Threatened Species Assessment

Uperoleia martini
Martin's Toadlet

Taxonomy

Uperoleia martini Davies & Littlejohn, 1986

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2015).

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

Proposed conservation status

Critically Endangered in Victoria

Criterion A2ce+4ce

Species Information

Description and Life History

The life history of this species is almost entirely unknown. Males grow to 33 mm, with maximum sizes of females unknown (Anstis 2017). Males call in spring and early summer during high rainfall periods. Clutch size is unknown, with eggs laid singularly. Tadpoles grow to 41 mm. Metamorphosis has been observed in late summer and early autumn. Size and age at sexual maturity, growth rates, adult survival rates and longevity are unknown. Humphries (1979) provides information on population turnover in a population of the related species *U. rugosa*, which suggests a high proportion of individuals entering his study site each year were new recruits (67% on average). As such, it is possible congeners such as *U. martini* may also have relatively low survival rates and short longevity. However, this is entirely speculative without collecting either direct data on this species or greater knowledge of the life history of *Uperoleia* species more broadly.

Generation Length

The generation length of Martin's Toadlet is inferred to be 2 to 6 years. Survival rates and longevity of *Uperoleia* species are almost entirely unknown. Humphries (1979) provides information on population turnover in a population of Martin's Toadlet, which suggests a high proportion of individuals entering his study site each year were new recruits (67% on average). As such, one may infer relatively low survival rates and short longevity in this species.

Distribution

The taxon is restricted to far eastern Victoria, with possible populations in Nadgee Nature Reserve in the far south-east of NSW. In Victoria, it is restricted to the coastal heaths and woodlands of Gippsland, east of Yarram, affiliated with sandy substrates across this range.

Habitat

In Victoria, the taxon is affiliated with heathlands and open forests on sandy soils, breeding in seasonal wetlands during high rainfall periods and small permanent ponds in some locations.

Threats

Historic threats include loss and fragmentation of the habitat due to a range of land uses. Clearing for agriculture occurred following European settlement (Hunter et al. 2018). The taxon was severely impacted by drought in the last few years, leading to a drying of breeding ponds.

More than 30% of the likely habitat for Martin's Toadlet is within the extent of the 2019-20 bushfires and 13% was estimated to have been severely burnt (DELWP 2020). One third of Gippsland populations may be impacted and it is assumed that many animals were killed. The taxon is inferred to have very high genetic risk (DELWP unpublished data 2020).

Most of the taxon's range is now gazetted as public land, but with varying land use activities that include forestry operations, road construction, agricultural activities, and fuel management activities. Increased fire frequency and intensity is considered to be a major threat. In January 2018 almost the entire reserve of Holey Plains State Park, where records of the taxon occur, was burnt in an intensive fire (although the impact of fire is unknown). The taxon could be impacted by planned burning, which is being widely practiced to mitigate the risk of bushfires within the taxon's range.

Climate change-induced increases in drought severity and frequency pose a threat to the taxon in the long term. Climate change can strongly influence rainfall and temperature patterns, as well as fire frequency, severity and scale. All of these things can alter hydrology, as well as the vegetation component of this taxon's habitat. Extreme heat events could kill individuals, especially when other factors (drought, weeds, deer, firewood collection, etc.) are also affecting populations.

Disturbance associated with forest management operations including road construction and maintenance, planned burning and fire suppression operations can remove habitat (including non-breeding habitat), fragment populations, and facilitate the spread and introduction of invasive species, including frogs that are 'reservoir hosts' for the Amphibian Chytrid Fungus *Batrachochytrium dendrobatidis*. Removal of fallen (or soon-to-be-fallen) logs and coarse woody debris for firewood removes shelter sites for frogs, as well as shelter for invertebrates, which are the main food of frogs.

The effect of fire retardants on Australian amphibians is only now becoming the subject of detailed investigation. Until that research is completed it will be prudent to assume that fire retardants have a detrimental impact on all life history stages of frogs.

The Victorian Code of Practice for Timber Production 2014 (the Code). includes general prescriptions such as protection and buffering of old growth forests and waterways to provide protection from timber harvesting. In recent years, modified harvesting and forest regeneration practices have been implemented in native forest that are designed to further mitigate the potential threat from forestry operations to threatened species and their habitats.

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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 Critically Endangered

The population reduction over the past 10 to 18 years is inferred to be 50 to 85%, based on (c) and (e) above.

The taxon was severely impacted by drought in the last few years, leading to a drying of breeding ponds. More than 30% of the likely habitat for Martin's Toadlet is within the extent of the 2019-20 bushfires and 13% was estimated to have been severely burnt (DELWP 2020). One third of Gippsland populations may be impacted and it is assumed that many animals were killed. The taxon is inferred to have very high genetic risk (DELWP unpublished data 2020).

Eligible under Criterion A3 as Endangered

The population reduction over the next 10 to 18 years is suspected to be 40 to 70%, based on (c) and (e) above.

In the future, ongoing climate-induced drying and warming and the probability of unfavourable future fire regimes suggest that the taxon will suffer further declines.

Eligible under Criterion A4 as Critically Endangered

The population reduction over any 10 to 18 years, including both past and future, is inferred to be 50 to 85%, based on (c) and (e) above.

This is based on the known past and future threats.

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:

Eligible under Criterion B1 as Vulnerable

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 6,006 km², based on accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

Individual occurrences are considered severely fragmented based on the taxon's limited dispersal ability, the barriers to dispersal and/or the lack of habitat separating them. Such fragmentation precludes the possibility of recolonisation in the event of local extinction.

It is inferred to have a continuing decline in (i), (ii), (iii) and (v). Although the majority of remaining habitat for the taxon is in reserved land (Hunter et al. 2018), these areas are still subject to threatening processes. The taxon could be impacted by planned burning, which is being widely practiced to mitigate the risk of bushfires within the taxon's range. In the long term, increased fires and climate induced drying and warming are likely to drive declines.

It is inferred to have extreme fluctuations in (iv) above. Being reliant on seasonally flooded wetlands for reproduction, and therefore subject to the vagaries of rainfall variability, it is plausible that this taxon displays extreme fluctuations in abundance. Ten-fold oscillations are considered plausible between La Nina and El Nino cycles.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 144 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it is severely fragmented, has a continuing decline in (i), (ii), (iii) and (v) and extreme fluctuations in (iv) above.

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

It is inferred that there are 2,000 to 20,000 mature individuals, but other thresholds under this criterion have not been met.

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

It is inferred that there are 2,000 to 20,000 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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DSE (2013) *Advisory List of Threatened Vertebrate Fauna in Victoria 2013.* Department of Sustainability and Environment, East Melbourne. (Retrieved from https://www.environment.vic.gov.au/__data/assets/pdf_file/0014/50450/Advisory-List-of-Threatened-Vertebrate-Fauna_FINAL-2013.pdf)

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