



NEW ZEALAND THREAT CLASSIFICATION SERIES 5

# Conservation status of New Zealand frogs, 2013

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Department of  
Conservation  
*Te Papa Atawhai*



Cover: Archey's frog, *Leiopelma archeyi*, Coromandel Range, June 1977. Photo: D. Garrick.

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## Abstract

A reassessment of the conservation status of the New Zealand frog fauna is presented using threat categories defined in the New Zealand Threat Classification System (NZTCS) manual. The fauna was last assessed using the same threat categories in 2009 and since that time no major changes in status are recorded. The list presented here replaces all previous NZTCS lists for frogs.

Keywords: threatened species, frogs, *Leiopelma*, *Litoria*, conservation status, threat classification, New Zealand

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# 1. Summary

The Department of Conservation (DOC) initiated a 3-year cycle of review of species' threat status in July 2007. Under this system, one taxonomic group is reviewed at a time, with all groups covered over a 3-year cycle. As part of the current review cycle, the threat status of New Zealand frogs was reviewed during February 2013. In New Zealand today, the Class Amphibia is represented by only four native (*Leiopelma archeyi*, *L. hamiltoni*, *L. hochstetteri*, and *L. pakeka*) and three introduced (*Litoria aurea*, *L. ewingii* and *L. raniformis*) frog species (King et al. 2009). Our reassessment of the threat status of these species was based upon New Zealand Threat Classification System (NZTCS) categories (Townsend et al. 2008), the latest published and unpublished data on the taxa under review, our specialist knowledge and consultation with colleagues (listed in section 3).

The last appraisal of the conservation status of New Zealand frogs, made during 2009, reported three species to be Threatened (*Leiopelma hamiltoni* being Nationally Critical, and *L. archeyi* and *L. pakeka* being Nationally Vulnerable) and one to be At Risk (*L. hochstetteri* 'Declining'). In addition, three *Leiopelma* species were listed as Extinct, three Introduced and Naturalised *Litoria* species were considered to be abundant in New Zealand despite two of them being threatened in their country of origin, and an additional unidentified frog entity from northern Great Barrier Island was listed as 'Data Deficient' (Newman et al. 2010).

Based on maternally-inherited mitochondrial markers, Fouquet et al. (2010) identified 13 evolutionary significant units (ESUs) within *L. hochstetteri*, which they suggested should serve as the focus for future management and conservation of this species. Newman et al. (2010) made preliminary appraisals of each of these 13 ESUs, which revealed at least one to be threatened (Newman et al. 2010); however these ESUs were not included in the 2008–11 NZTCS summary statistics.

When conducting this review, we were aware that the taxonomic status of *L. pakeka* required further resolution because recent genetic analyses suggested a case could be made to synonymise *L. pakeka* and *L. hamiltoni* (see Newman et al. 2010; D. Gleeson pers. comm.). However, data supporting such a merger were not available to us and so for the purpose of this appraisal, we treated these frogs as separate species and moved *L. pakeka* to the 'Taxonomically Indeterminate' section of the list to reflect this uncertainty. We did, though, have access to preliminary information on population genetic structure of *L. hochstetteri*, which suggested that at least 10 highly distinctive genetic groupings within this species are supported by analysis of nuclear genetic markers (D. Gleeson, C. Clay, N. Gemmell, R. Howitt and A. Haigh pers. comm.). For our current assessment, we used these groups with the addition of the northern Great Barrier Island population of *L. hochstetteri*, which was not included in the Gleeson et al. genetic investigation (D. Gleeson pers. comm.). Name changes of *L. hochstetteri* groups assessed in 2009 and 2013 are summarised in Table 1. Until morphological analysis is completed, it is unknown whether these groupings are consistent with phenotypic differentiation, or what taxonomic level they may be recognised at (D. Gleeson pers. comm.).

A comparative summary of the number of taxa in each threat category in 2009 (Newman et al. 2010) and 2013 (this report) is presented in Table 2.

Overall, provided genetic groupings, or ESUs, of *L. hochstetteri* are ignored, there are no changes to the number of Threatened, At Risk and other NZTCS categories of frogs listed between 2009 and 2013. However, this review did take into account genetic groupings of *L. hochstetteri* and for these there are some changes (Table 2). Two entities previously assessed as Not Threatened were reassessed as Declining (*L. aff. hochstetteri* "Eastern Raukumara" and *L. aff. hochstetteri* "Western Raukumara"). A further ESU, *L. aff. hochstetteri* "Central/South Coromandel", previously assessed as Relict, was reassessed as Declining. Finally, two other ESUs, both previously assessed as

Table 1. Name changes affecting distinctive genetic groupings of *Leiopelma hochstetteri* assessed for threat status in 2009 (Newman et al. 2010) and in 2013 (this report).

