Database, SNA

Taxon group	Common name	Primary Ecosystem	Source
<i>Neochanna diversus</i>	Black mudfish	Swamps and bogs	NIWA Freshwater Fish Database, SNA
Freshwater Invertebrates			
<i>Oxyethira</i> (Trichoglène) <i>kirikiriroa</i>	Caddisfly	Streams, rivers and lakes	DOC CMS (2014), Smith 2008
Terrestrial Invertebrates			
<i>Houdinia flexilissima</i>	Fred the thread	Swamps, rivers and lakes	DOC CMS (2014)
Mammals (bats)			
<i>Chalinolobus tuberculatus</i>	Long-tailed bat/pekapeka-tou-roa	Forest and scrub	DOC Bioweb
Vascular Plants			
<i>Bromus arenarius</i>	Sand brome	Beaches and dunes	de Lange p.c.
<i>Bulbophyllum tuberculatum</i>	-	Forest and scrub	DOC Bioweb
<i>Christella dentata</i>	Soft fern	Swamps, rivers and lakes	DOC Bioweb
<i>Epilobium hirtigerum</i>	Hairy willowherb	Swamps, rivers and lakes	DOC Bioweb
<i>Euphorbia glauca</i>	Shore spurge/waiū-atua	Beaches and dunes	DOC Bioweb
<i>Fimbristylis velata</i>	-	Swamps, rivers and lakes	DOC Bioweb
<i>Hypolepis dicksonioides</i>	Giant hypolepis	Geothermal	de Lange p.c.
<i>Kunzea robusta</i>	Kanuka	Forest and scrub	de Lange <i>et al.</i> (2018), NZPCN
<i>Leptospermum scoparium</i> var. <i>scoparium</i>	Mānuka	Forest and scrub	de Lange <i>et al.</i> (2018), NZPCN
<i>Lophomyrtus bullata</i>	Ramarama	Forest and scrub	de Lange <i>et al.</i> (2018), NZPCN
<i>Metrosideros diffusa</i>	White climbing rātā	Forest and scrub	de Lange <i>et al.</i> (2018), NZPCN
<i>Metrosideros fulgens</i>	Rātā vine	Forest and scrub	de Lange <i>et al.</i> (2018), NZPCN
<i>Metrosideros perforata</i>	Small white rātā/akatea	Forest and scrub	de Lange <i>et al.</i> (2018), NZPCN
<i>Mida salicifolia</i>	Maire-taiki	Forest and scrub	SNA
<i>Ptisana salicina</i>	King fern/ para	Forest and scrub	DOC Bioweb
<i>Rorippa divaricata</i>	NZ mustard cress/matangoa	Forest and scrub	DOC Bioweb
<i>Solanum aviculare</i> var. <i>aviculare</i>	Poroporo	Forest and scrub	de Lange p.c.
<i>Sporadanthus ferrugineus</i>	Giant wire rush	Swamps and bogs	DOC Bioweb
<i>Syzygium maire</i>	Tawake/swamp maire	Forest and scrub	SNA
* <i>Juncus holoschoenus</i> var. <i>holoschoenus</i>		Swamps and bogs	DOC Bioweb

*One species recently extinct from the Waikato region, potentially still occurs.

Table 11. Waipa District threatened species records where primary ecosystem is swamps and bogs (including Threatened, At Risk and Data Deficient taxa)

Taxon group	Common name	NZTCS Status
Birds		
<i>Botaurus poiciloptilus</i>	Australasian bittern/ matuku	Threatened Nationally Critical
<i>Bowdleria punctata vealeae</i>	Nth Is fernbird/mātātā	At Risk Declining
<i>Porphyrio hochstetteri</i> *	Sth Is takahē	Threatened Nationally Vulnerable
Freshwater Fish		
<i>Neochanna diversus</i>	Black mudfish	At Risk Declining
Terrestrial Invertebrates		
<i>Houdinia flexilissima</i>	Fred the thread	At Risk Relict
Vascular Plants		
<i>Corunastylis nuda</i>	-	At Risk Naturally Uncommon
Leptospermum aff. scoparium (c) (AK 191319; "Waikato Peat Bog")	Waikato peat bog mānuka	Threatened Nationally Critical
<i>Lycopodiella serpentina</i>	Bog clubmoss	Threatened Nationally Vulnerable
<i>Sporadanthus ferrugineus</i>	Giant wire rush	At Risk Relict
<i>Utricularia australis</i>	Yellow bladderwort	Threatened Nationally Critical
<i>Utricularia delicatula</i>	Bladderwort	At Risk Relict

*Species translocation

The occurrence of threatened species varies across the council's predator free 2050 zones (Table 12, also refer to map Appendix 3 for zone boundaries). A high number of threatened species occur in the Coromandel to Te Aroha and Awakino to Port Waikato zones (164 taxa each), while fewer threatened species (33 taxa) are recorded from the smaller Te Aroha to Mokaihaha zone.

Table 12. Number of threatened species recorded across Waikato region's six predator free 2050 zones (including Threatened, At Risk and Data Deficient taxa)

Taxon group	Awakino to Port Waikato	Coromandel to Te Aroha	Wetlands	Arapuni to Taupiri	Te Aroha to Mokaihaha	Rangitoto to Ruapehu
Birds	23	32	16	17	5	13
Freshwater fish	9	9	6	7	3	3
Herpetofauna						
• Frogs	2	2	-	1	1	1
• Reptiles	9	13	2	5	2	8
Invertebrates						
• Freshwater	5	-	2	2	-	1
• Terrestrial	8	7	1	2	1	1
Mammals (bats)	2	1	1	1	-	2
Marine mammals	1	-	-	-	-	-
Vascular Plants	105	100	39	36	21	66
Total	164	164	67	71	33	95

3.2 Regionally uncommon species

A total of 109 species were found to be recorded as regionally uncommon within the Waikato region, although not threatened nationally. This includes 90 vascular plant species, five bird species, eight terrestrial and four freshwater invertebrates, one freshwater fish and loggerhead turtle. Loggerhead turtle is classed as Non-Resident Vagrant by NZTCS (not threatened) although having an IUCN Vulnerable threat status it has been included as regionally uncommon in the dataset. As an example Table 13 shows all regionally uncommon species recorded for Hamilton

City, with primary ecosystem and data source. A list of all regionally uncommon species currently recorded in the Waikato region is presented in Appendix 7.

Table 13. Hamilton City regionally uncommon species records (and source) with broad primary ecosystem derived from known habitat

Taxon by Group	Common name	Broad Ecosystem	Primary	Source
Birds				
<i>Anas rhynchos</i>	Australasian shoveler/ kuruwhengi	Swamps and bogs		SNA
<i>Anthornis melanura melanura</i>	Bellbird/korimako	Forest and scrub		SNA
Terrestrial Invertebrates				
<i>Hemideina thoracica</i>	Auckland tree wētā	Forest and scrub		Wehi (2013)
Vascular Plants				
<i>Astelia grandis</i>	Swamp astelia	Swamps and bogs		SNA
<i>Dianella haemata</i>	Swamp blueberry/ turutu	Swamps and bogs		SNA
<i>Libocedrus plumosa</i>	Kawaka/kaikawaka	Forest and scrub		SNA

3.3 Regionally lost species

Of the 60 species considered to have been lost recently from the Waikato region, with records 20-70 years old and/or pending field verification, i.e. some are potentially still present, 52 are vascular plants; four bird species; two bird lice taxa; one freshwater snail and one gecko (Table 14). See Appendix 8 for all regionally recently lost taxa and conservation status.

Table 14. Regionally recently lost taxa and NZTCS conservation status for the Waikato region

Conservation status	Species count
Nationally Critical	12
Nationally Vulnerable	10
Nationally Endangered	5
Declining	11
Relict	2
Naturally Uncommon	18
Data Deficient	2
Total	60

3.4 International (IUCN) conservation status

In the Waikato region there are 56 species or taxa recorded which are currently assessed as threatened i.e. Red Listed, data deficient or near threatened by IUCN (including lower risk, requiring updated assessment), while 350 of Waikato's threatened and regionally uncommon taxa are not yet evaluated by IUCN (Table 15). Red Listing is not of great importance for the conservation management of many of New Zealand's endemic species given the national NZTCS assessment process but it can be useful for species with wider or global distributions e.g. marine mammals or sea birds.

Table 15. Waikato’s threatened, data deficient and regionally uncommon species as assessed by IUCN rank: threatened, data deficient, near threatened/lower risk or not yet evaluated

Taxon group	Threatened	Data Deficient	Near Threatened or Lower Risk	Not Evaluated	Total
Birds	13	0	12	30	55
Freshwater fish	6	1	1	3	11
Herpetofauna					
• Frogs	1	0	0	1	2
• Reptiles	5	0	2	12	19
Invertebrates					
• Freshwater	0	0	1	7	8
• Terrestrial	1	0	0	18	19
Mammals (bats)	2	0	0	0	2
Marine mammals	1	2	0	1	4
Vascular plants	1	1	6	278	286
Total	30	4	22	350	406

The 30 species with IUCN Red List threatened status which occur in the Waikato region (see Appendix 9) represent a range of groups, the largest being birds (Table 15). Some of the smaller taxon groups have a higher proportion of IUCN evaluated species, such as bats, marine mammals and freshwater fish, while a large number of plant and invertebrate taxa have not been evaluated.

4 Discussion

4.1 Database limitations

The dataset represents a current snapshot in time and reclassification of conservation status for any taxa may occur in the future due to new taxonomic knowledge or actual changes recorded in a population’s size or range. While the database contains current known records and habitats for species this does not mean that a species is necessarily absent from other sites unless confirmed by field survey, especially in the case of poorly understood taxa. The quality and accuracy of data collected may vary depending on the source although care has been taken to verify information through multiple sources where possible.

