



NEW ZEALAND THREAT CLASSIFICATION SERIES 25

# Conservation status of New Zealand amphibians, 2017

Rhys J. Burns, Ben D. Bell, Amanda Haigh, Phillip Bishop, Luke Easton, Sally Wren, Jennifer Germano, Rodney A. Hitchmough, Jeremy R. Rolfe and Troy Makan

Cover: Hamilton's frog, *Leiopelma hamiltoni*. Photo: Phil Bishop.

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# Conservation status of New Zealand amphibians, 2017

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## Abstract

The conservation status of all known New Zealand amphibian taxa was assessed using the New Zealand Threat Classification System (NZTCS). A full list is presented, along with a quantitative summary and brief notes on the most important changes. This list replaces all previous NZTCS lists for frogs.

Keywords: New Zealand Threat Classification System, NZTCS, conservation status, alpine newt, Archey's frog, Hamilton's frog, Hochstetter's frog, Maud Island frog, Leiopelmatidae

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# 1. Summary

The conservation status of New Zealand’s amphibian taxa was reassessed in May 2017, as part of a Department of Conservation (DOC) commitment to maintain updated information on the status of threatened species. This assessment was based on New Zealand Threat Classification System (NZTCS) categories (Townsend et al. 2008), recent published and unpublished data, our specialist knowledge and consultation with colleagues (listed in Section 3).

The last conservation status assessment (Newman et al. 2013) assessed frogs only and classified 9 taxonomically determinate taxa (with only 3 being extant and endemic to New Zealand), and 12 taxonomically indeterminate taxa. Due to the successful establishment in the wild of the Italian alpine newt (see below), we have considered that an assessment of all amphibians – not just frogs – found in New Zealand is now warranted.

Major advances in our understanding of the taxonomy of New Zealand amphibians have coincided with this latest reassessment:

- *Leiopelma pakeka* (Maud Island frog) has been determined through three independent genetic analyses (Holyoake et al. 2001; Thurlow 2015; L. Easton unpubl. data) as being minimally differentiated from *Leiopelma hamiltoni* (Hamilton’s frog), so that they should be synonymised and only constitute one species.
- The 11 Evolutionarily Significant Units (ESUs) of *Leiopelma hochstetteri* (Hochstetter’s frog) are insufficiently differentiated to justify separate cryptic species identities, and appear to reflect phylogeographic structuring, so all ESUs should be synonymised (L. Easton, pers. comm. and unpubl. data).

For both *L. hamiltoni* and *L. hochstetteri* however, there is sufficient biogeographic evidence and genetic differentiation to support the notion that these previously described populations (i.e. 2 *L. hamiltoni*, 11 *L. hochstetteri*) are all likely to have differentiated prior to human arrival in New Zealand. These include the two natural populations of *L. hamiltoni*, plus the 13 major genetic groups of *L. hochstetteri* identified by Fouquet et al. (2010). Therefore, maintaining them as separate managed populations (i.e. ESUs) is currently seen as appropriate (L. Easton, pers. comm. and unpubl. data) and is consistent with previously reported pre-human divergence times (e.g. Fouquet et al. 2010). A summary of name changes since the last threat ranking classification is shown in Table 1.

Table 1. Name changes affecting New Zealand amphibians between the publication of Newman et al. (2013) and this document.