NAME IN NEWMAN ET AL. (2010)	NAME IN THIS REPORT AND REGION(S) WHERE TAXA FOUND
Northern Great Barrier Island	<i>Leiopelma</i> aff. <i>hochstetteri</i> "Great Barrier" Northern Great Barrier Island
Mt. Moehau – Tokatea	<i>Leiopelma hochstetteri</i> sensu stricto Mt Moehau – Tokatea – Hunua Ranges
Hunua Ranges	Included within <i>Leiopelma hochstetteri</i> sensu stricto
Otawa	<i>Leiopelma</i> aff. <i>hochstetteri</i> "Otawa" Otawa
Whareorino	<i>Leiopelma</i> aff. <i>hochstetteri</i> "Whareorino" Whareorino
Rangitoto – Maungatautari	<i>Leiopelma</i> aff. <i>hochstetteri</i> "Waikato" Rangitoto – Maungatautari
Waipu – Brynderwyn – Warkworth	<i>Leiopelma</i> aff. <i>hochstetteri</i> "Northland" Waipu – Brynderwyn – Warkworth
Waitakere Ranges	<i>Leiopelma</i> aff. <i>hochstetteri</i> "Waitakere" Waitakere Ranges
Tapu, Coromandel	Included within <i>Leiopelma</i> aff. <i>hochstetteri</i> "Central/South Coromandel"
South Coromandel	<i>Leiopelma</i> aff. <i>hochstetteri</i> "Central/South Coromandel" Central/South Coromandel, includes Tapu
Kaimai Ranges	<i>Leiopelma</i> aff. <i>hochstetteri</i> "Kaimai" Kaimai Ranges
Pukeamaru – Whanarua	<i>Leiopelma</i> aff. <i>hochstetteri</i> "Eastern Raukumara" Pukeamaru – Whanarua
Toatoa – Whitiakau – Manganuku	<i>Leiopelma</i> aff. <i>hochstetteri</i> "Western Raukumara" Whitiakau – Manganuku

Table 2. Comparative summary of the threat status of New Zealand frog species assessed in 2009, frog species and evolutionally significant units (ESUs) of *Leiopelma hochstetteri* provisionally assessed in 2009 (Newman et al. 2010) and all taxa assessed in 2013 (this report).

CATEGORY	TOTAL 2009	TOTAL 2009 INCLUDING <i>L. Hochstetteri</i> ESUS	TOTAL 2013
Extinct	3	3	3
Data Deficient	1	1	1
Threatened—Nationally Critical	1	2	2
Threatened—Nationally Endangered	0	0	0
Threatened—Nationally Vulnerable	2	2	2
At Risk—Declining	1	3	10
At Risk—Recovering	0	0	0
At Risk—Relict	0	7	0
At Risk—Naturally Uncommon	0	0	0
Non-resident native—Migrant	0	0	0
Non-resident native—Vagrant	0	0	0
Non-resident native—Coloniser	0	0	0
Not Threatened	0	2	0
Introduced and Naturalised	3	3	3
<b>Total</b>	<b>11</b>	<b>23</b>	<b>21</b>

Relict, were merged into other genetic groupings (the Hunua Ranges population was included within *L. hochstetteri* sensu stricto, and the Tapu population within *L. aff. hochstetteri* “Central/South Coromandel” (Table 1)). Thus, of the 11 *L. hochstetteri* entities assessed, one (Otago) was judged to be Nationally Critical while all others were gauged to be Declining. In contrast to 2009, no entities were listed as Relict because information on the extent of their former ranges is not available. Also, only limited information is available on population size, trend and area of occupancy of Eastern and Western Raukumara ESUs. High numbers of frogs of these ESUs can still be found in good habitat sites, but planned harvesting of exotic forest containing *L. hochstetteri* over coming decades is likely to impact on both the frogs and their habitat throughout parts of their ranges.

This listing replaces all previous NZTCS lists for New Zealand frogs.