Some species groups are not currently incorporated in the dataset e.g. non-vascular plants, fungi (including lichenised fungi) and marine organisms other than mammals. A lack of available or published distribution data is limiting for many taxa in these groups and some threatened taxon groups included in the database. Additionally, for those unnamed or indeterminate taxa and data deficient species there is often insufficient knowledge to evaluate conservation status.

It is acknowledged that there is scope for this database to be extended or have an associated database to include iconic species as defined by cultural, e.g. mātauranga Māori, and community value-based perspectives besides ecological-based assessment.

4.2 Species rank changes in recent NZTCS assessments

The conservation status of a species may change during reassessment and some species may move to or from ‘not threatened’ status. Taxa being reassessed from not threatened to threatened (or at risk), or vice versa, may hold regionally uncommon status despite being not threatened nationally making it useful to maintain data for regionally uncommon species alongside the threatened species in the dataset.

There were several recent changes of note for bird rankings since the 2012 assessments (Robertson *et al.* 2013). The Australasian bittern/matuku moved to the highest threat status of Nationally Critical in the most recent classification (Robertson *et al.* 2017) as the population continues to decline throughout the country. Waikato's wetlands are a stronghold for the bittern/ matuku, particularly Whangamarino with 25% of NZ's bittern population (Cromarty & Scott 1996). Likewise marsh crake/koitareke (*Porzana pusilla affinis*) and spotless crake/pūweto (*Porzana tabuensis*) have suffered ongoing population declines and both have moved within the At Risk category from Relict to Declining status. The North Island robin/toutouwai (*Petroica longipes*) has also moved into At Risk Declining status having previously been not threatened. In contrast, North Island brown kiwi (*Apteryx mantelli*), Northern New Zealand dotterel/ tūturiwhatu (*Charadrius obscurus aquilonius*) and North Island kākā (*Nestor meridionalis septentrionalis*) have moved from Threatened to At Risk status due to successful ongoing conservation management programmes.

One of Waikato's frog species, *Leiopelma hochstetteri*, has been reinstated as a single taxon in the most recent publication by Burns *et al.* (2018) with no change to the conservation status: At Risk Declining. The previous 11 genetic groupings nationally suggested by Newman *et al.* (2013), of which four occurred in the Waikato Region: *Leiopelma hochstetteri sensu stricto*, *L. aff. hochstetteri* "Central/South Coromandel", *L. aff. hochstetteri* "Waikato" and *L. aff. hochstetteri* "Whareorino" are not considered distinct enough at the species level but will be retained as groupings for management purposes. The other Waikato frog species, Archey's frog, has changed from Threatened Nationally Vulnerable to At Risk Declining. The large Coromandel population remains at stable numbers and although based on a better understanding of the size and state of populations, rather than observed improvements, overall confidence in the assessment remains low and the assessment is qualified as 'Data Poor' (Burns *et al.* 2018).

The Coromandel or Northern striped gecko remains taxonomically indeterminate but moved from Nationally Endangered down to Nationally Vulnerable recently (Hitchmough *et al.* 2016) as a result of more records and an extension of the known range.

The North Island long-tailed bat/pekapeka-tou-roa had previously been classed as Nationally Vulnerable and indeterminately taxonomically distinct from the South Island long-tailed bat (O'Donnell *et al.* 2013). However, recent genetic studies provide little evidence for this distinction and long-tailed bats are now treated as one taxon resulting in an elevation in conservation status for North Island populations to Nationally Critical (O'Donnell *et al.* 2018). The increased status reflects increased concerns over habitat loss and impacts from vespid wasps and introduced mammalian predators.

The conservation status of vascular plants were reassessed by de Lange *et al.* (2018) resulting in considerable changes for the Waikato region (Table 16); 11 taxa improved yet seven of these remain threatened, while 50 taxa worsened in status and 10 new threatened taxa were assessed for the first time. One taxon, *Uncinia viridis*, was removed from threatened status as it is no longer considered taxonomically distinct from the not threatened *Carex horizontalis*. Many changes (23 taxa) relate to the risk of disease, primarily kauri dieback (*Phytophthora agathidicida*) and myrtle rust (*Austropuccinia psidii*). The conservation status of all native Myrtaceae has been reassessed following the detection of myrtle rust in New Zealand in May 2017 and concern over the potential devastation that could be caused to native *Metrosideros* species if the *Ceratocystis fimbriata* strain responsible for 'Rapid 'Ōhi'a Death' in Hawai'i (recently identified as two species *C. lukuohia* and *C. huliohia* by Barnes *et al.* (2018)) became established in New Zealand. As with kauri dieback, there is currently no known effective treatment for myrtle rust. Therefore, as a precautionary measure de Lange *et al.* (2018) have elevated the designations for all New Zealand Myrtaceae and kauri, previously considered to be either Not Threatened or At Risk, to At Risk or Threatened status. The sole non-Myrtaceous plant known to be intimately associated with New Zealand Myrtaceae, the endemic hemiparasitic

dwarf mistletoe *Korthalsella salicornioides*, has also been reassessed as Threatened Nationally Critical (see Plate 4).

Table 16. Direction of change in conservation status for vascular plants in the Waikato region following de Lange et al. (2018) since de Lange et al. (2013)

Change in status 2018	Threatened taxa 2018	Not threatened 2018
Better (11 taxa)	7	4
Worse (50 taxa)	50*	
No change (130 taxa)	130	
Neutral (6 taxa to or from Data Deficient)	4	2
Taxonomically indistinct (1 taxon)		1
New listings (10 taxa previously not assessed)	10**	

*Includes 7 previously regionally uncommon species and 19 taxa in relation to myrtle rust and kauri dieback threat. **Includes 4 taxa in relation to myrtle rust threat.

4.3 Waikato endemic species

Waikato has at least 16 endemic threatened species, there are possibly more undescribed taxa that are endemic to the region, especially in poorly understood groups such as invertebrates. Many of these nationally significant species have the lesser conservation status of At Risk (with ongoing conservation management in place), however, several Waikato endemics have elevated Threatened status.

Waikato's endemic species occur across a range of ecosystem types and threat rankings. In relatively intact native peat bog communities we find the giant wire rush and coexisting moth larvae Fred the thread, while the swamp helmet orchid occurs only at Whangamarino wetland. On the east coast the Mercury Island tussock wētā is restricted to coastal forest offshore in the Mercury Island group while the Coromandel or Northern striped gecko and Te Aroha stag beetle are recorded from the Coromandel and eastern ranges. Three threatened shrub species found in the Coromandel ranges *Dracophyllum patens*, *Epacris sinclairii* and *Coprosma dodonaeifolia* are also found on Great Barrier Island, the latter also occurring on Little Barrier Island. Several species are restricted to the northern tip of the Coromandel Peninsula; the Moehau stag beetle and Moehau wētā are found in native forest here along with Archey's frog which also occurs in the Herangi ranges in King Country. *Veronica scopulorum* (see plate 6) is a shrub which is restricted to rocky limestone/karst outcrops inland from Kawhia, while Mahoenui giant wētā inhabits remnant lowland forest patches and scrub and is known naturally from only one site in King Country. Three invertebrate taxa (two aquatic snails and a beetle) which are considered endemic to the Waikato have been found to be associated with limestone/karst cave ecosystems.

The Waikato region is also a stronghold for populations of several other threatened species including Australasian bittern/matuku, Pycroft's petrel, Māui dolphin, North Island kōkako and 'geothermal' or 'prostrate' kanuka (*Kunzea tenuicaulis*).

4.4 Translocation of species

Translocation is an expensive and technically challenging conservation management tool which has been used historically in the Waikato region for a range of species (McHalik 1998, Sherley 2010) and continues to be used today. Translocation may be used to allow genetic mixing, to create a protected population e.g. predator free islands, or to reintroduce species either back into their former range or to extend their current range following the removal or reduction of threats (Department of Conservation 2017). All species translocations whether led by DOC, community groups or other agencies and stakeholders must follow best practice guidelines and involve consultation with any iwi that may be affected by the translocation.

The majority of translocations in the Waikato region have extended the range of threatened species which already had remnant populations present in the region, known as re-stocking,

supplementation or reintroducing populations. This has been possible due to pest control efforts and predator fencing allowing birds, plants, herpetofauna and invertebrates to be reintroduced at mainland sites e.g. North Island brown kiwi at Maungatautari, North Island kōkako at Mt Pirongia, Giant wire rush at Lake Rotopiko and Archey's frog at Pureora, or be moved between Coromandel's predator-free offshore islands such as several lizard and wētā species. Some threatened bird species have been translocated into the Waikato region to create new safe populations in the absence of predators, having been practically lost from the NZ mainland historically (introductions potentially beyond their former natural range) these include tīeke, hihi, North Island weka, takahē and little spotted kiwi. The population of the shrub tītīrangī/napuka (*Veronica speciosa*) on the Waikato west coast is thought to have been planted by Māori and primarily holds cultural rather than conservation significance (pers. comm. P. de Lange 2015).

Translocation would almost undoubtedly be necessary for bringing back those species which have been lost from the Waikato region, if suitable and safe habitat is available. This may be most achievable for those species which have been lost more recently, as suitable habitat is more likely to still exist. Those recently lost species of the highest conservation status could particularly benefit from reestablishing new populations such as the Nationally Critical shrub kākābeak/ngutu kākā (*Clianthus puniceus*) and coastal birds NZ fairy tern/tara iti (*Sternula neris davisae*) and NZ shore plover/tūturuatu (*Thinornis novaeseelandiiae*).

