Conservation Status of Bat Species in Tāmaki Makaurau / Auckland

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Cover image credit: Long-tailed bat *(Chalinolobus tuberculatus)*, Waitākere Ranges Regional Park. Photograph by Aotearoa Science Agency.
Inside image credit: Installing a harp trap to catch long-tailed bats for a radiotracking study, Waitākere Ranges Regional Park. Photograph by Ben Paris.

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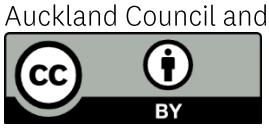
We thank Pascale Michel (DOC) for sharing documentation for the assessments. Jeremy Rolfe (DOC) has led the development of this systematic approach to assessing the regional conservation status for indigenous species. Philippa Crisp and Roger Uys (Greater Wellington Regional Council) gave advice on the process followed for their assessments. Jane Andrews (Auckland Council) is the Biodiversity Focus Area Programme lead for Auckland Council.



Executive summary

The regional conservation status of all known bat taxa in Tāmaki Makaurau / the Auckland region was assessed for the first time, using the New Zealand Threat Classification System (NZTCS). We used the draft Department of Conservation regional guidelines (Department of Conservation 2014) and followed the process outlined by the Greater Wellington Regional Council (Crisp, 2020). A total of two bat species were identified as present in Tāmaki Makaurau / Auckland, the pekapeka-tou-poto, Northern lesser short-tailed bat (*Mystacina tuberculata aupourica*) and the pekapeka-tou-roa, long-tailed bat (*Chalinolobus tuberculatus*). Both species were assessed as regionally threatened.

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1 Introduction

Completing regional conservation status assessments for bats in Tāmaki Makaurau / Auckland is a component of Auckland Council's Biodiversity Focus Area (BFA) Programme. Under this programme, several projects are being established to deliver on council's obligations for regional biodiversity management under Te Tahua Pūtea Tau 2021-2031 Long-term Plan (Auckland Council 2021), the Auckland Council Indigenous Biodiversity Strategy (Auckland Council 2012), Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020 (Department of Conservation 2020), Mahere ā-Rohe Whakahaere Kaupapa Koiora Orotā mō Tāmaki Makaurau Auckland Regional Pest Management Plan 2020-2030 (Auckland Council 2020) and the draft National Policy Statement for Indigenous Biodiversity (Ministry for the Environment 2022).

The Department of Conservation regularly assesses the national conservation status of many taxa using the New Zealand Threat Classification System (NZTCS) (Townsend et al., 2008, Rolfe et al., 2021). National conservation status assessments of New Zealand bats are published at regular intervals as part of the Department of Conservation New Zealand Threat Classification Series (O'Donnell et al., 2010, 2012, 2018). While the national assessments are helpful for prioritising conservation management, research, monitoring and natural resource management decisions at a national scale, there are limitations in their use of informing these at a regional scale in relation to the statutory responsibilities of local government.

The regional conservation status of a species is particularly important in the context of consenting processes under the Resource Management Act 1991 (RMA). Under the RMA, regional and district councils have a statutory obligation to manage threatened species' habitats. A key requirement of managing threatened species' habitats and achieving recovery of threatened species in Tāmaki Makaurau / Auckland is to have a good understanding of regional population sizes and know where declines are occurring. In addition to regulatory requirements, regional conservation assessments may help inform local government decisions as land managers of conservation areas such as regional parks. Furthermore, regional conservation status assessments will provide a stronger foundation for assessing species nationally as they utilise regional expert knowledge and data that may not otherwise be readily available.

Greater Wellington Regional Council has completed regional threat assessments for several taxa groups in the Wellington Region (Crisp, 2020). Methodologies for that work were based on the national NZTCS system (Townsend et al., 2008, Rolfe et al., 2021) and thresholds for area of occupancy/species number adjusted for land area in the region (Appendix 1). National strongholds and additional regional qualifiers including natural or historic range limits were also considered (Appendix 2). Auckland Council has recently completed regional conservation status assessments for reptiles, amphibians and vascular plants using this methodology. This report is the first regional conservation status assessment for bats in Tāmaki Makaurau / Auckland.

2 Methods

A panel comprised of external experts (Dr Kerry Borkin, Dr Ian Davidson-Watts, Dr David Clarke, Fiona Davies, Chris Burton) and Auckland Council ecologists (Ben Paris, Jacinda Woolly, Dr Sabine Melzer) assessed the status of the bat species in Tāmaki Makaurau / Auckland during a virtual workshop held during November 2022. The external panel members were invited to participate in the assessment based on their knowledge and experience working with bats in the region and/or nationally.

This report covers both bat species present in the region and followed the draft Department of Conservation process for assessing regional conservation status (Department of Conservation 2014, pers. comm. Pascale Michel).