## 2. Conservation status of all known New Zealand frogs

Taxa are assessed according to the criteria of Townsend et al. (2008), grouped by conservation status, then alphabetically by scientific name. For non-endemic species that are threatened internationally, the IUCN category is listed alongside the NZTCS listing. Categories are ordered by degree of loss, with Extinct at the top of the list and Not Threatened at the bottom, above Introduced and Naturalised. The Data Deficient list is inserted between Extinct and Threatened.

See Townsend et al. (2008) for details of criteria and qualifiers, which are abbreviated as follows:

- CD Conservation Dependent
- De Designated
- DP Data Poor
- EF Extreme Fluctuations
- EW Extinct in the Wild
- IE Island Endemic
- Inc Increasing
- OL One Location
- PD Partial Decline
- RF Recruitment Failure
- RR Range Restricted
- SO Secure Overseas
- Sp Sparse
- St Stable
- TO Threatened Overseas



## 2.1 Taxonomically Determinate

### Extinct

Taxa for which there is no reasonable doubt—following repeated surveys in known or expected habitats at appropriate times (diurnal, seasonal and annual) and throughout the taxon’s historic range—that the last individual has died.

SCIENTIFIC NAME	FAMILY
<i>Leiopelma auroraensis</i>	
<i>Leiopelma markhami</i>	
<i>Leiopelma waitomoensis</i>	

### Data Deficient

Taxa that are suspected to be threatened, or in some instances, possibly extinct but are not definitely known to belong to any particular category due to a lack of current information about their distribution and abundance. It is hoped that listing such taxa will stimulate research to find out the true category (for a fuller definition see Townsend et al. 2008).

No taxonomically determinate frog taxa are listed in this category.

### Threatened

Taxa that meet the criteria specified by Townsend et al. (2008) for the categories Nationally Critical, Nationally Endangered and Nationally Vulnerable.

Limited to taxa that are native and resident, i.e. excluding introduced taxa or those that are colonisers, migrants or vagrants.

#### Nationally Critical

Criteria for Nationally Critical:

##### ***A—very small population (natural or unnatural)***

A(1) <250 mature individuals, regardless of cause

A(2) ≤2 subpopulations, ≤200 mature individuals in the larger subpopulation

A(3) Total area of occupancy ≤1 ha (0.01 km<sup>2</sup>)

##### ***B—small population (natural or unnatural) with a high ongoing or predicted decline***

B(1/1) 250–1000 mature individuals, predicted decline 50–70%

B(2/1) ≤5 subpopulations, ≤300 mature individuals in the largest subpopulation, predicted decline 50–70%

B(3/1) Total area of occupancy ≤10 ha (0.1 km<sup>2</sup>), predicted decline 50–70%

##### ***C—population (irrespective of size or number of sub-populations) with a very high ongoing or predicted decline (>70%)***

C Predicted decline >70%

SCIENTIFIC NAME	COMMON NAME	FAMILY	CRITERIA 2013	QUALIFIERS
<i>Leiopelma hamiltoni</i>	Hamilton’s frog	Leiopelmatidae	A(3)	CD, OL, St

## Nationally Endangered

Criteria for Nationally Endangered:

### ***A—small population (natural or unnatural) that has a low to high ongoing or predicted decline***

A(1/1) 250–1000 mature individuals, predicted decline 10–50%

A(2/1) ≤5 subpopulations, ≤300 mature individuals in the largest subpopulation, predicted decline 10–50%

A(3/1) Total area of occupancy ≤10 ha (0.1 km<sup>2</sup>), predicted decline 10–50%

### ***B—small stable population (unnatural)***

B(1/1) 250–1000 mature individuals, stable population

B(2/1) ≤5 sub-populations, ≤300 mature individuals in the largest subpopulation, stable population

B(3/1) Total area of occupancy ≤10 ha (0.1 km<sup>2</sup>), stable population

### ***C—moderate population and high ongoing or predicted decline***

C(1/1) 1000–5000 mature individuals, predicted decline 50–70%

C(2/1) ≤15 sub-populations, ≤500 mature individuals in the largest subpopulation, predicted decline 50–70%

C(3/1) Total area of occupancy ≤100 ha (1 km<sup>2</sup>), predicted decline 50–70%

No taxonomically determinate frog taxa are listed in this category.