4.5 Threats to native species

All NZTCS threat classifications are based on the size of the population or subpopulations, and trending for each taxon. Additional information is provided by qualifiers (see Appendix 3) which support the classification by providing critical detail on population status e.g. recruitment failure, one location, conservation dependent, range restricted or in some cases data poor.

There are some threats which are common to many native species e.g. predation from introduced animals and habitat loss. Other threats may be more specific to certain environments e.g. changes in hydrology, human land development or use of natural resources; competition from introduced invasive plants and animals (both aquatic and terrestrial); and pollution (e.g. marine and freshwater environments particularly), or quite specific to particular taxon groups or species such as illegal collection; disease; browsing by introduced herbivores and naturally small or range restricted populations (Department of Conservation 2017, 2014).

New disease threats such as kauri dieback disease and Myrtle rust pose a real risk to some previously threatened and not threatened species causing a precautionary reassessment of their risk of extinction due to the unknown long-term impacts of these diseases in New Zealand. In the future, additional species may require reassessment, depending on disease impacts, due to an association with affected species such as the Naturally Uncommon orchid *Caladenia alata* found in mānuka (*Leptospermum* spp.) and kānuka (*Kunzea* spp.) habitat (C. Beard pers. comm. 2018).

4.6 Integrating threatened species management

Council has a clear statutory mandate to maintain and enhance indigenous biodiversity through instruments such as the Resource Management Act 1991 and the Biosecurity Act 1993. The Waikato Region has suffered extensive clearance of native vegetation and drainage of wetlands which along with the suite of introduced fauna and flora present puts increased pressure on the life-supporting capacity of those remaining indigenous ecosystems. The Waikato Regional Policy Statement (2016) sets a clear direction for more collaborative indigenous biodiversity management, and recognises that achieving ecological protection and restoration goals can realise economic, social and cultural benefits.

This database represents a project with potential to provide a regional model of collaboration across private and public land in the identification, prioritisation and delivery of threatened species protection. The Waikato Conservation Management Strategy (Department of Conservation 2014) acknowledges that many areas of high biodiversity value in the Waikato occur on private land. These areas play an important role in buffering and connecting native habitats and ecosystems, and many private landowners support threatened species protection on their land.

The council's Significant Natural Area (SNA) process plays a crucial role in identifying such habitats on private land and in promoting understanding for natural area protection. To be effective in protecting threatened species council must maintain up to date knowledge on species distributions and threats. For example, the recent precautionary elevation of threat status for kauri and all native Myrtaceae has implications for council's SNA process in terms of identifying threatened species habitat, particularly with regard to the more widespread species including kauri, mānuka, kānuka and rātā species. To retain the original intent of identifying SNA through threatened species presence, and whilst research is ongoing to determine the disease threat posed to these species, a current exception for mānuka and kānuka has been suggested in the draft National Policy Statement on Indigenous Biodiversity (Biodiversity Collaborative Group 2018). It acknowledges that some relatively common Myrtaceae taxa have been elevated in conservation status solely due to the threat of myrtle rust, and suggests that these species of kānuka and mānuka should not trigger identification of an SNA based on their presence alone. It should follow that within the Waikato all common Myrtaceae (including rātā and pōhutukawa), which have been given the NZTCS qualifier of 'De' (designated) solely due to myrtle rust threat, should also be included in this SNA exception. For the Waikato region this includes two kānuka, two mānuka (one taxonomically indeterminate), six climbing rātā, two rātā tree species and pōhutukawa (see table in Appendix 6). Whilst the impacts of myrtle rust on New Zealand Myrtaceae taxa is largely unknown, the observed impact of kauri dieback disease on kauri populations may warrant identification of SNA based solely on kauri presence as a threatened species.

In 2017 the Department of Conservation released a draft NZ Threatened Species Strategy which emphasised the reliance of DOC on working with other landowners to advance species protection. The draft strategy outlines actions required to significantly progress threatened species conservation across New Zealand with an aim to increase the number of threatened species being actively managed. It also identified 150 currently managed priority species for enhanced management, as chosen to represent diversity across species groups, high threat status and nationally iconic species. Initially, these priority species were identified in the council's species dataset to align with DOC threatened species management and support DOC's vision across the Waikato Region. However, the content of DOC's draft strategy is likely to be incorporated into a new DOC Biodiversity Strategy due for release in late 2019 and it is recommended that council align with the priorities of that new document when it becomes available (L. Reynolds and J. Rolfe pers. comm. 2018).

As the council is in a position to help raise the profile amongst private landowners of Waikato's threatened species and the ecosystems that support them it is envisaged that this database will assist council to do this while continuing to work with DOC, Iwi and other agencies across the Waikato region to achieve more integrated species protection efforts on private and public land. This includes activities such as pest control, monitoring or fencing at priority sites through council administered funds and the work of Land Management Officers, as well as undertaking biodiversity restoration on council land.

5 Recommendations for future management of the database

The conservation status of threatened taxa can change frequently as rare species are often poorly understood or are the focus of current research, particularly those data deficient and indeterminate taxa. Actual changes or increased knowledge of threatened taxa population size and range may also occur affecting the accuracy of information held in the Waikato threatened and uncommon species database. Threat status may also be escalated at any time for previously not threatened species due to events such as biosecurity incursions or outbreaks of disease e.g. kauri dieback and Myrtle rust. Therefore, it is recommended that:

- A full update and analysis of the Waikato threatened and uncommon species dataset should be undertaken every 3 years to incorporate all new publications and information available in national or international databases.
- Where possible the dataset can be updated on an ad hoc basis as new information and publications become available.
- Further taxon groups which are not currently included should be added as more comprehensive information (including regional occurrence/presence data and conservation status) becomes available, e.g. non-vascular plants: hornworts and liverworts (de Lange *et al.* 2015) and mosses (Rolfe *et al.* 2016), fungi and lichenised fungi (de Lange *et al.* 2018a), marine fish, marine invertebrates (Freeman *et al.* 2014) and marine plants.
- Ecosystem classification for threatened species habitat in the database could be expanded from indigenous ecosystems to include highly anthropogenically influenced ecosystems (e.g. Singers *et al.* 2017 for Auckland Council) where threatened species can occur and is often applicable for private land such as exotic forest or pasture.
- Access to more comprehensive spatially-referenced species population data would support accuracy of the current threatened and uncommon species dataset.
- Iconic species could be used more by the council to raise the profile of threatened species and/or ecosystems within territorial authorities or ecological districts. This could highlight links with relevant and important ecological issues: e.g. freshwater quality and shortjaw kōkopu in Waipa District; or wetland habitat and bittern/matuku, giant wire rush and Fred the thread in Waikato District; or support a particular focus of community groups e.g. coastal habitat and ōi/grey faced petrel (*Pterodroma macroptera*) at Raglan.
- Consideration be given to broadening the meaning of iconic species to include cultural, ecological and community value-based perspectives, and the associated implications this may have on future updates and alterations to the database.

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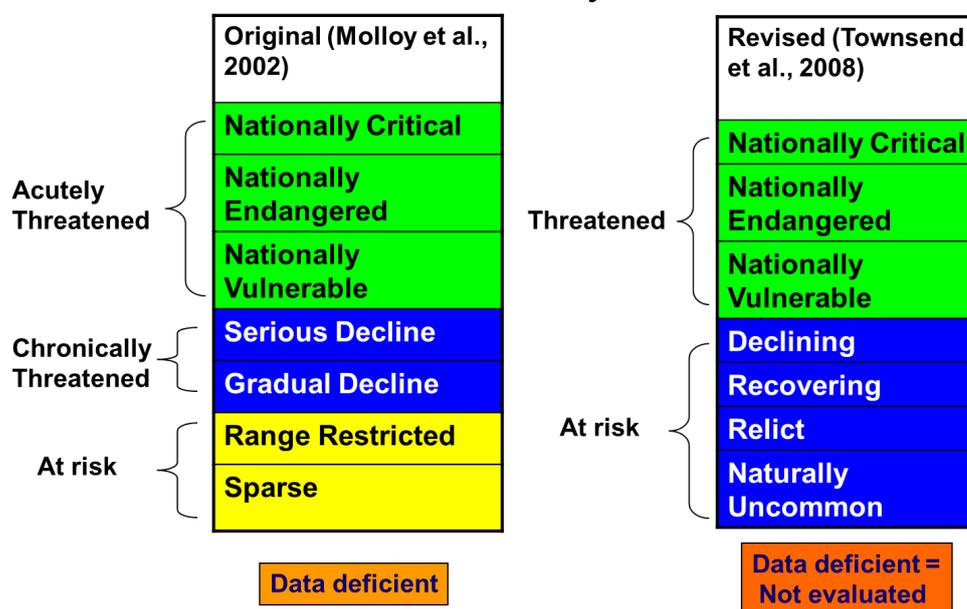
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Appendix 2. Comparison for the original 2002 and revised 2008 NZTCS