We used spatial data from Auckland Council and the Department of Conservation in conjunction with other map layers including vegetation cover (Land Cover Database v. 5.0; Manaaki Whenua – Landcare Research 2020) and land water boundaries to inform decisions on distribution of each bat species. Spatial data was viewed in the Auckland Council Conservation Information System, Ruru. A decision support tool was developed in Ruru consisting of an ESRI dashboard (geographic information software system) with an embedded web map and ArcGIS survey123 form to facilitate assessing each species following the process outlined in Appendix 1 (Fig. 1). The tool allows all required information including spatial data to be viewed in one place and the survey123 form contains a series of predefined questions and selections.

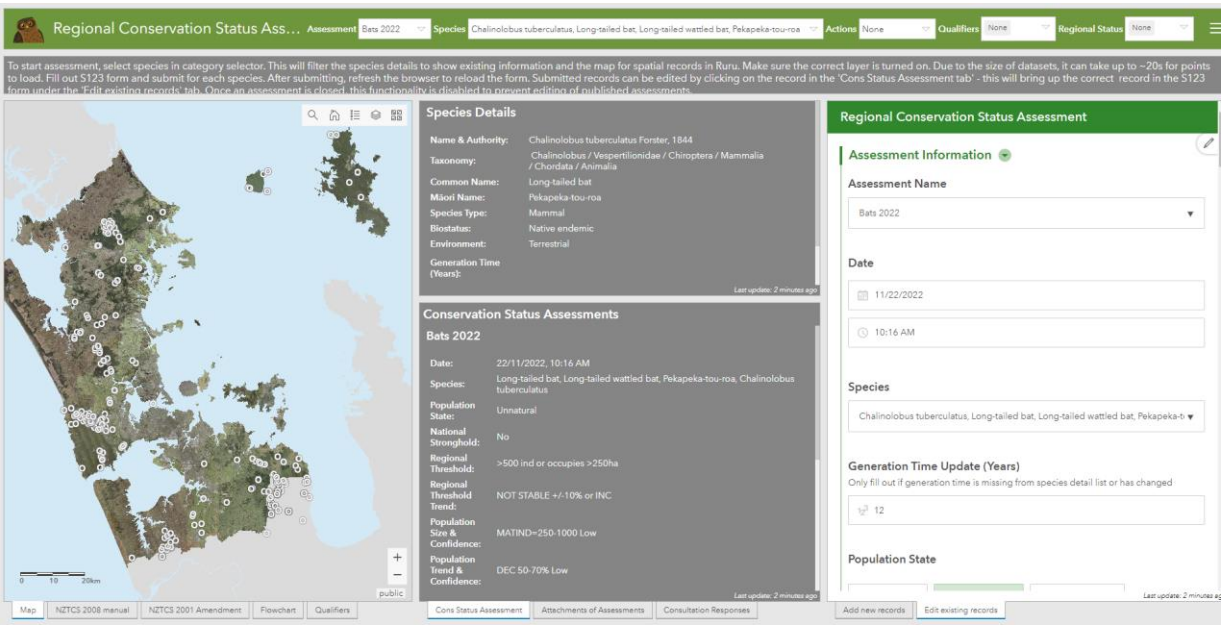

Figure 1. Decision support tool developed in Ruru (Auckland Council Conservation Information System).

All bat species from the national NZTCS list (O'Donnell et al., 2018) not known to be present in the region were removed from consideration in the assessment. Nationally threatened species that reproduce or are resident for more than half their life cycle in the region were assigned a regional conservation status by applying the NZTCS criteria (Townsend et al., 2008, Rolfe et al., 2021).

To maintain the highest protection of threatened species and for consistency between regional and national assessments, regional status must not be a lower threat category than the most recent published national status. For example, a Nationally Endangered taxon cannot be assessed as Regionally Vulnerable or lower, but it could be assessed as Regionally Critical. Population trend criteria are applied based on current knowledge, projecting from recent past into the future.

The process for determining the regional threat status of a species is shown in Appendix 1 and a full list of qualifiers applied in Appendix 2. If more than 20% of the national population is breeding or resident for more than half their life cycle in Tāmaki Makaurau / Auckland, the species was assigned National Stronghold status and the NZTCS criteria applied. Regional thresholds for number of mature individuals and habitat occupancy area, allowing for differences in land area, were applied as drafted by the Department of Conservation (Department of Conservation 2014). Thresholds are designed to be used universally across a wide range of taxa and allow for using either an area or population size estimate based on the information available for a species. For Tāmaki Makaurau / Auckland, the threshold was set at 500 mature individuals present or a habitat occupancy area of 250ha. If a species did not meet the threshold, it was assigned a regional conservation status by applying the NZTCS criteria. If it did meet the threshold and the population was ±10% stable or increasing, it was assigned the status regionally not threatened.