SCIENTIFIC NAME (NEWMAN ET AL. 2013)	SCIENTIFIC NAME (THIS DOCUMENT)	COMMON NAME
<i>Leiopelma hochstetteri</i> sensu stricto	<i>Leiopelma hochstetteri</i> Fitzinger, 1861	Hochstetter’s frog
<i>Leiopelma</i> aff. <i>hochstetteri</i> “Central/South Coromandel”	<i>Leiopelma hochstetteri</i> Fitzinger, 1861	Hochstetter’s frog
<i>Leiopelma</i> aff. <i>hochstetteri</i> “Eastern Raukumara”	<i>Leiopelma hochstetteri</i> Fitzinger, 1861	Hochstetter’s frog
<i>Leiopelma</i> aff. <i>hochstetteri</i> “Great Barrier”	<i>Leiopelma hochstetteri</i> Fitzinger, 1861	Hochstetter’s frog
<i>Leiopelma</i> aff. <i>hochstetteri</i> “Kaimai”	<i>Leiopelma hochstetteri</i> Fitzinger, 1861	Hochstetter’s frog
<i>Leiopelma</i> aff. <i>hochstetteri</i> “Northland”	<i>Leiopelma hochstetteri</i> Fitzinger, 1861	Hochstetter’s frog
<i>Leiopelma</i> aff. <i>hochstetteri</i> “Otago”	<i>Leiopelma hochstetteri</i> Fitzinger, 1861	Hochstetter’s frog
<i>Leiopelma</i> aff. <i>hochstetteri</i> “Waikato”	<i>Leiopelma hochstetteri</i> Fitzinger, 1861	Hochstetter’s frog
<i>Leiopelma</i> aff. <i>hochstetteri</i> “Waitakere”	<i>Leiopelma hochstetteri</i> Fitzinger, 1861	Hochstetter’s frog
<i>Leiopelma</i> aff. <i>hochstetteri</i> “Western Raukumara”	<i>Leiopelma hochstetteri</i> Fitzinger, 1861	Hochstetter’s frog
<i>Leiopelma</i> aff. <i>hochstetteri</i> “Whareorino”	<i>Leiopelma hochstetteri</i> Fitzinger, 1861	Hochstetter’s frog
<i>Leiopelma pakeka</i>	<i>Leiopelma hamiltoni</i> McCulloch, 1919	Hamilton’s frog
<i>Litoria aurea</i>	<i>Ranoidea aurea</i> (Lesson, 1830)	Green and golden bell frog
<i>Litoria raniformis</i>	<i>Ranoidea raniformis</i> (Keferstein, 1867)	Southern bell frog

With the resolution of this taxonomic uncertainty, the only extant taxonomically indeterminate taxon is the ‘northern Great Barrier swimming frog’, which has been recorded twice (Whitaker & Hard 1985; J. Quirk, pers. comm.) and is regarded here as Data Deficient. A recent attempt in 2016 to find this taxon was unsuccessful (D. van Winkel, pers. comm.).

A comparative summary of the number of taxa in each threat category since the previous threat classification is provided in Table 2, with a summary of those status changes shown in Table 3. There are now only three extant native frog taxa to which a conservation threat status needs to be assigned.

Table 2. Summary of the status of New Zealand amphibian species assessed in 2013 (Newman et al. 2013) and 2017 (this document).

CONSERVATION STATUS	NEWMAN ET AL. 2013	THIS REPORT
<b>Taxonomically Determinate</b>		
Extinct	3	3
Threatened – Nationally Critical	1	0
Threatened – Nationally Vulnerable	1	1
At Risk – Declining	1	2
Introduced and Naturalised	3	4
<b>Taxonomically Indeterminate</b>		
Data Deficient	1	1
Threatened – Nationally Critical	1	0
Threatened – Nationally Vulnerable	1	0
At Risk – Declining	9	0
<b>Total</b>	<b>21</b>	<b>11</b>

Table 3. Summary of status changes of amphibians between 2013 (data in rows) (Newman et al. 2013) and 2017 (data in columns). Numbers above the diagonal (shaded mid-grey) indicate improved status (e.g. one taxon has moved from Nationally Critical in 2013 to Nationally Vulnerable in 2017), numbers below the diagonal (shaded light grey) indicate poorer status, numbers on the diagonal (shaded dark grey) have not changed, and numbers without shading are either introduced species, taxa added at this assessment, or taxa rejected from this assessment because they are no longer considered to be distinct (TI) from other taxa.

		Conservation status 2017								
		Total 22	EX 3	DD 1	NC 0	NV 1	Dec 2	Rel 0	IN 11	TI <sup>1</sup> 4
Conservation status 2013	Extinct (Ex)	3	3							
	Data Deficient (DD)	1		1						
	Threatened – Nationally Critical (NC)	2				1				1
	Threatened – Nationally Vulnerable (NV)	2					1			1
	At Risk – Declining (Dec)	10						1		9
	At Risk – Relict (Rel)	0								
	Introduced and Naturalised (Int)	3							3	
	Not listed	1							1	

<sup>1</sup> Taxonomically indistinct: now considered to be conspecific with another species in the report.