Structure of the New Zealand Threat Classification System

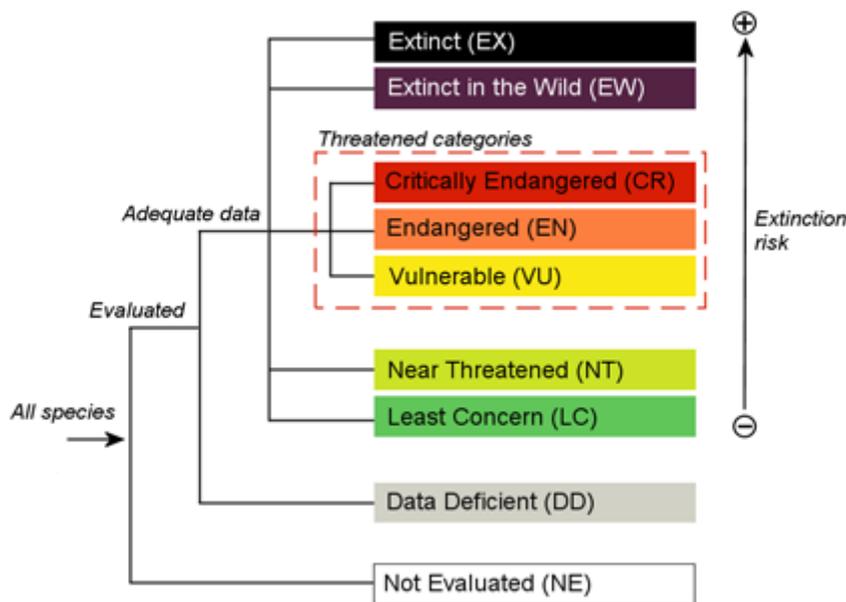


Appendix 3. Qualifiers for threat classification as described in the NZTCS 2008 revision

Qualifier	Description	Revision 2008
CD	Conservation Dependent	Unchanged since 2002
DP	Data Poor	Unchanged since 2002
EF	Extreme Fluctuations	Unchanged since 2002
EW	Extinct in the Wild	Unchanged since 2002
OL	One Location	Unchanged since 2002
RF	Recruitment Failure	Unchanged since 2002
SO	Secure Overseas	Unchanged since 2002
TO	Threatened Overseas	Unchanged since 2002
St	Stable	Changed 2008
De	Designated	New 2008
IE	Island endemic	New 2008
Inc	Increasing	New 2008
PD	Partial Decline	New 2008
RR	Range Restricted	New 2008
Sp	Sparse	New 2008

NB: see Townsend *et al.* 2008 for further definitions of each qualifier. Two qualifiers: Human Induced (HI) and Recovering (RC) were removed in the 2008 revision.

Appendix 4. IUCN threat categories



NB: Some species are also categorised as Lower Risk (conservation dependent or near threatened) and are noted as needing an updated assessment by IUCN (Source: IUCN 2012).

Appendix 5. All threatened species currently recorded in the Waikato Region with presence in territorial authorities (T.A.)

NB: Includes Threatened, At Risk and Data Deficient conservation status.

Taxon name	Thames-Coromandel	Hauraki	Waikato	Matamata-Piako	Hamilton	Waipa	Otorohanga	South Waikato	Waitomo	Taupō	Rotorua	Area outside T.A.
Birds												
<i>Acanthisitta chloris granti</i>			p			p	p	p	p	p	p	
<i>Anarhynchus frontalis</i>	p	p										
<i>Anas chlorotis</i>	p		p				p					
<i>Anthus novaeseelandiae novaeseelandiae</i>										p	p	
<i>Apteryx mantelli</i>	p	p					p		p	p	p	
<i>Apteryx owenii</i>	p											
<i>Ardea modesta</i>			p	p		p						
<i>Botaurus poiciloptilus</i>	p		p			p			p	p	p	
<i>Bowdleria punctata vealeae</i>	p		p			p	p				p	
<i>Calidris canutus rogersi</i>		p										
<i>Callaeas wilsoni</i>			p			p	p	p	p			
<i>Charadrius bicinctus bicinctus</i>	p	p	p				p		p	p	p	
<i>Charadrius obscurus aquilonius</i>	p		p				p		p			
<i>Chlidonias albobristatus</i>							p		p			

Taxon name	Thames-Coromandel	Hauraki	Waikato	Matamata-Piako	Hamilton	Waipa	Otorohanga	South Waikato	Waitomo	Taupō	Rotorua	Area outside T.A.
<i>Cyanoramphus novaezelandiae novaezelandiae</i>	p							p				
<i>Egretta sacra sacra</i>	p		p									
<i>Eudynamys taitensis</i>										p		
<i>Eudyptula minor minor</i>	p											
<i>Falco novaeseelandiae "bush"</i>	p	p	p	p		p	p		p	p	p	
<i>Fregetta maoriana</i>												
<i>Gallirallus australis greyi</i>	p											
<i>Gallirallus philippensis assimilis</i>	p	p	p									
<i>Haematopus finschi</i>	p	p					p		p			
<i>Haematopus unicolor</i>	p	p					p		p			
<i>Himantopus novaezelandiae</i>	p	p					p		p			
<i>Hydroprogne caspia</i>					p	p	p			p		
<i>Hymenolaimus malacorhynchos</i>	p		p				p	p	p	p	p	
<i>Larus bulleri</i>										p	p	
<i>Larus novaehollandiae scopulinus</i>	p	p	p				p		p		p	
<i>Limosa lapponica</i>	p	p					p		p			
<i>Mohoua albicilla</i>			p			p					p	
<i>Nestor meridionalis septentrionalis</i>	p	p	p	p	p	p	p	p	p	p	p	
<i>Notiomystis cincta</i>						p						
<i>Pelagodroma marina maoriana</i>	p											
<i>Petroica longipes</i>	p		p			p	p	p	p		p	
<i>Phalacrocorax carbo novaehollandiae</i>	p	p	p	p	p	p	p	p	p	p	p	
<i>Phalacrocorax sulcirostris</i>					p	p				p	p	
<i>Phalacrocorax varius varius</i>	p											
<i>Philesturnus rufusater</i>	p					p					p	
<i>Platalea regia</i>			p			p			p		p	
<i>Poliiocephalus rufopectus</i>			p			p		p	p	p	p	
<i>Porphyrio hochstetteri</i>						p						
<i>Porzana pusilla affinis</i>	p		p				p					
<i>Porzana tabuensis tabuensis</i>			p					p			p	
<i>Pterodroma pycrofti</i>	p											
<i>Puffinus assimilis haurakiensis</i>	p											
<i>Puffinus carneipes</i>	p											
<i>Puffinus gavia</i>	p											
<i>Sterna striata aucklandornis</i>		p										
<i>Sterna striata striata</i>		p										
Freshwater fish												
<i>Anguilla dieffenbachii</i>	p	p	p	p	p	p	p	p	p	p	p	
<i>Cheimarrichthys fosteri</i>	p	p	p	p	p	p	p		p			
<i>Galaxias argenteus</i>	p	p	p		p	p	p		p			
<i>Galaxias brevipinnis</i>	p	p	p			p	p		p	p	p	
<i>Galaxias divergens</i>								p				
<i>Galaxias maculatus</i>	p	p	p	p	p	p	p	p	p			
<i>Galaxias postvectis</i>	p	p	p			p	p		p			
<i>Geotria australis</i>	p	p	p			p	p		p			
<i>Gobiomorphus hubbsi</i>	p		p				p		p			
<i>Neochanna diversus</i>	p	p	p	p	p	p	p		p			
Frogs												
<i>Leiopelma archeyi</i>	p	p							p			
<i>Leiopelma hochstetteri</i>	p	p	p	p		p	p		p			

Taxon name	Thames-Coromandel	Hauraki	Waikato	Matamata-Piako	Hamilton	Waipa	Otorohanga	South Waikato	Waitomo	Taupō	Rotorua	Area outside T.A.
Reptiles												
<i>Dactylocnemis pacificus</i>	p	p	p			p	p		p	p		
<i>Hoplodactylus duvaucelii</i>	p					p			p			
<i>Mokopirirakau granulatus</i>	p	p	p	p		p	p	p	p	p		
<i>Naultinus elegans</i>	p	p	p			p	p	p	p	p		
<i>Naultinus punctatus</i>										p		
<i>Oligosoma aff. infrapunctatum</i> "crenulate"										p		
<i>Oligosoma alani</i>	p								p			
<i>Oligosoma infrapunctatum</i>						p	p		p	p		
<i>Oligosoma microlepis</i>										p		
<i>Oligosoma moco</i>	p	p										
<i>Oligosoma oliveri</i>	p											
<i>Oligosoma ornatum</i>	p	p					p		p			
<i>Oligosoma smithi</i>		p										
<i>Oligosoma striatum</i>				p			p	p	p			
<i>Oligosoma suteri</i>	p											
<i>Oligosoma whitakeri</i>	p								p			
<i>Sphenodon punctatus</i>	p		p			p			p			
<i>Toropuku</i> "Coromandel"	p											
Freshwater invertebrates												
<i>Amarinus lacustris</i>		p										
<i>Austropeplea tomentosa</i>			p						p	p		
<i>Echyridella menziesii</i>			p	p		p		p		p	p	
<i>Leptopyrgus manningi</i>			p									
<i>Oxyethira (Trichoglene) kirikiroa</i>					p							
<i>Potamopyrgus doci</i>									p			
<i>Potamopyrgus troglodytes</i>									p			
Terrestrial invertebrates												
<i>Anagotus</i> sp. 3 "Moehau" (Coromandel, NZAC4001390)	p											
<i>Anaticola</i> sp.	p		p				p					
<i>Caloptilia</i> sp. "Teucridium"	p								p			
<i>Deinacrida mahoenui</i>	p					p			p			
<i>Duvaliomimus (Mayotrechus) mayae mayae</i>									p			
<i>Duvaliomimus (Mayotrechus) mayae mayorum</i>									p			
<i>Geodorcus alsobius</i>	p											
<i>Geodorcus auriculatus</i>	p	p		p								
<i>Hemiandrus "elegans"</i>	p											
<i>Houdinia flexilissima</i>		p	p	p	p	p	p					
<i>Latrodectus katipo</i>			p				p		p			
<i>Motuweta isolata</i>	p											
<i>Mystacinobia zelandica</i>			p				p		p	p		
<i>Neanops caecus</i>									p			
<i>Neanops pritchardi</i>									p			
<i>Rhytida webbi</i>							p					
Mammals- bats												
<i>Chalinolobus tuberculatus</i>	p	p	p		p	p	p		p			
<i>Mystacina tuberculata rhyacobia</i>			p				p		p	p		
Marine mammals												
<i>Balaenoptera edeni brydei</i>												p