The Auckland region is defined here as the Auckland administrative area. For the purposes of this assessment the entire Te Ngāherehere-o-Kohukohunui Forest was considered. This is because, while a large part of the Hūnua Ranges is within the Waikato region, most of the area is managed by Auckland Council as the Hūnua Ranges Regional Park. Te Ngāherehere-o-Kohukohunui, the extensive tract of forest across the Hūnua Ranges, provides one of the most important opportunities to conserve and protect ecologically functional ecosystems and the diversity of native species that they support on the mainland of Tāmaki Makaurau / Auckland.

3 Results

Two bat species were identified as present in Tāmaki Makaurau / Auckland (Table 1): the pekapeka-tou-poto, Northern lesser short-tailed bat (*Mystacina tuberculata aupourica*) and the pekapeka-tou-roa, long-tailed bat (*Chalinolobus tuberculatus*). Both species are Regionally Threatened. The region was identified as a national stronghold (>20% of the national population present) for the lesser short-tailed bat. Neither species are endemic to Tāmaki Makaurau / Auckland.

The long-tailed bat was assessed as Regionally Critical. Although this species is widespread across the region, apart from an assumed secure population on predator-free Te Hauturu-ō-Toi / Little Barrier Island, the population trend for the rest of the region was estimated to be a 50-70% decline over the next three generations, associated primarily with predation from introduced mammalian predators (including rats, possums, mustelids, cats), but also ongoing habitat loss and degradation and from other human impacts.

The estimated population size for long-tailed bats was 250-1000 mature individuals for the region. There was low confidence in the estimated population size and trend as very little population monitoring work, and no mark-recapture studies sufficient to understand survival rates have been undertaken to determine these for bat populations within the region.

There have been several short-term studies completed to identify roost trees of long-tailed bats (using capture of individual long-tailed bats, attaching radio-transmitters and following them to attempt to identify roosts), (Alexander, 2001; Davidson-Watts, 2019; EcoQuest 2019, 2020). Based on the initial findings from these studies, the panel felt a conservative estimate of population size was prudent.

Further survey and monitoring work is required to better understand the stability of long-tailed bat populations in Tāmaki Makaurau / Auckland and the critical areas of habitat to them. Particularly important areas that were identified for long-tailed bats in the region included Te Hauturu-ō-Toi / Little Barrier Island, Aotea / Great Barrier Island, the Hūnua Ranges, the Waitākere Ranges, the Manukau lowlands / Franklin area and the Rodney district. Long-tailed bats have been recorded widely across the region, however the relative importance and their use of different areas requires further investigation.

The lesser short-tailed bat was assessed as Regionally Vulnerable. Within the region, lesser short-tailed bats are presently only known from predator-free Te Hauturu-ō-Toi / Little Barrier Island. The panel considered that there have been insufficient survey efforts to undoubtedly rule out the possibility of other populations in the region persisting, with the most likely locations being the Hūnua Ranges and Aotea / Great Barrier Island.

At present Te Hauturu-ō-Toi / Little Barrier Island is the southernmost population for the species, so the Natural Range qualifier has been applied. The population trend for lesser short-tailed bats was estimated to be stable +/- 10% on the basis that the primary threats to the species have been removed from the only known site (because Te Hauturu-ō-Toi / Little Barrier Island is a protected

nature reserve and has been predator-free since 2004). Although this population is likely to be stable, if any mainland populations do remain in the region, they are likely to be in decline and so the Partial Decline qualifier has been applied. The estimated population size for short-tailed bats was 1000-5000 mature individuals. There was low confidence in the estimated population size and trend as the panel members were not aware of any population monitoring being done on lesser short-tailed bats in the region.

Both species are dependent on the continuation of conservation measures. This includes that Te Hauturu-ō-Toi / Little Barrier Island (where both species of bat are present), remains predator-free with ongoing pest pathway management and surveillance. It is also important that those areas of forested habitat containing large numbers of old trees (including the Hūnua and Waitākere Ranges where long-tailed bat roosts have been located) remain protected from activities that could adversely impact these populations. Conservation measures include the ongoing protection of existing vegetation (particularly potential roost trees) from removal or disturbance. Measures also include the continuation, expansion or intensification of existing predator control programmes in these areas, particularly for rats, possums, mustelids and cats.

Conservation research is required to determine additional solutions for recovery for both species. This includes the development of more efficient and effective survey and population monitoring techniques and improved methods for landscape-scale mainland predator suppression for rats, possums, mustelids, and feral/unowned/stray cats. Further research on the human pressures potentially impacting long-tailed bats such as the effects of artificial lighting would be beneficial.

The potential effects of climate change on both bat species are not well understood but are likely to pose new threats and exacerbate existing threats. Potential climate change impacts may include increases in predator irruptions, disease impacts on roost trees, and the frequency and intensity of extreme weather events. For example, these may result in suboptimal conditions for torpor (short bouts of hibernation), changing food resources, and loss of roost trees and available habitat. The Climate Impact qualifier has been applied to both species.