## Nationally Vulnerable

Criteria for Nationally Vulnerable:

### ***A—small, increasing population (unnatural)***

A(1/1) 250–1000 mature individuals, predicted increase >10%

A(2/1) ≤5 subpopulations, ≤300 mature individuals in the largest subpopulation, predicted increase >10%

A(3/1) Total area of occupancy ≤10 ha (0.1 km<sup>2</sup>), predicted increase >10%

### ***B—moderate, stable population (unnatural)***

B(1/1) 1000–5000 mature individuals, stable population

B(2/1) ≤15 subpopulations, ≤500 mature individuals in the largest subpopulation, stable population

B(3/1) Total area of occupancy ≤100 ha (1 km<sup>2</sup>), stable population

### ***C—moderate population, with population trend that is declining***

C(1/1) 1000–5000 mature individuals, predicted decline 10–50%

C(2/1) ≤15 subpopulations, ≤500 mature individuals in the largest subpopulation, predicted decline 10–50%

C(3/1) Total area of occupancy ≤100 ha (1 km<sup>2</sup>), predicted decline 10–50%

### ***D—moderate to large population, and moderate to high ongoing or predicted decline***

D(1/1) 5000–20 000 mature individuals, predicted decline 30–70%

D(2/1) ≤15 subpopulations and ≤1000 mature individuals in the largest subpopulation, predicted decline 30–70%

D(3/1) Total area of occupancy ≤1000 ha (10 km<sup>2</sup>), predicted decline 30–70%

### ***E—large population, and high ongoing or predicted decline***

E(1/1) 20 000–100 000 mature individuals, predicted decline 50–70%

E(2/1) Total area of occupancy ≤10 000 ha (100 km<sup>2</sup>), predicted decline 50–70%

SCIENTIFIC NAME	COMMON NAME	FAMILY	CRITERIA 2013	QUALIFIERS
<i>Leiopelma archeyi</i>	Archeys frog	Leiopelmatidae	D(1/1)	CD, De, RR, Sp

## At Risk

Taxa that meet the criteria specified by Townsend et al. (2008) for Declining, Recovering, Relict and Naturally Uncommon.

### Declining

Criteria for Declining:

#### **A—moderate to large population and low ongoing or predicted decline**

A(1/1) 5000–20000 mature individuals, predicted decline 10–30%

A(2/1) Total area of occupancy  $\leq 1000$  ha (10 km<sup>2</sup>), predicted decline 10–30%

#### **B—large population and low to moderate ongoing or predicted decline**

B(1/1) 20000–100000 mature individuals, predicted decline 10–50%

B(2/1) Total area of occupancy  $\leq 10000$  ha (100 km<sup>2</sup>), predicted decline 10–50%

#### **C—very large population and low to high ongoing or predicted decline**

C(1/1) >100000 mature individuals, predicted decline 10–70%

C(2/1) Total area of occupancy >10000 ha (100 km<sup>2</sup>), predicted decline 10–70%

SCIENTIFIC NAME	COMMON NAME	FAMILY	CRITERIA 2013	QUALIFIERS
<i>Leiopelma hochstetteri sensu stricto</i>	Hochstetter's frog	Leiopelmatidae	B(1/1)	RR

### Recovering

Taxa that have undergone a documented decline within the last 1000 years and now have an ongoing or predicted increase of >10% in the total population or area of occupancy, taken over the next 10 years or three generations, whichever is longer. Note that such taxa that are increasing but have a population size of <1000 mature individuals (or total area of occupancy of <10 ha) are listed in one of the Threatened categories, depending on their population size (for more details see Townsend et al. (2008)).

Criteria for Recovering:

A 1000–5000 mature individuals or total area of occupancy  $\leq 100$  ha (1 km<sup>2</sup>), and predicted increase >10%

B 5000–20000 mature individuals or total area of occupancy  $\leq 1000$  ha (10 km<sup>2</sup>), and predicted increase >10%

No taxonomically determinate frog taxa are listed in this category.

### Relict

Taxa that have undergone a documented decline within the last 1000 years, and now occupy <10% of their former range and meet one of the following criteria:

A 5000–20000 mature individuals; population stable ( $\pm 10\%$ )

B >20000 mature individuals; population stable or increasing at >10%

The range of a relictual taxon takes into account the area currently occupied as a ratio of its former extent. Relict can also include taxa that exist as reintroduced and self-sustaining populations within or outside their former known range (for more details see Townsend et al. (2008)).

No taxonomically determinate frog taxa are listed in this category.

