Threatened Species Assessment

Pseudophryne bibronii
Brown Toadlet

Taxonomy

Pseudophryne bibronii Günther, 1858

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2005).

Categorised as Endangered in the 2013 Advisory list of threatened vertebrate fauna in Victoria (DSE 2013).

Proposed conservation status

Endangered in Victoria

Criteria A2ce+3ce+4ce

Species Information

Description and Life History

Knowledge is limited for this taxon. It is a small frog, with adult males reaching a total length of 30 mm and females 32 mm (Anstis 2017). The taxon lays small clutches of large eggs, on average 163 eggs (97-235) according to Anstis (2017). Larvae take around 120-180 days to reach metamorphosis. Growth rates and adult survival rates are largely unknown; however, limited mark-recapture work in NSW (by P. Byrne) and in Victoria (by C. Cleeland) suggests adult survival rates are high, and longevity of 10 years+ is possible.

Generation Length

The generation length of the Brown Toadlet is inferred to be 5 to 15 years. This is based upon observations of extreme longevity in captivity (>30 years) and limited mark-recapture studies showing long-term return of breeding males to calling sites for this taxon and others (by P. Byrne in NSW and C. Cleeland in Vic). Males have been recaptured 11 years after first capture as adults (P. Byrne, unpubl. data).

Distribution

This is a very widely distributed taxon in south-eastern Australia, although this distribution likely encompasses several different taxa (S. Donnellan cited in Anstis 2017). It is widely distributed in Victoria, with the exception of parts of the far east and Alps (where it is replaced by *P. dendyi*) and the Mallee regions of the NW.

Habitat

The taxon occupies a wide variety of habitats across south eastern Australia, including montane bogs and heaths, forest, woodlands, heaths, rocky outcrops and grasslands. Breeding takes place in seasonally flooded depressions and drainage lines, with the abandoned burrows of invertebrates frequently being used for calling and nesting.

Threats

Although evidence is scant, the taxon is thought to have declined significantly following the spread of chytrid fungus across its range during the 1980s, with higher elevation populations and/or those in otherwise cool/wet environments being particularly affected (following the general pattern for other taxa afflicted by chytrid in southeast Australia). Habitat destruction, degradation and fragmentation from both urban and agricultural development

remain important threats. Increasing failure of autumn rains is a considerable threat to this taxon, given its reliance on these rains (and follow up winter rain) to flood nests and keeping the eggs inundated for sufficient time to allow metamorphosis of larvae. As such, climate change represents a considerable threat to this taxon, both given its impacts on rainfall (lower and more erratic rain in south-eastern Australia) and increases in temperature and evaporation rates, and reductions in soil moisture.

IUCN Criteria

Criterion A. Population size reduction.
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [*(a) cannot be used for A3*]

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation [*except A3*]

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

(d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

Evidence:

Eligible under Criterion A2 as Endangered

The population reduction over the past 15 to 45 years is inferred to be 35 to 75%, based on (c) and (e) above.

The taxon is thought to have undergone significant population declines beginning in the 1980s, following a pattern analogous to that shown by other taxa susceptible to chytrid fungus. Nevertheless, declines are spatially patchy, as is the extent of information on the scale of these declines. The percentages included are based on an analysis of the decline in Area of Occupancy (AoO) from records in the Victorian Biodiversity Atlas (VBA), under the assumption that AoO is correlated with abundance. Change in AoO was calculated by pooling records by decade from the 1970s to the present. The decline over the last 45 years was based on comparison of 1970s AoO to 2010s AoO (~75%). Decline over the last 15 years was based on comparison of 2000s AoO to 2010s AoO (~35%).

The causes of the reduction may not have ceased, be understood or be reversible.

Eligible under Criterion A3 as Endangered

The population reduction over the next 15 to 45 years is projected to be 15 to 60%, based on (c) and (e) above.

On average, the decline of the taxon's AoO is 15% per decade. It is likely that some declines will continue, due to ongoing impacts of habitat change, chytridiomycosis and changed rainfall patterns. Hence, inclusion of 15% as the lower estimate. The upper estimate is approximately four times this, i.e. 60%.

It could be argued that persisting populations might be a case of the "living dead". They are small, isolated and likely to go extinct with minimal prospect of recolonization in many cases.

Eligible under Criterion A4 as Endangered

The population reduction over any 15 to 45 year period, including both past and future (up to 100 years in the future), is inferred to be 20 to 60%, based on (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

Past and future declines were calculated from loss of records, implying a significant loss over any period up to 45 years.

Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (area of occupancy			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Ineligible under Criterion B

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 155,864 km² and the AoO is estimated to be 2,167 km², both of which exceed the thresholds for criterion B.

Criterion C. Small Population size and decline				
		Critically Endangered	Endangered	Vulnerable
Number of mature individuals		< 250	< 2,500	< 10,000
AND at least one of C1 or C2				
C1	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2	An observed, estimated, projected or inferred continuing decline AND least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals				

Evidence:

Ineligible under Criterion C as Data Deficient

There is insufficient evidence to determine the number of mature individuals.

Criterion D. Very small or restricted population			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals (observed or estimated)	<·50	<·250	<·1,000
D2 Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time.	-	-	D2. Typically: AoO <·20 km2 or number of locations ≤·5

Evidence:

Ineligible under Criterion D

There is insufficient evidence to determine the number of mature individuals.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

Anstis (2017). *Tadpoles and Frogs of Australia.* Second edition. New Holland Publishing, Sydney.

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Osborne W. (1990). Declining frog populations and extinctions in the Canberra region. *Bogong* 11: 4-7.

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