Table 1: Regional Conservation Status of bat species in Tāmaki Makaurau / Auckland

Common Name	Name and Authority	National Conservation Status (2017)	Regional Conservation Status (2022)	Regional Criteria	National Stronghold	Regional Population	Regional Trend	Regional Confidence Population	Regional Confidence Trend	Regional Qualifiers	Regional Threat Assessment Notes
Long-tailed bat, pekapeka-tou-roa	*Chalinolobus tuberculatus* Forster, 1844	Nationally Critical	Regionally Critical	B (1)	No	250-1,000	50-70% decline	Low	Low	CI, CD, CR, DPS, DPT, PD	Have been detected throughout the region but as a highly mobile species, the detections do not indicate population state/size. Very little known on its population state – no monitoring of population size or survival rates. Where roosts have been located within the region, low numbers have been recorded in comparison to similar studies elsewhere. Rate of decline considered to be high where there is no predator control in roost areas.
Northern lesser short-tailed bat, pekapeka-tou-poto	*Mystacina tuberculata aupourica* Hill & Daniel, 1985	Nationally vulnerable	Regionally Vulnerable	B (1)	Yes	1,000-5,000	Stable +/- 10%	Low	Low	CI, CD, CR, DPS, DPT, NS, NR, PD	The only currently known population in the region is on Te Hauturu-ō-Toi / Little Barrier Island – this is also the national stronghold for the species. Population considered likely to be stable with the island remaining pest-free. Insufficient survey has taken place to exclude them remaining elsewhere in the region.

4 Discussion

The two bat species present in Tāmaki Makaurau / Auckland are considered regionally threatened. Long-tailed bats were assessed as being "regionally critical", while northern lesser short-tailed bats were assessed as "regionally vulnerable". These regional conservation assessments will be useful to help guide the prioritisation of species for targeted survey, monitoring, management, and research to ensure regional viability of indigenous species is maintained in the region over the long-term.

Completing regional conservation status assessments for bats in Tāmaki Makaurau / Auckland is a component of Auckland Council's Biodiversity Focus Area (BFA) Programme. BFAs represent the minimum set of sites requiring targeted management of critical pressures to ensure regional viability of indigenous ecosystems, sequences and species is maintained in the region over the long-term (>50 years). Under this programme, several projects are being established to deliver on council's obligations for regional biodiversity management.

As part of the regional conservation status assessments' workshop the panel discussed key pressures for bats in the region that require management to ensure the long-term persistence of bats in Tāmaki Makaurau / Auckland. Survey and research needs were discussed to clarify priorities for addressing critical information gaps.

While work under the different projects is being shaped to improve outcomes for threatened species in the region, Auckland Council has been supporting survey work for long-tailed bats for a number of years, with further council supported surveys underway or planned (Table 2).

Table 2: Long-tailed bat survey projects led or supported by Auckland Council

Survey project	References	Status
Auckland regional long-tailed bat surveys 2011-2017	Bioresearches 2011, 2012, 2013, 2014a, 2014b, 2016a; Boffa Miskell 2015, 2017a; de Koning 2013; Reed 2014	Completed
Auckland long-tailed bat distribution modelling 2016	Crewther, 2016; Boffa Miskell 2017b	Completed
Hūnua Ranges bat surveys pre- and post- pest control operations	Bioresearches 2015, 2016b; Ecology New Zealand 2019	Completed
Hūnua Ranges long-tailed bat survey and radio tracking 2018-2019	EcoQuest Education Foundation 2019, 2020	Completed
Waitākere Ranges long-tailed bat survey and radio tracking 2018-2019	AECOM 2019; Davidson-Watts Ecology 2019	Completed
Aotea / Great Barrier Island bat survey 2021	Soundcounts 2021	Completed

Survey project	References	Status
Finding Franklin Bats long-tailed bat survey and radio tracking 2021-2023	EcoQuest Education Foundation 2022	Underway
Community bat surveys through Community Waitākere/Kaipātiki Project (Upper Harbour, Rodney and Waitākere) 2022		Ongoing

Identifying areas for bat management

There are a number of characteristics of long-tailed bats that make them challenging to protect, including being a highly mobile species. Despite them being a highly mobile species, they are essentially 'tethered' to roosts, so the protection of suitable roosts and other trees is crucial for their survival. A roost is a place where bats shelter or rest, use for periods of torpor and for breeding. Long-tailed bats regularly move to new roosts, when these are available, and utilise a network of suitable roosts across an area (O'Donnell and Sedgeley 1999).

Fundamental knowledge gaps for long-tailed bats in the region include key roosting areas and feeding areas. The majority of the survey work done in the region to date has focussed on detection (using acoustic detectors or recorders). These surveys have provided evidence of long-tailed bat activity or presence across the region, but do not provide much information on the use or importance of the area in which they are detected.