Taxon name	Thames-Coromandel	Hauraki	Waikato	Matamata-Piako	Hamilton	Waipa	Otorohanga	South Waikato	Waitomo	Taupō	Rotorua	Area outside T.A.
<i>Cephalorhynchus hectori maui</i>												p
<i>Orcinus orca</i>			p									p
<i>Tursiops truncatus</i>												p
Vascular plants												
<i>Agathis australis</i>	p	p	p	p		p	p	p				
<i>Alepis flavida</i>										p		
<i>Amphibromus fluitans</i>			p						p	p		
<i>Anaphalioides subrigida</i>											p	
<i>Anthosachne kingiana</i> subsp. <i>multiflora</i>							p					
<i>Arthropodium bifurcatum</i>	p											
<i>Asplenium cimmeriorum</i>									p			
<i>Blechnum molle</i>				p								
<i>Blechnum zeelandicum</i>			p									
<i>Botrychium australe</i>			p							p	p	
<i>Brachyglottis kirkii</i> var. <i>kirkii</i>	p	p						p	p	p		
<i>Brachyglottis myrianthos</i>	p		p									
<i>Bromus arenarius</i>	p	p			p					p		
<i>Bulbophyllum tuberculatum</i>	p		p		p	p	p		p			
<i>Caladenia alata</i>			p			p	p				p	
<i>Caladenia atradenia</i>			p			p	p				p	
<i>Caladenia bartlettii</i>	p	p		p			p		p			
<i>Caladenia variegata</i>										p		
<i>Calochilus paludosus</i>	p			p								p
<i>Calochilus robertsonii</i>	p		p							p	p	
<i>Calystegia marginata</i>	p											
<i>Carex litorosa</i>							p					
<i>Carex obtusifolia</i>										p		
<i>Carex rubicunda</i>										p		
<i>Carmichaelia nana</i>												
<i>Carmichaelia williamsii</i>	p											
<i>Celmisia adamsii</i> var. <i>adamsii</i>	p											
<i>Centipeda minima</i> subsp. <i>minima</i>			p				p		p			
<i>Christella</i> aff. <i>dentata</i> (b) (AK 126902; "thermal")										p	p	
<i>Christella dentata</i>			p		p		p		p			
<i>Clematis quadribracteolata</i>							p			p	p	
<i>Coprosma</i> aff. <i>acerosa</i> (a) (AK 158739; Central North Island)									p			
<i>Coprosma acerosa</i>	p		p						p			
<i>Coprosma dodonaeifolia</i>	p	p										
<i>Coprosma wallii</i>										p		
<i>Corunastylis nuda</i>	p			p		p	p			p	p	
<i>Corunastylis pumila</i>			p									
<i>Corybas</i> aff. <i>rivularis</i> (AK 251833; Kaitarakihi)	p		p									
<i>Corybas</i> aff. <i>oblongus</i> (WAIK8626; "swamp")		p	p	p								
<i>Corybas carsei</i>			p									
<i>Corybas sanctigeorgianus</i>							p					
<i>Cyclosorus interruptus</i>		p	p	p			p	p	p	p	p	
<i>Cyperus insularis</i>	p		p									
<i>Dactylanthus taylorii</i>	p		p				p	p	p	p	p	
<i>Danhatchia australis</i>	p											

Taxon name	Thames-Coromandel	Hauraki	Waikato	Matamata-Piako	Hamilton	Waipa	Otorohanga	South Waikato	Waitomo	Taupō	Rotorua	Area outside T.A.
<i>Dichelachne inaequiglumis</i>						p	p		p			
<i>Dichelachne micrantha</i>	p											
<i>Dicranopteris linearis</i>								p		p	p	
<i>Dracophyllum patens</i>	p											
<i>Epacris sinclairii</i>	p											
<i>Epilobium astonii</i>	p											
<i>Epilobium hirtigerum</i>			p		p		p			p		
<i>Epilobium insulare</i>			p				p		p			
<i>Euchiton ensifer</i>										p		
<i>Euchiton paludosus</i>										p		
<i>Euchiton polylepis</i>										p		
<i>Euphorbia glauca</i>	p		p		p		p					
<i>Ficinia spiralis</i>	p	p	p				p		p			
<i>Fimbristylis velata</i>			p		p			p	p		p	
<i>Fuchsia procumbens</i>	p		p	p								
<i>Gentianella chathamica</i> subsp. <i>nemorosa</i>	p		p			p	p			p		
<i>Geranium retrorsum</i>												
<i>Geranium solanderi</i>										p		
<i>Gleichenia inclusisora</i>	p											
<i>Gratiola concinna</i>	p		p					p	p	p		
<i>Halocarpus kirkii</i>	p		p									
<i>Hibiscus diversifolius</i> subsp. <i>diversifolius</i>	p											
<i>Hymenophyllum pluviatile</i>											p	
<i>Hypericum involutum</i>						p	p					
<i>Hypericum minutiflorum</i>										p		
<i>Hypolepis dicksonioides</i>	p				p					p	p	
<i>Isoetes kirkii</i>										p		
<i>Isolepis crassiuscula</i>										p		
<i>Juncus caespiticius</i>											p	
<i>Juncus distegus</i>			p				p			p	p	
<i>Korthalsella clavata</i>								p				
<i>Korthalsella salicornioides</i>	p	p	p							p	p	
<i>Kunzea amathicola</i>			p				p		p			
<i>Kunzea robusta</i>	p	p	p	p	p	p	p	p	p	p	p	
<i>Kunzea serotina</i>										p		
<i>Kunzea tenuicaulis</i>										p	p	
<i>Lagenophora lanata</i>	p											
<i>Lagenophora montana</i>										p		
<i>Lepidium oleraceum</i>	p		p									
<i>Lepidosperma neozelandicum</i>			p									
<i>Lepilaena bilocularis</i>										p		
<i>Leptinella tenella</i>							p					
<i>Leptospermum</i> aff. <i>scoparium</i> (a) (AK 284541; Auckland)												
<i>Leptospermum</i> aff. <i>scoparium</i> (b) (AK 247250; "coastal silver prostrate")	p											
<i>Leptospermum</i> aff. <i>scoparium</i> (c) (AK 191319; "Waikato Peat Bog")		p	p			p						
<i>Leptospermum scoparium</i> var. <i>scoparium</i>	p	p	p	p	p	p	p	p	p	p	p	
<i>Lindsaea viridis</i>			p							p		
<i>Lophomyrtus bullata</i>	p	p	p	p	p	p	p	p	p	p	p	

Taxon name	Thames-Coromandel	Hauraki	Waikato	Matamata-Piako	Hamilton	Waipa	Otorohanga	South Waikato	Waitomo	Taupō	Rotorua	Area outside T.A.
<i>Lophomyrtus obcordata</i>	p	p		p			p	p	p	p		
<i>Luzula leptophylla</i>										p		
<i>Lycopodiella serpentina</i>	p	p	p	p		p	p					
<i>Mazus novaezeelandiae</i> subsp. <i>impolitus</i> <i>impolitus</i>												
<i>Melicytus flexuosus</i>									p	p		
<i>Mentha cunninghamii</i>							p		p	p	p	
<i>Metrosideros albiflora</i>	p		p	p								
<i>Metrosideros carminea</i>	p	p	p			p	p		p		p	
<i>Metrosideros colensoi</i>	p	p	p			p	p	p	p	p	p	
<i>Metrosideros diffusa</i>	p	p	p	p	p	p	p	p	p	p	p	
<i>Metrosideros excelsa</i>	p	p	p				p			p	p	
<i>Metrosideros fulgens</i>	p	p	p	p	p	p	p	p	p	p	p	
<i>Metrosideros perforata</i>	p	p	p	p	p	p	p	p	p	p	p	
<i>Metrosideros robusta</i>	p	p	p	p		p	p		p	p		
<i>Metrosideros umbellata</i>	p		p	p		p	p			p		
<i>Mida salicifolia</i>	p		p	p	p	p	p	p	p	p	p	
<i>Myosotis pansa</i> subsp. <i>praeceps</i>									p			
<i>Myosotis spathulata</i>			p									
<i>Myriophyllum robustum</i>	p	p	p	p			p	p	p			
<i>Neomyrtus pedunculata</i>		p	p				p	p	p	p	p	
<i>Nephrolepis flexuosa</i>	p									p	p	
<i>Nestegis apetala</i>	p											
<i>Notogrammitis rawlingsii</i>	p											
<i>Olearia angulata</i>			p				p					
<i>Olearia cheesemanii</i>		p										
<i>Olearia pachyphylla</i>	p		p									
<i>Ophioglossum petiolatum</i>			p	p			p		p	p	p	
<i>Ourisia vulcanica</i>										p		
<i>Paspalum orbiculare</i>	p		p									
<i>Pellaea</i> aff. <i>falcata</i> (b) (AK 330788; "Auckland volcanoes")			p									
<i>Peperomia tetraphylla</i>											p	
<i>Peraxilla colensoi</i>							p			p		
<i>Peraxilla tetrapetala</i>	p	p	p	p			p		p	p	p	
<i>Phlegmariurus</i> aff. <i>varius</i> (a) (WAIK 7743; "tree fern")							p					
<i>Picris burbridgeae</i>	p	p									p	
<i>Pimelea</i> aff. <i>villosa</i> (AK 216133; southern New Zealand)	p											
<i>Pimelea longifolia</i>		p		p								
<i>Pimelea microphylla</i>										p		
<i>Pimelea oreophila</i> subsp. <i>ephaistica</i>							p			p		
<i>Pimelea orthia</i> subsp. <i>orthia</i>	p											
<i>Pimelea tomentosa</i>	p	p	p	p		p	p		p	p		
<i>Pimelea urvilleana</i> subsp. <i>nesica</i>	p											
<i>Pimelea villosa</i>	p						p					
<i>Pimelea xenica</i>	p											
<i>Piper excelsum</i> subsp. <i>peltatum</i>	p											
<i>Pisonia brunoniana</i>	p											
<i>Pittosporum ellipticum</i>	p	p	p			p	p					