Two of the three extant native frog taxa that are now recognised have changed conservation threat status since the last assessment 4 years ago:

- *L. hamiltoni* has changed from ‘Threatened – Nationally Critical’ to ‘Threatened – Nationally Vulnerable’, reflecting both the increasing population and multiple sites where this taxon now occurs.
- *L. archeyi* has changed from ‘Threatened – Nationally Vulnerable’ to At ‘Risk – Declining’. The large Coromandel population (which suffered an extreme and probably disease-induced population decline 2 decades ago) remains at suppressed yet stable numbers. All non-managed populations are anticipated to have a declining population trend due to impacts of introduced predators (Egeter et al. 2015a, b, in press) as well as the continued potential impact of mining development in southern Coromandel. Although this change is 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’.
- *L. hochstetteri* remains ‘At Risk – Declining’, despite the amalgamation of all 11 populations from 2013 into one taxon, which reflects the ongoing anticipated decline of this taxon over most populations.

Included in this report is the introduced and naturalised Italian alpine newt (*Ichthyosaura alpestris apuana*) which has established a breeding population in the western Bay of Plenty (Bell 2016). The establishment of this species in the wild has led us to change the scope of this threat assessment to now include all amphibians, not just frogs. Efforts to eradicate this population continue and its inclusion in this report reflects the fact that it can naturalise in New Zealand and may do so again even if the current eradication programme is successful.

In addition, the taxonomy of Australian frogs has been revised since the previous conservation status assessment. As a result of this revision, the generic name of two introduced New Zealand frogs has changed from *Litora* to *Ranoidea* (Duellman et al. 2016; Table 1).

## 2. Conservation status of all known New Zealand amphibians, 2017

Taxa are assessed according to the criteria of Townsend et al. (2008), then arranged alphabetically by scientific name. For non-endemic species that are threatened internationally, the IUCN category is listed alongside the NZTCS listing. Brief explanations of the statuses, criteria and qualifiers used in this report are presented below in Table 4.

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

CD	Conservation Dependent
DP	Data Poor
OL	One Location
RR	Range Restricted
Sp	Sparse

### **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.



Table 4. Conservation status of all known New Zealand amphibians, 2017.

SPECIES NAME	COMMON NAME	FAMILY NAME	STATUS 2017	CRITERIA	QUALIFIERS	STATUS 2013
<i>Leiopelma auroraensis</i> Worthy, 1987	Aurora frog	Leiopelmatidae	Extinct			Extinct
<i>Leiopelma markhami</i> Worthy, 1987	Markham's frog	Leiopelmatidae	Extinct			Extinct
<i>Leiopelma waitomoensis</i> Worthy, 1987	Waitomo frog	Leiopelmatidae	Extinct			Extinct
<i>Incertae cedis</i> "Northern Great Barrier Island swimming frog"	Northern Great Barrier Island swimming frog		Data Deficient			Data Deficient
<i>Leiopelma hamiltoni</i> McCulloch, 1919	Hamilton's frog	Leiopelmatidae	Threatened – Nationally Vulnerable	B(3)	CD	Nationally Critical
<i>Leiopelma archeyi</i> Turbott, 1942	Archey's frog	Leiopelmatidae	At Risk – Declining	A(1)	CD, DP, RR, Sp	Nationally Vulnerable
<i>Leiopelma hochstetteri</i> Fitzinger, 1861	Hochstetter's frog	Leiopelmatidae	At Risk – Declining	C(1)		Declining
<i>Ichthyosaura alpestris apuana</i> Bonaparte, 1839	Italian alpine newt	Salamandridae	Introduced and naturalised			Not listed
<i>Litoria ewingii</i> Duméril & Bibron (1841)	Brown tree frog	Hylidae	Introduced and Naturalised			Introduced and Naturalised
<i>Ranoidea aurea</i> (Lesson, 1830)	Green and golden bell frog	Hylidae	Introduced and Naturalised (IUCN: Vulnerable A2ace)		TO	Introduced and Naturalised
<i>Ranoidea raniformis</i> (Kieferstein, 1867)	Southern bell frog	Hylidae	Introduced and Naturalised (IUCN: Endangered A2ae)		TO	Introduced and Naturalised
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Central/South Coromandel" Newman, et al. (2013)	Hochstetter's frog (undetermined)	Leiopelmatidae	Taxonomically indistinct			Declining
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Eastern Raukumara" Newman, et al. (2013)	Hochstetter's frog (undetermined)	Leiopelmatidae	Taxonomically indistinct			Declining
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Great Barrier" Newman, et al. (2013)	Hochstetter's frog (undetermined)	Leiopelmatidae	Taxonomically indistinct			Declining
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Kaimai" Newman, et al. (2013)	Hochstetter's frog (undetermined)	Leiopelmatidae	Taxonomically indistinct			Declining
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Northland" Newman, et al. (2013)	Hochstetter's frog (undetermined)	Leiopelmatidae	Taxonomically indistinct			Declining
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Otago" Newman, et al. (2013)	Hochstetter's frog (undetermined)	Leiopelmatidae	Taxonomically indistinct			Nationally Critical
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Waikato" Newman, et al. (2013)	Hochstetter's frog (undetermined)	Leiopelmatidae	Taxonomically indistinct			Declining
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Waikare" Newman, et al. (2013)	Hochstetter's frog (undetermined)	Leiopelmatidae	Taxonomically indistinct			Declining
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Western Raukumara" Newman, et al. (2013)	Hochstetter's frog (undetermined)	Leiopelmatidae	Taxonomically indistinct			Declining
<i>Leiopelma</i> aff. <i>hochstetteri</i> "Whareorino" Newman, et al. (2013)	Hochstetter's frog (undetermined)	Leiopelmatidae	Taxonomically indistinct			Declining
<i>Leiopelma pakeka</i> Bell et al., 1998	Maud Island frog	Leiopelmatidae	Taxonomically indistinct			Nationally Vulnerable