Identifying roosting areas is critical for targeting areas for predator management. An intensive level of predator management is required to achieve recovery of long-tailed bat populations (O'Donnell et al., 2017). Given the effort and resource required, it is essential that the right areas are targeted for management. Finding roosts and roosting areas, requires radiotracking of individual bats. This would mean that individual bats would need to be caught and radio transmitters attached to them, with attempts made to follow bats to their roosts. Although there have been several initial, short-term radiotracking studies which have led to the discovery of roost trees of long-tailed bats, further work is required to refine areas for management for long-tailed bats in the region.

Habitat protection measures

Under the Auckland Unitary Plan there are measures in place to protect areas of vegetation through the Significant Ecological Areas (SEA) overlay. There are rules associated with the overlay to protect these areas from inappropriate use or development. The overlay covers many areas of vegetation which may be used by long-tailed bats for roosting, or at night when flying, socialising, feeding, or commuting. However as so little is understood about their use of these areas for roosting versus when flying, it cannot be assumed sufficient habitat protection is afforded by this measure alone. It is possible that there are roosting areas outside of mapped Significant Ecological Areas, and almost certainly there will be foraging and commuting areas outside of these. Further detection and radiotracking studies are required to understand important areas used by long-tailed bats within the region so that suitable protection measures can be put in place.

The draft National Policy Statement for Indigenous Biodiversity (Ministry for the Environment 2022) lists both long-tailed bat and northern lesser short-tailed bat as specified 'highly mobile fauna'. It proposes the region-wide identification of Significant Natural Areas (SNAs), and the identification of additional 'highly mobile fauna areas' where these fall outside of SNAs. These areas are to be managed to maintain viable populations of these species across their natural range. Councils further must include objectives, policies, or methods in their policy statements and plans for managing the adverse effects of new subdivision, use, and development on highly mobile fauna areas. It is also proposed that councils should provide information to their communities about highly mobile fauna and their habitats, and about best practice techniques for managing adverse effects on any specified highly mobile species in their regions.

Some of the areas identified as important habitat for long-tailed bats through the conservation status assessment are afforded legal protection as reserves (administered by the Department of Conservation, and local and regional parks administered by Auckland Council). The Waitākere Ranges is also subject to the Waitākere Ranges Heritage Act which was established to help with the protection and enhancement of its heritage values including indigenous ecosystems and habitat values.

Pest management

Auckland Council undertakes and supports various ongoing pest management activities that are likely to benefit long-tailed bat populations including:

- Predator management in the Hūnua and Waitākere Ranges;
- Regional possum control programme;
- Pathways management to maintain the status of the Hauraki Gulf pest-free islands;
- Kauri dieback management; and
- Supporting many of the community-led pest management initiatives across the region.

Populations of long-tailed bats may have benefitted from these programmes even though the programmes were not designed for them specifically, but species outcome monitoring for long-tailed bats has not been undertaken to confirm this. Further detection and radiotracking studies would help refine areas requiring more targeted or intensified pest management.

Monitoring

Mark and recapture programmes are the only established standardised best-practice method for outcome monitoring for long-tailed bats. These programmes rely upon capturing bats, marking them in some way (for example with a band or pit-tag), and then capturing them again at a later date in order to understand survival and population size. This method is resource intensive and can be challenging to undertake, but this work is essential to understand the state of existing long-tailed bat populations and any changes in response to management interventions. Outcome monitoring through mark and recapture programmes may also provide opportunities for identifying the impacts of emerging threats to long-tailed bats in the region.

Coordination of bat work

In 2020, the Auckland Bat Alliance was initiated: bringing together Auckland Council, the Department of Conservation, mana whenua, community groups and ecological consultants to understand key research, management and collaboration needs for the many people working with long-tailed bats across the region. The Alliance prioritised research on determining what long-tailed bats needed to flourish in Tāmaki Makaurau / Auckland. The consensus was that the first priority for research should be determining where long-tailed bats are using including key areas, roosting sites and feeding areas. Working groups were split into policy and planning; training and development; and research and data, with alliance members meeting several times over two years to discuss findings and recommendations. Ongoing funding for coordination of the Alliance could not be secured at the time and so the Alliance has not moved forward in its previous form. Strong community enthusiasm for coordinated citizen science bat surveying has continued with community groups recently receiving funding to conduct further bat surveys.

Next steps

A comprehensive framework and plan for management needs for threatened species as well as species-led outcome monitoring are being developed under Auckland Council's BFA programme. The programme aims to provide more reliable population state and trend data, allow for adaptive management, and improve outcomes for threatened species in the region.

