

# Threatened Species Assessment

## *Mixophyes balbus* Southern Barred Frog

### Taxonomy

*Mixophyes balbus* Straughan, 1968

Anstis (2013), p. 425 noted "DNA research has found there are two species within this range..." "Recently, no adults of the southern form have been found at any known site in NSW or Victoria south of the Watagan Forests (north of Sydney)."

### Current conservation status

Listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*.

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1992).

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

### Proposed conservation status

Critically Endangered in Victoria

Criteria A2ace+3ce+4ace; B1ab(i,ii,iii,v)+2ab(i,ii,iii,v); C2a(i,ii); D

The taxon may be extinct in Victoria. If it still persists, it is critically endangered and likely to become extinct in the near future.

### Species Information

#### Description and Life History

The Southern Barred Frog is a large frog, with adult males attaining 65 mm and females 80 mm in snout-vent length. Dorsal coloration is yellow-brown to olive-green, which merges laterally into the white ventral coloration. A dark stripe runs from the snout through the eye to the tympanum, and there are several faint, thin dark bars on the hind limbs. The fingers lack webbing while the toes are three-quarters webbed. Adults have a pale blue crescent along the upper part of the iris. The male advertisement call is a soft grating trill of about 10 pulses (Hunter and Gillespie 2011). Tadpoles are dark brown, dorsoventrally compressed, have a muscular tail with narrow caudal fins and grow to about 80 mm total length (Anstis 2002).

Breeding occurs in slow-flowing, shallow sections of stream between September and March (Anstis 2013). Males call mainly after or during rain in spring and autumn. Tadpoles inhabit the stream, including fast-flowing sections (Hero et al. 1991).

#### Generation Length

The generation length of Southern Barred Frog is suspected to be 2 to 5 years. This is based on extrapolation from studies on congeners (Newell et al. 2013).

#### Distribution

Genetic analysis has shown that there are two lineages within this 'species' - a northern and a southern taxon (Donnellan 2008, cited in Hunter et al. 2018). As records from Victoria represent the extreme southern edge of this taxon's distribution, they belong to the southern group. Declines have been most pronounced in this southern

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group, such that no extant population is currently known to exist (Hunter et al. 2018). The rapidity and extent of declines suggest that chytridiomycosis is the probable proximate cause (Hunter et al. 2018).

Within Victoria, the taxon is known only from a handful of records from two sites in East Gippsland. Recent surveys (Gillespie et al. 2014) have failed to find the taxon in Victoria, and it has not been recorded in Victoria since the 1980s. These apparent losses mirror those from the southern form of this taxon in NSW.

A relatively recent claimed record of this species from the Thurra River (Urlus and Marr 2011) is likely in error (Clemann and Gillespie 2012).

### Habitat

The taxon is usually found along flowing streams in rainforest and wet sclerophyll forests (Anstis 2013).

### Threats

The taxon is threatened by Amphibian Chytrid Fungus *Batrachochytrium dendrobatidis*, which causes chytridiomycosis in this and may other frog taxa. The increased virulence of the disease under cooler, moist conditions means that this taxon is likely to be highly susceptible to this pathogen as much of its historic distribution was in cool, moist upland habitats. Other threats include predation of tadpoles by introduced fish species, destruction and modification of habitat caused by changes in hydrological regimes, sediment movement and nutrient yields, and reduction in habitat availability caused by climate change (i.e. overall increasing temperatures, decreasing rainfall and increasing evaporation) (Hunter and Gillespie 2011).

### 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%
<p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>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.</p> <p>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]</p> <p>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.</p> <p style="text-align: center;">based on any of the following:</p> <p>(a) direct observation [except A3]</p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</p>			

### Evidence:

#### Eligible under Criterion A2 as Critically Endangered

The population reduction over the past 6 to 15 years is suspected to be 0 to 100%, based on (a), (c) and (e) above.

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Recent surveys (Gillespie et al. 2014) have failed to find the taxon in Victoria, so it is either already extinct or is likely to become so.

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

### Eligible under Criterion A3 as Critically Endangered

If the taxon still persists, the population reduction over the next 6 to 15 years is projected to be 100 %, based on (c) and (e) above. It is likely to become extinct in Victoria, if this has not already happened.

### Eligible under Criterion A4 as Critically Endangered

The population reduction over any 6 to 15 year period, including both past and future, is projected to be 0 to 100 %, based on (a), (c) and (e) above.

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 km <sup>2</sup>	< 5,000 km <sup>2</sup>	< 20,000 km <sup>2</sup>
B2. Area of occupancy (AOO)	< 10 km <sup>2</sup>	< 500 km <sup>2</sup>	< 2,000 km <sup>2</sup>
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:

#### Eligible under Criterion B1 as Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 4 km<sup>2</sup>, based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA). The taxon may already be extinct, or remains in one small area.

The taxon's former distribution in Victoria is considered here as one location, as its entire former range could have been (and probably was) affected by a single threatening event (chytridiomycosis).

If it persists, it has a continuing decline in (i), (ii), (iii) and (v) above.

#### Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 4 km<sup>2</sup>, based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it is projected to have 1 location and a continuing decline in (i), (ii), (iii) and (v) above.

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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:

#### Eligible under Criterion C2 as Critically Endangered

It is estimated that there are 0 to 20 mature individuals. The taxon may be extinct in Victoria. It is known only from a handful of records from three sites in East Gippsland. These records date from the mid 1960s to the early 1980s. Recent surveys (Gillespie et al. 2014) have failed to find the species in Victoria. These apparent losses mirror those from the southern form of this taxon in NSW.

The number of mature individuals is projected to continue to decline, the number of mature individuals in each subpopulation is 50 or fewer and the percentage of mature individuals in one subpopulation is 90-100 %.

If the taxon persists anywhere in Victoria, this would likely be due to the remnant population being in an area that has so far avoided infection by the amphibian chytrid fungus. However, such a population is unlikely to remain disease-free indefinitely.

Criterion D. Very small or restricted populations		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: AaO < 20 km <sup>2</sup> or number of locations ≤ 5

### Evidence:

#### Eligible under Criterion D as Critically Endangered

The taxon is estimated to have 0 to 20 mature individuals.

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

## References

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