Taxon name	Thames-Coromandel	Hauraki	Waikato	Matamata-Piako	Hamilton	Waipa	Otorohanga	South Waikato	Waitomo	Taupō	Rotorua	Area outside T.A.
<i>Pittosporum huttonianum</i>	p								p			
<i>Pittosporum kirkii</i>	p	p	p	p				p				
<i>Pittosporum turneri</i>							p		p	p		
<i>Pittosporum virgatum</i>	p	p					p					
<i>Planchonella costata</i>												
<i>Poa aff. colensoi</i> (a) (AK 265464; Mt Moehau)	p											
<i>Poa billardierei</i>	p						p					
<i>Pomaderris apetala</i> subsp. <i>maritima</i>			p			p			p			
<i>Pomaderris hamiltonii</i>		p	p									
<i>Pomaderris phyllicifolia</i> subsp. <i>phyllicifolia</i>			p									
<i>Pomaderris rugosa</i>	p	p	p			p	p					
<i>Prasophyllum hectorii</i>	p		p				p		p	p	p	
<i>Pseudopanax laetus</i>						p						
<i>Pterostylis aff. graminea</i> (CHR 513330; "sphagnum")			p									
<i>Pterostylis micromega</i>			p							p		
<i>Pterostylis paludosa</i>	p		p				p			p		
<i>Pterostylis puberula</i>	p		p									
<i>Pterostylis tasmanica</i>	p	p	p					p				
<i>Ptisana salicina</i>	p	p	p	p	p	p	p		p	p		
<i>Ranunculus macropus</i>			p				p		p	p	p	
<i>Rorippa divaricata</i>	p	p	p	p	p	p	p		p			
<i>Scandia aff. rosifolia</i> (AK 344466; "inland")			p				p		p			
<i>Scandia rosifolia</i>	p						p					
<i>Schizaea dichotoma</i>	p						p				p	
<i>Schoenus carsei</i>										p		
<i>Senecio banksii</i>										p		
<i>Senecio colensoi</i>										p		
<i>Senecio marotiri</i>	p											
<i>Senecio repangae</i> subsp. <i>repangae</i>	p											
<i>Sicyos mawhai</i>	p											
<i>Solanum aviculare</i> var. <i>aviculare</i>					p	p	p					
<i>Sonchus kirkii</i>		p	p									
<i>Sophora fulvida</i>			p									
<i>Spiranthes novae-zelandiae</i>										p		
<i>Sporadanthus ferrugineus</i>		p	p	p	p	p	p					
<i>Stellaria aff. parviflora</i> (AK 169580; Poor Knights)												
<i>Streblus banksii</i>	p											
<i>Stuckenia pectinata</i>			p							p		
<i>Syzygium maire</i>	p	p	p	p	p	p	p	p	p			
<i>Teucrium parvifolium</i>	p	p							p			
<i>Thelymitra aff. longifolia</i> (a) (CHR 537579; Whakapapa)										p		
<i>Thelymitra formosa</i>			p									
<i>Thelymitra ixioides</i>		p	p									
<i>Thelymitra tholiformis</i>												
<i>Thismia rodwayi</i>		p	p			p	p			p		
<i>Thyridia repens</i>	p	p					p					
<i>Tupeia antarctica</i>	p	p	p	p		p	p			p	p	
<i>Urtica perconfusa</i>										p	p	

Taxon name	Thames-Coromandel	Hauraki	Waikato	Matamata-Piako	Hamilton	Waipa	Otorohanga	South Waikato	Waitomo	Taupō	Rotorua	Area outside T.A.
<i>Utricularia australis</i>	p	p	p	p		p	p	p	p	p		
<i>Utricularia delicatula</i>			p	p		p	p					
<i>Veronica</i> aff. <i>bishopiana</i> (a) (AK 202263; Hikurangi Swamp)			p									
<i>Veronica obtusata</i>			p				p					
<i>Veronica scopulorum</i>			p				p		p			
<i>Veronica speciosa</i>			p						p			
<i>Zannichellia palustris</i>			p							p		
<i>Zostera muelleri</i> subsp. <i>novazelandica</i>	p		p				p		p			

Appendix 6. Conservation status for kauri, native Myrtaceae taxa (occurring in Waikato region) and associated *Korthalsella salicornioides* following de Lange *et al.* (2018)

NB: High or unknown disease threat level is noted. For NZTCS qualifier descriptions see Appendix 3.

Species/ Taxa	Common name	NZTCS Status	NZTCS Qualifiers	Previous name	Notes
<i>Agathis australis</i>	Kauri	Threatened Nationally Vulnerable	DP	—	Previously Not threatened. High threat from kauri dieback disease.
<i>Kunzea amathicola</i>	Kānuka	Threatened Nationally Vulnerable	DP, DE	<i>Kunzea</i> aff. <i>ericoides</i> (a) (AK 286081; “sand”)	Previously At Risk Declining. High threat from myrtle rust.
<i>Kunzea tenuicaulis</i>	Geothermal kānuka	Threatened Nationally Endangered	DP, RR	<i>Kunzea ericoides</i> var. <i>microflora</i>	Previously At Risk Naturally Uncommon. High threat from myrtle rust.
* <i>Kunzea linearis</i>	Rawiri mānuka, kānuka	Threatened Nationally Vulnerable	DP	<i>Kunzea ericoides</i> var. <i>linearis</i>	Previously At Risk Declining. High threat from myrtle rust.
<i>Kunzea robusta</i>	Kānuka	Threatened Nationally Vulnerable	DP, DE	<i>Kunzea</i> aff. <i>ericoides</i> (b) (AK 288521; ‘common’)	Previously Not threatened. Unknown threat from myrtle rust.
<i>Kunzea serotina</i>	Kānuka, makahikātoa	Threatened Nationally Vulnerable	D, DE	New listing 2018	New taxonomic entity 2014. Unknown threat from myrtle rust.
<i>Leptospermum</i> aff. <i>scoparium</i> (a) (AK 284541; Auckland)	Auckland mānuka	Threatened Nationally Vulnerable	DP, DE	New listing 2018	Taxonomically indeterminate. Unknown threat from myrtle rust.
<i>Leptospermum</i> aff. <i>scoparium</i> (b) (AK 247250; “coastal silver prostrate”)	Coastal silver prostrate mānuka	Threatened Nationally Vulnerable	DP, DE	New listing 2018	Taxonomically indeterminate. Unknown threat from myrtle rust.
<i>Leptospermum</i> aff. <i>scoparium</i> (c) (AK 191319; “Waikato peat bog”)	Waikato peat bog mānuka	Threatened Nationally Critical	DP, DE	New listing 2018	Taxonomically indeterminate. Unknown threat from myrtle rust.
<i>Leptospermum scoparium</i> var. <i>scoparium</i>	Mānuka, kahikātoa	At Risk Declining	DP, DE	—	Previously Not threatened. Unknown threat from myrtle rust.
<i>Lophomyrtus bullata</i>	Ramarama, bubble leaf	Threatened - Nationally Critical	DP	—	Previously Not threatened. High threat from myrtle rust.
<i>Lophomyrtus obcordata</i>	Rōhutu, New Zealand myrtle	Threatened - Nationally Critical	DP	—	Previously Not threatened. High threat from myrtle rust.
<i>Metrosideros albiflora</i>	White rātā vine, akatea,	Threatened - Nationally Vulnerable	DP, DE	—	Previously Not threatened. Unknown threat from myrtle rust.