There is a significant amount of future work required to survey, manage, monitor, and protect bat species within the region. Working alongside mana whenua and in continued partnership with communities, researchers, private landowners, and other agencies will be critical for ensuring the long-term survival of bat species in Tāmaki Makaurau / Auckland.

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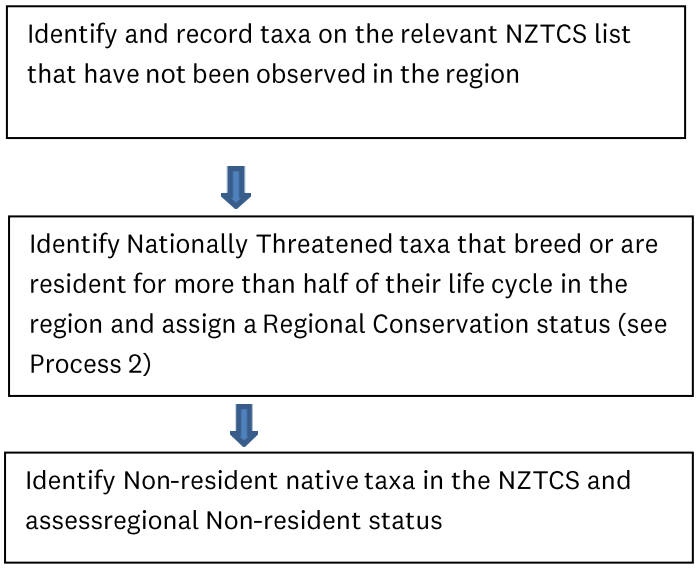
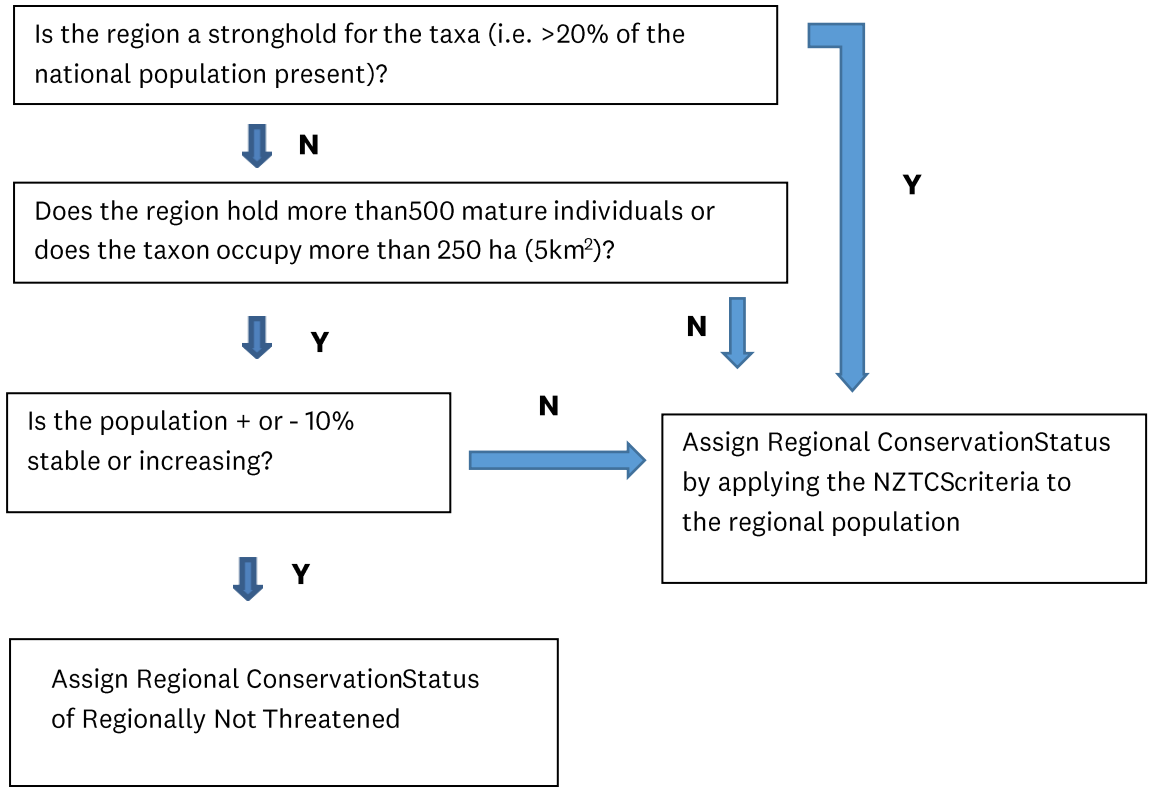
Appendix 1: Process for determining the regional threat status of a species

