Threatened Species Assessment

Delma impar
Striped Legless Lizard

Taxonomy

Delma impar (Fischer, 1882)

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 1991).

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

Proposed conservation status

Endangered in Victoria

Criterion A3bc

Species Information

Description and Life History

The Striped Legless Lizard has a pale grey-brown ground colour, usually with several dark brown and white dorso-lateral and lateral stripes along the body, these breaking into a 'checker' pattern on the tail. The head is darker grey-brown, often with bright yellow on the lower sides behind the eyes. It has a snout-vent length to 120 mm, and a tail up to about 180 mm.

It is a diurnal, semi-fossorial species, generally active between the months of September and April (Coulson 1990; Banks et al. 1999). Due to its cryptic, semi-fossorial nature, it is very rarely seen. Over winter the species enters brumation (a state of torpor) while sheltering in soil cavities, under rocks or in the base of grass tussocks (Coulson 1990; Kutt 1992; Banks et al. 1999; Smith and Robertson 1999). The first time many farmers encounter the Striped Legless Lizard is, unfortunately, when they are ploughing its grassland habitat.

The Striped Legless Lizard is a selective arthropod feeder with spiders, field crickets, lepidopteran larvae and cockroaches recorded as primary prey, while a range of readily available invertebrate prey items such as ants and slaters are avoided (Coulson 1990; Nunan 1995; Kutt et al. 1998; Goonan 2008). Both sit-and-wait and active foraging strategies are thought to be utilised by the species (Wainer unpublished; Kutt et al. 1998; Banks et al. 1999).

Longevity of the Striped Legless Lizard has been estimated at about 10 years (ARAZPA 1996). Mating occurs in spring, with females depositing two elongated soft-shelled eggs in a soil cavity or under a rock in mid to late December (Kutt 1992; Banks et al. 1999; Peterson and Rohr 2010). Communal clutches of up to 36 eggs and repeated use of communal nests have been recorded (Peterson and Rohr 2010). The incubation period appears to be approximately six to eight weeks, with the hatchlings emerging in February. At birth, hatchlings measure 40 - 45 mm SVL and weigh about 0.5 - 0.75 g (Banks et al. 1999).

While little is known about movement patterns and home range sizes of the Striped Legless Lizard, there is some evidence that it is a sedentary species (Coulson 1990; Kutt 1992; Dorrough and Ash 1999). While large movements of up to 60 m have been recorded during the mating period (Kutt 1993; Kukolic et al. 1994), recapture data from O'Shea (2005) suggests very small home ranges (<10 m2) and Dorrough and Ash (1999) suggest that overall, populations progress across the landscape at an estimated rate of less than 12 m per year. Recent genetic results also indicate a reluctance or inability for the species to disperse over long distances (Maldonado et al. 2012).

Generation Length

The generation length of Striped Legless Lizard is estimated to be 7 to 8 years. Longevity has been estimated at about 10 years but it has been postulated that individuals can live for up to double that (Banks et al. 1999). Age at sexual maturity has been estimated to be 2 - 3 years for males and 3 - 4 years for females, after which the females are thought to be capable of breeding every year, depending on environmental conditions (ARAZPA 1996).

Distribution

The Striped Legless Lizard is restricted to natural temperate grasslands of south-eastern Australia (Coulson 1990), where it is patchily distributed from south-eastern NSW, the ACT, Victoria and south-eastern South Australia (Smith and Robertson 1999). Within Victoria, the species has been recorded from grasslands and grassy woodlands in the State's north east around Yea, Alexandra and Benalla; the State's north-central, south-east of Bendigo and on the isolated volcanics north of Ballarat; the northern alluvial plains around Mitiamo and Boort; the Wimmera Plain around Horsham and Rupanyup; and across the Victorian Volcanic Plain from the north of Melbourne in the east to Hamilton in the west.

Genetic research shows that across the Striped Legless Lizard's geographical range the species forms four distinct genetic lineages, three of which occur in Victoria (South Australia / Wimmera, south-western Victoria (including Melbourne) and north eastern/eastern Victoria) (Maldonado et al. 2012).

Habitat

Being a grassland specialist, it was thought until recently that the Striped Legless Lizard only occurred at sites dominated by native species such as Kangaroo Grass (*Themeda triandra*), Wallaby Grass (*Rytidosperma* spp.) and Spear Grass (*Austrostipa* spp.) (Coulson 1990; Hadden 1995). However, recent surveys have revealed that the Striped Legless Lizard can also be found at sites with a large, if not predominant, cover of exotic grasses such as Serrated Tussock (*Nassella trichotoma*) and Chilean Needle-grass (*Nassella neesiana*), as well as some common annual pasture grasses (Dorrough 1995; Dorrough and Ash 1999). Thus, it appears that a relatively dense and continuous structure, rather than specific floristic species within the grassland, may be important in influencing occupancy by the Striped Legless Lizard (Dorrough and Ash 1999; Smith and Robertson 1999). Recent studies in south-western Victoria and south-eastern South Australia also found sites with heavy clay-based soils to be favoured by the species (Stratman 2007; Candy 2008), although it has been recorded on a range of soil types at other locations across its range.

Little is known about the Striped Legless Lizard's specific microhabitat use. The species utilises the base of grass tussocks, cavities beneath rocks and fallen timber and cracks in clay soils for shelter (Hadden 1995; Smith and Robertson 1999).

Threats

The decline of the Striped Legless Lizard across its geographical range is attributed to the loss and degradation of its grassland and grassy woodland habitats (Hadden 1995; Smith and Robertson 1999). Since European settlement, approximately 99.5% of the Striped Legless Lizard's endemic lowland temperate grassland has been destroyed or severely altered (Kirkpatrick et al. 1995). Threats to remaining populations also relate directly to further habitat loss and alteration via a number of processes including: urban and infrastructure development, pasture improvement, change in agricultural practices from grazing to cultivation, ploughing, rock removal, extended heavy stock grazing, inappropriate fire regimes, introduced predators, weed invasion, soil compaction and genetic effects (Webster et al. 1992; Cogger et al. 1993; Dorrough 1995; Hadden 1995; ARAZPA 1996; Smith and Robertson 1999).

These threats continue, to varying degrees, at most known Striped Legless Lizard sites. Populations are generally extremely fragmented, and many are very small. Over 50% of known extant sites in south-western Victoria are less than 5 ha in size (Candy 2008) and/or occur on roadsides, heightening the vulnerability of these populations to extinction through stochastic ecological and / or genetic isolation effects.

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 Vulnerable

The population reduction over the past 21 to 24 years is inferred to be 25 to 40%, based on (b) and (c) above.

This is based on the loss of habitat and populations around the Melbourne area. In recent times it has been determined that animals are not to be translocated, so many are likely to have been killed by new developments.

Eligible under Criterion A3 as Endangered

The population reduction over the next 21 to 24 years is suspected to be 30 to 50%, based on (b) and (c) above.

There is likely to be a significant decline, mostly as a result of further expansion of the Melbourne urban boundary, but also because of the identified 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 B as Vulnerable

The Area of Occupancy (AoO) is estimated to be 876 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

Within the three genetically distinct subpopulations there are many highly fragmented and genetically isolated groups. Populations are generally extremely fragmented and many are very small. Over 50% of known extant sites in south-western Victoria are less than 5 ha in size (Candy 2008), heightening the vulnerability of these populations to extinction through stochastic ecological and / or genetic isolation effects.

Eight different locations were identified through the population viability analysis, it provides an estimation of extinction probabilities by incorporating identifiable threats to population survival.

It has a continuing decline in (i), (ii), (iii) 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
(a) (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.

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