### 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).

### Threatened

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

### Nationally Vulnerable

Criteria for Nationally Vulnerable:

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

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

### 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) 5000–20000 mature individuals, predicted decline 10–30%

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

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

## 3. Acknowledgements

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## 4. References

- Bell, B.D. 2016: A review of potential alpine newt (*Ichthyosaura alpestris*) impacts on native frogs in New Zealand. *Journal of the Royal Society of New Zealand* 46: 214–231.
- Duellman, W.E.; Marion, A.B.; Hedges, S.B. 2016: Phylogenetics, classification, and biogeography of the tree frogs (Amphibia: Anura: Arbonae). *Zootaxa* 4104. Magnolia Press, Auckland. 109 p.
- Egeter, B.; Bishop, P.J.; Robertson, B.C. 2015a: Detecting frogs as prey in the diets of introduced mammals: a comparison between morphological and DNA-based diet analyses. *Journal of Molecular Ecology Resources* 15: 306–316.
- Egeter, B.; Robertson, B.C.; Bishop, P.J. 2015b: A synthesis of direct evidence of predation on amphibians in New Zealand, in the context of global invasion biology. *Herpetological Review* 46: 512–519.
- Egeter, B.; Robertson, B.; Roe, C.; Peixoto, S.; Puppo, P.; Easton, L.; Bishop, P. In press: Molecular diet analysis reveals predation by invasive rats on two species of endemic New Zealand frogs. *Molecular Ecology*.

- Fouquet, A.; Green, D.M.; Waldman, B.; Bowsler, J.H.; McBride K.P.; Gemmell, N.J. 2010: Phylogeography of *Leiopelma hochstetteri* reveals strong genetic structure and suggests new conservation priorities. *Conservation Genetics* 11: 907–919.
- Holyoake, A.; Waldman, B.; Gemmell, N.J. 2001: Determining the species status of one of the world's rarest frogs: a conservation dilemma. *Animal Conservation* 4: 29–35.
- Newman, D.G.; Bell, B.D.; Bishop, P.J.; Burns, R.J.; Haigh, A.; Hitchmough, R.A. 2013: Conservation status of New Zealand frogs, 2013. *New Zealand Threat Classification series 5*. Department of Conservation, Wellington. 10 p.
- Thurlow, L.E. 2016: Deducing the phylogeny of New Zealand's endemic frog genus - *Leiopelma*. Unpublished MSc Thesis, University of Otago, Dunedin. 136 p.
- Townsend, A.J.; de Lange, P.J.; Duffy, C.A.J.; Miskelly, C.M.; Molloy, J.; Norton, D.A. 2008: New Zealand Threat Classification System manual. Department of Conservation, Wellington. 35 p.
- Whitaker, A.H.; Hardy, G.S. 1985: An unusual frog observation. *Journal of the Royal Society of New Zealand* 15: 289–290.

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