Process 1: Determination of regional threat status



Process 2: Determination of strongholds and Regionally Not Threatened species



Appendix 2: List of national and regional qualifiers

Code	Qualifier	Qualifier Type	National / Regional	Description
DPR	Data Poor: Recognition	Assessment Process Qualifier	National	Confidence in the assessment is low because of difficulties in determining the identity of the taxon in the field and/or in the laboratory. Taxa that are DPR will often be DPS and DPT. In such cases, the taxon is most likely to be Data Deficient.
DPS	Data Poor: Size	Assessment Process Qualifier	National	Confidence in the assessment is low because of a lack of data on population size.
DPT	Data Poor: Trend	Assessment Process Qualifier	National	Confidence in the assessment is low because of a lack of data on population trend.
DE	Designated	Assessment Process Qualifier	National	A taxon that the Expert Panel has assigned to what they consider to be the most appropriate status without full application of the criteria. For example, a commercial fish stock that is being fished down to Biomass Maximum Sustainable yield (BMSy) may meet criteria for 'Declining', however, it could be designated as 'Not Threatened' if the Expert Panel believes that this better describes the taxon's risk of extinction
IE	Island Endemic	Biological Attribute Qualifier	National	A taxon whose natural distribution is restricted to one island archipelago (e.g. Auckland Islands) and is not part of the North or South Islands or Stewart Island/Rakiura. This qualifier is equivalent to the 'Natural' Population State value in the database.
NS	Natural State	Biological Attribute Qualifier	National	A taxon that has a stable or increasing population that is presumed to be in a natural condition, i.e., has not experienced historical human-induced decline.
RR	Range Restricted	Biological Attribute Qualifier	National	A taxon naturally confined to specific substrates, habitats or geographic areas of less than 1000 km^2 (100 000 ha), this is assessed by taking into account the area of occupied habitat of all sub-populations (and summing the areas of habitat if there is more than one sub-population), e.g. Chatham Island forget-me-not (*Myosotidium hortensia*) and Auckland Island snipe (*Coenocorypha aucklandica aucklandica*). This qualifier can apply to any 'Threatened' or 'At Risk' taxon. It is redundant if a taxon is confined to 'One Location' (OL).
Sp	Sparse	Biological Attribute Qualifier	National	The taxon naturally occurs within typically small and widely scattered subpopulations. This qualifier can apply to any 'Threatened' or 'At Risk' taxon.
NO	Naturalized Overseas	Population State Qualifier	National	A New Zealand endemic taxon that has been introduced by human agency to another country (deliberately or accidentally) and has naturalised there e.g., *Olearia traversiorum* in the Republic of Ireland.
OL	One Location	Population State Qualifier	National	Found at one location in New Zealand (geographically or ecologically distinct area) of less than 100 000 ha (1000 km^2), in which a single event (e.g. a predator irruption) could easily affect all individuals of the taxon, e.g. L'Esperance Rock groundsel (Senecio esperensis) and Open Bay Island leech (*Hirudobdella antipodum*). 'OL' can apply to all 'Threatened', 'At Risk', Non-resident Native – Coloniser and Non-resident Native – Migrant taxa, regardless of whether their restricted distribution in New Zealand is natural or human-induced. Resident native taxa with restricted distributions but where it is unlikely that all sub-populations would be threatened by a single event (e.g. because water channels within an archipelago are larger than known terrestrial predator swimming distances) should be qualified as 'Range Restricted' (RR).
SO	Secure Overseas	Population State Qualifier	National	The taxon is secure in the parts of its natural range outside New Zealand.
SO?	Secure Overseas?	Population State Qualifier	National	It is uncertain whether a taxon of the same name that is secure in the parts of its natural range outside New Zealand is conspecific with the New Zealand taxon.