Species/ Taxa	Common name	NZTCS Status	NZTCS Qualifiers	Previous name	Notes
<i>Metrosideros carminea</i>	Crimson rātā vine, Carmine rātā	Threatened - Nationally Vulnerable	DP, DE	—	Previously Not threatened. Unknown threat from myrtle rust.
<i>Metrosideros colensoi</i>	Rātā (weeping vine)	Threatened - Nationally Vulnerable	DP, DE	—	Previously Not threatened. Unknown threat from myrtle rust.
<i>Metrosideros diffusa</i>	Climbing white rātā	Threatened - Nationally Vulnerable	DP, DE	—	Previously Not threatened. Unknown threat from myrtle rust.
<i>Metrosideros excelsa</i>	Pōhutukawa, New Zealand Christmas tree	Threatened - Nationally Vulnerable	DP, DE	—	Previously Not threatened. Unknown threat from myrtle rust.
<i>Metrosideros fulgens</i>	Climbing rātā, akatawhiwhi	Threatened - Nationally Vulnerable	DP, DE	—	Previously Not threatened. Unknown threat from myrtle rust.
<i>Metrosideros perforata</i>	Climbing white rātā, akatorotoro, akatea	Threatened - Nationally Vulnerable	DP, DE	—	Previously Not threatened. Unknown threat from myrtle rust.
<i>Metrosideros robusta</i>	Northern rātā	Threatened - Nationally Vulnerable	DP, DE	—	Previously Not threatened. Unknown threat from myrtle rust.
<i>Metrosideros umbellata</i>	Southern rātā	Threatened - Nationally Vulnerable	DP, DE	—	Previously Not threatened. Unknown threat from myrtle rust.
<i>Neomyrtus pedunculata</i>	Rōhutu, myrtle	Threatened - Nationally Critical	DP	—	Previously Not threatened. High threat from myrtle rust.
<i>Syzygium maire</i>	Swamp maire, maire tawake	Threatened - Nationally Critical	DP	—	Previously Not threatened, but Regionally uncommon. High threat from myrtle rust.
<i>Korthalsella salicornioides</i>	Dwarf mistletoe, leafless mistletoe	Threatened – Nationally Critical	DP, Sp		Previously At Risk- Naturally Uncommon. High threat from myrtle rust.

*No longer considered present and potentially now lost from Waikato region (DOC unpublished notes 2014)

Appendix 7. Waikato regionally uncommon species (but nationally not threatened) as recorded through the SNA process

Taxon group	Species	Common name
Birds		
	<i>Anas rhynchotis</i>	Australasian shoveler/ kuruwhengi
	<i>Cyanoramphus auriceps</i>	Yellow-crowned parakeet/ kākārīki
	<i>Himantopus himantopus leucocephalus</i>	Pied stilt/ poaka
	<i>Petroica macrocephala toitoi</i>	Pied tit/ NZ tomtit/ miromiro
	<i>Anthornis melanura melanura</i>	Bellbird/ korimako
Freshwater fish		
	<i>Gobiomorphus huttoni</i>	Redfin bully
Reptiles		
	<i>Caretta caretta**</i>	Loggerhead turtle
Invertebrates		
	<i>Hemideina thoracica</i>	Auckland tree wētā
	<i>Hendea myersi cavernicola</i>	Harvestman spider
	<i>Onychiurus acicendelius</i>	Springtail
	<i>Paraleptamphopus</i> sp. A	Amphipod crustacean
	<i>Paraleptamphopus</i> sp. B	Amphipod crustacean
	<i>Paranephrops planifrons</i>	Crayfish/ kōura
	<i>Peripatoides suteri</i>	Peripatus/ velvet worm
	<i>Pseudosinella spelunca</i>	Springtail
	<i>Sigauss piliferus</i>	Alpine grasshopper
	<i>Spelaphourura petallata</i>	Springtail
	<i>Tyrannochthoniella</i> sp.	False scorpion
	<i>Uralbia (Zelandalbia) hopkinsi</i>	Aquatic mite
Vascular plants		
	<i>Androstoma empetrifolia</i>	-
	<i>Alternanthera nahui</i>	Nahui
	<i>Aporostylis bifolia</i>	Odd-leaved orchid
	<i>Asplenium lyallii</i>	Lyall's spleenwort
	<i>Asplenium trichomanes</i>	Spleenwort
	<i>Astelia grandis</i>	Swamp astelia
	<i>Brachyglottis kirkii</i> var. <i>angustior</i>	Kohurangi/ Kirk's Tree Daisy
	<i>Callitriche muelleri</i>	Mueller's starwort
	<i>Callitriche petriei</i> subsp. <i>Petriei</i>	Petrie's starwort
	<i>Carex inversa</i>	Creeping lawn sedge
	<i>Celmisia gracilentia</i>	Common mountain daisy/ pekapeka
	<i>Celmisia incana</i>	White mountain daisy
	<i>Centipeda aotearoana*</i>	NZ sneezewort
	<i>Cheilanthes distans</i>	Woolly cloak fern/ woolly rock fern
	<i>Chenopodium trigonon</i> subsp. <i>trigonon</i>	-
	<i>Corybas</i> aff. <i>rivularis</i> (CHR 518025; Kaimai)	

Taxon group	Species	Common name
	<i>Corybas cheesemanii</i>	Helmet orchid
	<i>Corybas rotundifolius</i> *	Helmet orchid
	<i>Crassula sinclairii</i>	-
	<i>Dianella haemata</i>	Swamp blueberry/ turutu
	<i>Elatine gratioloides</i>	-
	<i>Empodisma minus</i>	Lesser wire rush
	<i>Epacris pauciflora</i>	Tamangi/ tumingi
	<i>Epilobium chionanthum</i>	Marsh willowherb
	<i>Epilobium glabellum</i>	-
	<i>Epilobium hectorii</i>	-
	<i>Epilobium melanocaulon</i>	-
	<i>Festuca novae-zelandiae</i>	-
	<i>Fuchsia perscandens</i>	-
	<i>Gahnia rigida</i>	-
	<i>Gahnia xanthocarpa</i>	Mapere/ tupari-maunga
	<i>Galium trilobum</i>	Native bedstraw
	<i>Gastrodia minor</i>	-
	<i>Gastrodia sesamoides</i>	Pot-bellied orchid
	<i>Gonocarpus aggregatus</i>	-
	<i>Gunnera prorepens</i>	-
	<i>Huperzia australiana</i>	Club moss
	<i>Hydrocotyle hydrophila</i>	-
	<i>Hymenophyllum armstrongii</i>	Filmy fern
	<i>Hymenophyllum lyallii</i>	Filmy fern
	<i>Hymenophyllum minimum</i>	Filmy fern
	<i>Hymenophyllum pulcherrimum</i>	Filmy fern
	<i>Ileostylus micranthus</i>	Green mistletoe/ piritā
	<i>Juncus australis</i>	-
	<i>Juncus kraussii</i> subsp. <i>australiensis</i>	-
	<i>Lachnagrostis littoralis</i> subsp. <i>littoralis</i>	Coastal wind grass
	<i>Lagenophora pinnatifida</i>	-
	<i>Leionema nudum</i>	Mairehau
	<i>Libertia ixioides</i>	Mīkoikoi/ NZ iris
	<i>Libocedrus plumosa</i> *	Kawaka/ kaikawaka
	<i>Limosella lineata</i>	Mudwort
	<i>Lindsaea linearis</i>	-
	<i>Lobelia perpusilla</i>	-
	<i>Lophozonia menziesii</i>	Silver beech/ tawhai
	<i>Lycopodiella lateralis</i>	Clubmoss
	<i>Microtis oligantha</i>	Small onion orchid
	<i>Microtis parviflora</i>	Onion-leaved orchid
	<i>Myriophyllum votschii</i>	-
	<i>Nestegis montana</i>	Narrow-leaved maire
	<i>Olearia ilicifolia</i>	Mountain holly/ hakeke
	<i>Olearia solandri</i>	Coastal tree daisy
	<i>Olearia virgata</i>	Twiggy tree daisy
	<i>Ophioglossum coriaceum</i>	Adder's tongue
	<i>Pilularia novae-hollandiae</i>	Pillwort
	<i>Pimelia prostrata</i> subsp. <i>thermalis</i> *	-

Taxon group	Species	Common name
	<i>Pimelia prostrata</i> subsp. <i>vulcanica</i> *	-
	<i>Pittosporum cornifolium</i>	Tawhirikaro
	<i>Plagianthus regius</i> subsp. <i>regius</i>	Lowland ribbonwood/ manutu
	<i>Psilotum nudum</i>	Whisk fern/ skeleton fork fern
	<i>Ranunculus limosella</i>	Mud buttercup
	<i>Raukawa edgerleyi</i>	<i>Raukawa</i>
	<i>Rorippa palustris</i>	Marsh yellow cress/ poniu
	<i>Rytidosperma biannulare</i>	Gumland bristle grass
	<i>Rytidosperma setifolium</i>	Bristle tussock
	<i>Schizaea bifida</i>	Forked comb fern
	<i>Schoenus apogon</i>	-
	<i>Schoenus brevifolius</i>	Bog schoenus
	<i>Senecio glomeratus</i> subsp. <i>glomeratus</i>	Fireweed/ pukatea
	<i>Senecio quadridentatus</i>	Cotton fireweed/ pahokoraka
	<i>Sparganium subglobosum</i>	Burr reed/ mārū
	<i>Tetragia capillaris</i>	Tetragia
	<i>Thelymitra cyanea</i>	Swamp Sun Orchid/ Striped Sun Orchid
	<i>Thelymitra nervosa</i>	Spotted Sun Orchid
	<i>Trichomanes colensoi</i> *	Bristle fern
	<i>Trichomanes strictum</i>	Erect bristle fern
	<i>Trisetum arduanum</i>	-
	<i>Utricularia dichotoma</i>	Bladderwort
	<i>Vittadinia australis</i>	White fuzzweed
	<i>Wahlenbergia vernicosa</i>	Coastal Harebell/ Glossy Harebell
	<i>Wolffia australiana</i>	Water-meal

*Six species have been included here that were reassessed as no longer threatened in de Lange *et al.* (2018). **One Non-Resident Vagrant species is included here, loggerhead turtle (*Caretta caretta*), as it holds international (IUCN) vulnerable threat status.

Appendix 8. Species recently lost from the Waikato Region

NB: Includes records approximately 20-70 years old, or needing field verification for the region.

