



Liopholis guthega Guthega Skink

Taxonomy

Liopholis guthega (Donnellan, Hutchinson, Dempsey & Osborne, 2002)

The Victorian population is distinct from the NSW one (Atkins 2018)

Current conservation status

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

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* as *Egernia guthega* (SAC 2003).

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 B1ab(i,ii,iii,iv,v)

Species Information

Description and Life History

From Robertson and Coventry (2019): The Guthega Skink is mid to dark greyish or yellowish brown on the head and back with two broad black paravertebral stripes, sometimes ragged-edged and usually enclosing longitudinal series of pale spots. The upper lateral zone is black, enclosing one to three series of pale patches. The lower sides are mottled greyish, becoming pale grey or creamish on the belly. Juveniles are more brightly marked, generally mostly black with many striking yellow or white spots extending on to the tail. The largest individual measured in Victoria was 97 mm in snout-vent length.

The Guthega Skink is a diurnal heliotherm, basking near the burrow entrances. Individual warrens have been found to support between one and six individuals, presumably adults and their progeny. Its diet is selective, but temporally variable - invertebrates, predominantly ants and beetles, are the main food items taken in early to mid-summer, while seasonally abundant berries from the Snow Beard-heath, *Acrothamnus montanus*, are selected later in the summer. It is thought that individuals reach adult size and breed in their fourth year. In Victoria, mating occurs in spring, with one (rarely two) live young born in late summer to early autumn.

Generation Length

The generation length of the Guthega Skink is estimated to be 4 to 6 years. This is based on data provided in Atkins et al. (in press).

Distribution

Within Victoria this taxon only occurs on the Bogong High Plains. It also occurs in Kosciuszko National Park in NSW.

Habitat

Within Victoria the taxon has been recorded as isolated occurrences usually associated with granite boulder fields on the Bogong High Plains. It constructs complex burrow systems, often on exposed north or west-facing slopes.

Threats

Historically, large tracts of suitable habitat for the taxon have been lost as dams and alpine resort villages have been constructed and expanded. Infrastructure for resorts such as roads, tracks and ski runs have also destroyed, fragmented or modified habitat. Degradation of the taxon's habitat has also resulted from grazing and trampling by cattle, feral horses, deer and pigs and the grooming of ski runs. Domestic cattle have been removed from alpine park areas; however feral, horses and deer remain. Predation by the Fox (*Vulpes vulpes*) and the Cat (*Felis catus*) is a serious current threat that has been on the rise and requires quantification. The impact of predation is via the direct loss of individuals and detrimental alterations in lizard behaviour. Furthermore, continued development in the area increases predator access to the species (due to increased exposure of habitat, including hiding areas) and decreases areas of predator free habitat.

The most likely catastrophic threat to the Guthega Skink is bushfire. Large fires in the Australian Alps are not considered common, but two such fires have occurred in the past seven years (2003 and 2007), affecting much of the taxon's range in Victoria. Bushfires kill individuals, expose them to greater predation and alter floristics of habitat making it less suitable for the species. Predicted climate change is likely to increase fire frequency and severity in this region. As the taxon lives in some of the highest areas within Australia, movement into cooler, upward land is not feasible. Warmer temperatures may also see an increase in predator species that may impact on the Guthega Skink, as predators are able to encroach on previously predator free areas.

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 Endangered

The population reduction over the past 12 to 18 years is inferred to be 65 %, based on (a), (c) and (e) above.

A 'megafire' in 2003 intensely burned a very large proportion of this taxon's range in Victoria. Another fire in 2006/7 burnt smaller parts of the range. Based on known losses of colonies due to fire in NSW, it is probable that these fires in Victoria greatly reduced the number and size of colonies. Human disturbance of colonies continues.

Eligible under Criterion A3 as Endangered

The population reduction over the next 12 to 18 years is inferred to be 40 to 60%, based on (c) and (e) above.

Even in the absence of a rapid, catastrophic event such as another large bushfire, current threatening processes (climate change, human disturbance, infrastructure development, horse and deer impacts) will affect colonies.

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 ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
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 41 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas, including new records for the 2017-18 field season (with a high level of certainty based on extensive research by Zak Atkins).

It has a continuing decline in (i), (ii), (iii), (iv) and (v) above.

There are multiple, small isolated subpopulations that are all at risk from threats such as climate change, direct human disturbance, and impacts from feral species such as horses, such that there is increased extinction risk and little or no probability of recolonisation should subpopulations become extinct.

The taxon can be considered to occur in one location, because it occurs in a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the taxon present, specifically, such as through bushfire.

It has a continuing decline in (i), (ii), (iii), (iv) and (v) above.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 36 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it is severely fragmented, has one locations, and has a continuing decline in (i), (ii), (iii), (iv) and (v) 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:

Eligible under Criterion C1 as Endangered

It is estimated that there are 360 mature individuals. There are 12 known colonies in Victoria (Atkins 2018). A reasonable estimate of the number of mature individuals is an average of around 30 per colony.

There is an estimated continuing decline of 20 to 50 % within two generations.

Eligible under Criterion C2 as Endangered

It is estimated that there are 360 mature individuals, there is an estimated continuing decline, and the number of mature individuals in each subpopulation is estimated to be 30.

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 ² or number of locations ≤ 5

Evidence:

Eligible under Criterion D as Vulnerable

It is estimated that there are 360 mature individuals, and the taxon is very restricted.

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

References

Atkins Z.A. (2018) Conservation of the Guthega skink, *Liopholis guthega*. PhD. thesis, LaTrobe University, Melbourne.

Atkins, Z., Clemann, N., and Robert, K. A. (2015). Does shelter site selection aid persistence of a threatened alpine lizard? Assessing *Liopholis guthega* populations a decade after severe fire in southeastern Australia. *Journal of Herpetology*, 49(2), 222-229.

Atkins, Z.S., Clemann, N., Schroder, M., Chapple, D.G., Davis, N.E., Robinson, W.A., Wainer, J. and Robert, K.A., (2018). Consistent temporal variation in the diet of an endangered alpine lizard across two south-eastern Australian sky-islands. *Austral Ecology*. 43 (3):339-351

Atkins, Z.S., Clemann, N., Chapple, D.G., Edwards A M., Sinsch U., Schafer A.M., Schroder M., Scroggie M.P., and Robert K. A. (in press). Demographic and life history variation in two sky-island populations of an endangered alpine lizard. *Journal of Zoology*

DSE (2013) *Advisory List of Threatened Vertebrate Fauna in Victoria 2013*. Department of Sustainability and Environment, Melbourne

Robertson, P. and Coventry, A. J. (2019). *Reptiles of Victoria: a Guide to Identification and Ecology*. CSIRO Publishing. Clayton South.

SAC (2003). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 683 *Egernia guthega*.