Code	Qualifier	Qualifier Type	National / Regional	Description
S?O	Secure? Overseas	Population State Qualifier	National	It is uncertain whether the taxon is secure in the parts of its natural range outside New Zealand.
TO	Threatened Overseas	Population State Qualifier	National	The taxon is threatened in the parts of its natural range outside New Zealand.
TO?	Threatened Overseas?	Population State Qualifier	National	It is uncertain whether a taxon of the same name that is threatened in the parts of its natural range outside New Zealand is conspecific with the New Zealand taxon.
T?O	Threatened? Overseas	Population State Qualifier	National	It is uncertain whether the taxon is threatened in the parts of its natural range outside New Zealand.
CI	Climate Impact	Pressure Management Qualifier	National	The taxon is adversely affected by long-term climate trends and/or extreme climatic events. The following questions provide a guide to using the CI Qualifier: Is the taxon adversely affected by long-term changes in the climate, such as an increase in average temperature or sea-level rise? If NO = no Qualifier but needs monitoring and periodic re-evaluation because projected changes to the average climate and sea-level rise may adversely impact the taxon (including via changes to the distribution and prevalence of pests, weeds and predators) in the future. If YES = CI Qualifier Is the taxon adversely affected by extreme climate events, such as a drought, storm or heatwave? If No = no Qualifier but needs monitoring and periodic re-evaluation because projected changes to the climate are likely to increase the frequency and/or severity of these events in the future. If YES = CI Qualifier Use of the Climate Impact Qualifier would indicate the need for more in-depth research, ongoing monitoring of climate impacts, and potentially a climate change adaptation plan for the taxon.
CD	Conservation Dependent	Pressure Management Qualifier	National	The taxon is likely to move to a worse conservation status if current management ceases. The term 'management' can include indirect actions that benefit taxa, such as island biosecurity. Management can make a taxon CD only if cessation of the management would result in a worse conservation status. The influence of the benefits of management on the total population must be considered before using CD. The benefit of managing a single subpopulation may not be adequate to trigger CD, but may trigger Partial Decline (PD). Taxa qualified CD may also be PD because of the benefits of management.
CR	Conservation Research Needed	Pressure Management Qualifier	National	Causes of decline and/or solutions for recovery are poorly understood and research is required.
EW	Extinct In The Wild	Pressure Management Qualifier	National	The taxon is known only in captivity or cultivation or has been reintroduced to the wild but is not self-sustaining. Assessment of a reintroduced population should be considered only when it is self-sustaining. A population is deemed to be self-sustaining when the following two criteria have been fulfilled: it is expanding or has reached a stable state through natural replenishment and at least half the breeding adults are products of the natural replenishment, and it has been at least 10 years since reintroduction
EF	Extreme Fluctuations	Pressure Management Qualifier	National	The taxon experiences extreme unnatural population fluctuations, or natural fluctuations overlaying human-induced declines, that increase the threat of extinction. When ranking taxa with extreme fluctuations, the lowest estimate of mature individuals should be used for determining population size, as a precautionary measure.
INC	Increasing	Pressure Management Qualifier	National	There is an ongoing or forecast increase of > 10% in the total population, taken over the next 10 years or three

Code	Qualifier	Qualifier Type	National / Regional	Description
				generations, whichever is longer. This qualifier is redundant for taxa ranked as 'Recovering'.
PD	Partial Decline	Pressure Management Qualifier	National	The taxon is declining over most of its range, but with one or more secure populations (such as on offshore islands). Partial decline taxa (e.g. North Island kākā *Nestor meridionalis septentrionalis* and Pacific gecko *Dactylocnemis pacificus*) are declining towards a small stable population, for which the Relict qualifier may be appropriate.
PF	Population Fragmentation	Pressure Management Qualifier	National	Gene flow between subpopulations is hampered as a direct or indirect result of human activity. Naturally disjunct populations are not considered to be 'fragmented'.
PE	Possibly/Presumed Extinct	Pressure Management Qualifier	National	A taxon that has not been observed for more than 50 years but for which there is little or no evidence to support declaring it extinct. This qualifier might apply to several Data Deficient and Nationally Critical taxa.
RF	Recruitment Failure	Pressure Management Qualifier	National	The age structure of the current population is such that a catastrophic decline is likely in the future. Failure to produce new progeny or failure of progeny to reach maturity can be masked by apparently healthy populations of mature specimens. Population trend qualifiers
Rel	Relict	Pressure Management Qualifier	National	The taxon has declined since human arrival to less than 10% of its former range but its population has stabilised. The range of a relictual taxon takes into account the area currently occupied as a ratio of its former extent. Reintroduced and self-sustaining populations within or outside the former known range of a taxon should be considered when determining whether a taxon is relictual. This definition is modified from the definition of the At Risk – Relict category in the NZTCS manual (Townsend et al., 2008). The main difference is that trend is not included in the qualifier definition. This enables the qualifier to be applied to any taxon that has experienced severe range contraction, regardless of whether that contraction continues or has been arrested. This qualifier complements the 'Naturally Uncommon (NU)' qualifier which can be applied to taxa whose abundance has declined but which continue to occupy a substantial part of their natural range.
FR	Former Resident		Regional	Breeding population (existed for more than 50 years) extirpated from region but continues to arrive as a regional vagrant or migrant. FR and RN are mutually exclusive.
HR	Historical Range		Regional	The inferred range (extending in any direction) of the taxon in pre-human times meets its natural limit in the region.
IN	Introduced Native		Regional	Introduced to the region, though not known to have previously occurred in it.
NS	National Stronghold		Regional	More than 20% of the national population breeding or resident for more than half their life cycle in the region.
NR	Natural Range		Regional	The known range (extending in any direction) of the taxon meets it natural limit in the region.
RE	Regional Endemic		Regional	Known to breed only in the region.
RN	Restored Native		Regional	Reintroduced to the region after having previously gone extinct there.
TL	Type Locality		Regional	The type locality of the taxon is within the region. Ignore if the taxon is or has ever been regionally extinct.

Find out more: pestfree@aucklandcouncil.govt.nz
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