Taxon group	Species	Common name	NZTCS status
Birds			
	<i>Anas superciliosa</i>	Grey duck/ parera	Nationally Critical
	<i>Procellaria parkinsoni</i>	Black petrel/ Parkinson's petrel/ tāiko	Nationally Vulnerable
	<i>Sternula nereis davisae</i>	NZ fairy tern/ tara iti	Nationally Critical
	<i>Thinornis novaeseelandiae</i>	NZ shore plover/ tūturuatu	Nationally Critical
Invertebrates			
	<i>Potamopyrgus acus</i>	Freshwater snail	Nationally Critical
	<i>Quadriceps novaeseelandiae</i>	Bird louse	Naturally Uncommon
	<i>Saemundssonina (Saemundssonina) chathamensis</i>	Bird louse	Nationally Critical
Reptiles			
	<i>Woodworthia chrysosiretica</i>	Goldstripe Gecko	Relict
Vascular Plants			
	<i>Acaena emittens</i>	Bidibid/ pipiriri	Naturally Uncommon
	<i>Anemanthele lessoniana</i>	Gossamer grass	Relict
	<i>Anogramma leptophylla</i>	Jersey fern/ annual fern	Nationally Vulnerable
	<i>Blechnum norfolkianum</i>	-	Naturally Uncommon
	<i>Brachyglottis turneri</i>	-	Nationally Endangered
	<i>Bulbinella talbotii</i>	Talbot's onion	Naturally Uncommon
	<i>Caleana minor</i>	Flying duck orchid	Nationally Critical
	<i>Carex astonii</i>	Aston's Sedge	Naturally Uncommon
	<i>Carex berggrenii</i>	Berggren's Sedge	Declining
	<i>Carex capillacea</i>	Sedge	Nationally vulnerable
	<i>Carex cirrhosa</i>	Curly Sedge	Nationally Endangered
	<i>Carex longifructus</i>	Hook sedge	Naturally Uncommon
	<i>Carex tenuiculmis</i>	Red-leaved swamp sedge	Declining
	<i>Celmisia graminifolia</i>	-	Data Deficient
	<i>Chaerophyllum colensoi</i> var. <i>delicatum</i> (CHR 73872; Hauhungaroa Range)		Nationally Endangered
	<i>Clianthus puniceus</i>	Kākābeak/ ngutu kākā	Nationally Critical
	<i>Connorochloa tenuis</i>	Prostrate bluegrass	Data Deficient
	<i>Coprosma obconica</i>	Coprosma	Nationally Vulnerable
	<i>Corybas rivularis</i>	-	Naturally Uncommon
	<i>Corybas</i> aff. <i>rivularis</i> (CHR 534752; "rest area")		Naturally Uncommon
	<i>Crassula ruamahanga</i>	-	Naturally Uncommon
	<i>Daucus glochidiatus</i>	New Zealand carrot/ pinaki	Declining
	<i>Deschampsia cespitosa</i>	Tufted hair grass	Declining
	<i>Drymoanthus flavus</i>	-	Declining
	<i>Hymenophyllum atrovirens</i>	Filmy fern	Naturally Uncommon
	<i>Isolepis basilaris</i>	Pygmy clubrush	Declining
	<i>Isolepis lenticularis</i>	-	Nationally Critical

Taxon group Species	Common name	NZTCS status
<i>Juncus holoschoenus</i>	-	Nationally Critical
<i>Juncus pauciflorus</i>	Leafless rush	Nationally Vulnerable
<i>Kunzea linearis</i>	Rawiri mānuka/ kanuka	Nationally Vulnerable
<i>Lepidium flexicaule</i>	Coastal cress	Nationally Endangered
<i>Leptinella dispersa</i> subsp. <i>dispersa</i>	-	Naturally Uncommon
<i>Leptinella dispersa</i> subsp. <i>rupestris</i>	-	Nationally Critical
<i>Libertia peregrinans</i>	NZ iris/ mikoikoi	Nationally Vulnerable
<i>Limosella</i> (b) (CHR 515038; Manutahi)	Mudwort	Nationally Critical
<i>Lobelia carens</i>	-	Declining
<i>Machaerina complanata</i>	-	Nationally Vulnerable
<i>Mazus novaezeelandiae</i> subsp. <i>novaezeelandiae</i>	Dwarf musk	Declining
<i>Meliccytus</i> aff. <i>alpinus</i> (a) (CHR 541565; Rangipo)		Nationally Vulnerable
<i>Muehlenbeckia ephedroides</i>	-	Nationally Vulnerable
<i>Myosotis pygmaea</i>	Pygmy forget-me-not	Declining
<i>Phylloglossum drummondii</i>	-	Nationally Endangered
<i>Polygonum plebeium</i>	Small knotweed	Declining
<i>Pterostylis foliata</i>	Grassland greenhood/ tutukiwi	Naturally Uncommon
<i>Pterostylis humilis</i>	Greenhood/ tutukiwi	Naturally Uncommon
<i>Pterostylis porrecta</i>	Greenhood/ tutukiwi	Naturally Uncommon
<i>Rytidosperma merum</i>	-	Declining
<i>Rytidosperma pulchrum</i>	-	Naturally Uncommon
<i>Schoenus fluitans</i>	Floating schoenus	Naturally Uncommon
<i>Senecio scaberulus</i>	Fireweed	Nationally Critical
<i>Tetragonia tetragonoides</i>	Kōkihi/ NZ spinach	Naturally Uncommon
<i>Thelypteris confluens</i>	Marsh fern/ swamp fern	Naturally Uncommon

Appendix 9. Thirty species occurring in Waikato region which hold IUCN Threatened status

NB: All are NZTCS Threatened or At Risk except for Peripatus and Loggerhead turtle.

Taxon group	Species	Common name	IUCN status
Birds			
	<i>Anarhynchus frontalis</i>	Wrybill, ngutu pare	Vulnerable
	<i>Apteryx mantelli</i>	North Island brown kiwi	Vulnerable
	<i>Botaurus poiciloptilus</i>	Australasian bittern, matuku	Endangered
	<i>Chlidonias albostratus</i>	Black-fronted tern/ tarapirohe	Endangered
	<i>Fregetta maoriana</i>	NZ storm petrel	Critical
	<i>Gallirallus australis greyi</i>	North Island weka	Vulnerable
	<i>Himantopus novaezelandiae</i>	Black stilt/ kakī	Critical
	<i>Hymenolaimus malacorhynchos</i>	Blue duck/ whio	Endangered
	<i>Larus bulleri</i>	Black-billed gull/ tarāpuka	Endangered
	<i>Nestor meridionalis septentrionalis</i>	North Island kākā	Endangered
	<i>Notiomystis cincta</i>	Hihi, stitchbird	Vulnerable
	<i>Porphyrio hochstetteri</i>	Sth Is takahē	Endangered
	<i>Pterodroma pycrofti</i>	Pycroft's petrel	Vulnerable
Freshwater fish			
	<i>Cheimarrichthys fosteri</i>	Torrentfish/ panoko	Vulnerable
	<i>Galaxias argenteus</i>	Giant kōkopu	Vulnerable
	<i>Galaxias divergens</i>	Dwarf galaxias (West Coast)	Endangered
	<i>Galaxias postvectis</i>	Shortjaw kōkopu	Endangered
	<i>Gobiomorphus hubbsi</i>	Bluegill bully	Vulnerable
	<i>Neochanna diversus</i>	Black mudfish	Endangered
Herpetofauna			
	<i>Leiopelma archeyi</i>	Archev's frog	Critical
	<i>Caretta caretta</i>	Loggerhead turtle	Vulnerable
	<i>Oligosoma alani</i>	Robust skink	Vulnerable
	<i>Oligosoma microlepis</i>	Small-scaled skink	Vulnerable
	<i>Oligosoma striatum</i>	Striped skink	Vulnerable
	<i>Oligosoma whittakeri</i>	Whittaker's skink	Vulnerable
Terrestrial invertebrates			
	<i>Peripatoides suteri</i>	Peripatus	Vulnerable
Mammals (bats)			
	<i>Mystacina tuberculata rhyacobia</i>	Central lesser short-tailed bat/ pekapeka	Vulnerable
	<i>Chalinolobus tuberculatus</i>	Long-tailed bat/ pekapeka-tou-roa	Vulnerable
Marine mammals			
	<i>Cephalorhynchus hectori maui</i>	Māui dolphin	Endangered
Vascular plants			
	<i>Coprosma wallii</i>	Wall's coprosma	Endangered

8 Plates



Plate 1. The Waikato region has nationally important breeding sites for Australasian bittern/ matuku (*Botaurus poiciloptilus*), conservation status Nationally Critical. *Photo Department of Conservation.*



Plate 2. Archey's frog (*Leiopelma archeyi*) is endemic to the Waikato region, conservation status Declining. *Photo Sara Smerdon, Mahakirau Forest Estate Society Incorporated.*



Plate 3. Moth *Houdinia flexilissima* (in the larval form known as Fred the thread) on its only known host species the giant wire rush *Sporadanthus ferrugineus*, both endemic to the Waikato region and with conservation status of Relict. Photo Neil Fitzgerald.



Plate 4. Dwarf mistletoe *Korthalsella salicornioides*, conservation status Nationally Critical, on host plant kānuka *Kunzea robusta*, status Nationally Vulnerable- potentially threatened by myrtle rust disease. Photo Neil Fitzgerald.



Plate 5. Tainui *Pomaderris apetala* subsp. *maritima*, conservation status Nationally Critical, known to occur naturally at only a few sites, on the North Island's west coast. *Photo Moniqua Nelson-Tunsley.*



Plate 6. The Awaroa hebe *Veronica scopulorum* endemic to a few rocky outcrops in karst/ limestone areas of the Waikato, conservation status Declining. *Photo Bruce Clarkson.*