### **Naturally Uncommon**

Taxa whose distribution is confined to a specific geographical area or which occur within naturally small and widely scattered populations, where this distribution is not the result of human disturbance.

No taxonomically determinate frog taxa are listed in this category.

## **Non-resident Native**

Taxa whose natural presence in New Zealand is either discontinuous (Migrant) or temporary (Vagrant) or which have succeeded in recently (since 1950) establishing a resident breeding population (Coloniser).

### **Migrant**

Taxa that predictably and cyclically visit New Zealand as part of their normal life cycle (a minimum of 15 individuals known or presumed to visit per annum) but do not breed here.

No taxonomically determinate frog taxa are listed in this category.

### **Vagrant**

Taxa whose occurrences, though natural, are sporadic and typically transitory, or migrants with fewer than 15 individuals visiting New Zealand per annum.

No taxonomically determinate frog taxa are listed in this category.

### **Coloniser**

Taxa that otherwise trigger Threatened categories because of small population size, but have arrived in New Zealand without direct or indirect help from humans and have been successfully reproducing in the wild only since 1950.

No taxonomically determinate frog taxa listed in this category.

## **Not Threatened**

Resident native taxa that have large, stable populations.

No taxonomically determinate frog taxa are listed in this category.

## **Introduced and naturalised**

Taxa that have become naturalised in the wild after being deliberately or accidentally introduced into New Zealand by human agency.

SCIENTIFIC NAME	COMMON NAME	FAMILY	QUALIFIERS	IUCN THREAT STATUS VERSION 3.1
<i>Litoria aurea</i>	Green and gold bell frog	Hylidae	TO	Vulnerable A2ace Pop. trend: decreasing
<i>Litoria ewingii</i>	Brown tree frog	Hylidae		Least concern Pop. trend: stable
<i>Litoria raniformis</i>	Southern bell frog	Hylidae	TO	Endangered A2ae Pop. trend: decreasing

## 2.2 Taxonomically Indeterminate

This section includes described taxa whose taxonomic status is uncertain and requires further investigation, and also potentially distinct entities whose taxonomic status has yet to be formally determined.

### Data Deficient

Taxa that are suspected to be threatened, or in some instances, possibly extinct but are not definitely known to belong to any particular category due to a lack of current information about their distribution and abundance. It is hoped that listing such taxa will stimulate research to find out the true category (for a fuller definition see Townsend et al. 2008).

#### COMMON NAME

Northern Great Barrier swimming frog

### Threatened

Taxa that meet the criteria specified by Townsend et al. (2008) for the categories Nationally Critical, Nationally Endangered and Nationally Vulnerable.

Limited to taxa that are native and resident, i.e. excluding introduced taxa or those that are colonisers, migrants or vagrants.

#### Nationally Critical

SCIENTIFIC NAME	COMMON NAME	FAMILY	CRITERIA 2013	QUALIFIERS
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Otago"	Hochstetter's frog	Leiopelmatidae	A(1)	CD, OL

#### Nationally Vulnerable

SCIENTIFIC NAME	COMMON NAME	FAMILY	CRITERIA 2013	QUALIFIERS
<i>Leiopelma pakeka</i>	Maud Island frog	Leiopelmatidae	B(3/1)	CD, RR, St

## At Risk

Taxa that meet the criteria specified by Townsend et al. (2008) for Declining, Recovering, Relict and Naturally Uncommon.

### Declining

SCIENTIFIC NAME	COMMON NAME	FAMILY	CRITERIA 2013	QUALIFIERS
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Central/South Coromandel"	Hochstetter's frog	Leiopelmatidae	B(1/1)	RR
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Eastern Raukumara"	Hochstetter's frog	Leiopelmatidae	C(1/1)	DP
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Great Barrier"	Hochstetter's frog	Leiopelmatidae	B(1/1)	DP, RR
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Kaimai"	Hochstetter's frog	Leiopelmatidae	A(1/1)	RR
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Northland"	Hochstetter's frog	Leiopelmatidae	A(1/1)	RR
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Waikato"	Hochstetter's frog	Leiopelmatidae	A(1/1)	CD, DP, RR
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Waitakere"	Hochstetter's frog	Leiopelmatidae	B(1/1)	RR
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Western Raukumara"	Hochstetter's frog	Leiopelmatidae	C(1/1)	DP
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Whareorino"	Hochstetter's frog	Leiopelmatidae	A(1/1)	CD, DP, OL

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