



Drysdalia mastersii Masters' Snake

Taxonomy

Drysdalia mastersii (Krefft, 1866)

It is plausible that the populations of Masters' Snake that occur (or once occurred) in the Victorian and South Australian mallee may be taxonomically distinct from other occurrences along the South Australian and West Australian coast. The mallee is a clearly disjunct region with different habitats to those areas further west. Given the major disjunction between occurrences of this species in the Victorian and South Australian mallee and those occurring in a narrow coastal strip in south-western Western Australia and adjoining southern South Australia, and the habitat differences between these areas, it is plausible that there may be significant taxonomic differences between these areas. ARI and Zoos Victoria are planning to address this issue in future research.

Current conservation status

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

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

Proposed conservation status

Critically Endangered in Victoria

Criteria A2abc+3bc+4bc

Species Information

Description and Life History

Masters' Snake is a small grey-brown member of the family Elapidae (terrestrial, front-fanged venomous snake). A broken orange-yellow band or collar on the nape, and a lower number of subcaudal scales (ranging from 34 to 43 in Victoria (Coventry and Robertson 1991), although Cogger (2000) reports subcaudal scales in the range 40 to 55) distinguish it from the congeneric and superficially similar White-lipped Snake *D. coronoides* (which has 38 to 67 subcaudal scales). These species' ranges do not overlap. Masters' Snake's scales often have light lateral tips that produce a series of faint longitudinal striations (Cogger 2000). The head is darker than the body. Coventry and Robertson (1991) report a maximum length of less than 30 cm for Victorian specimens, whilst Wilson and Swan (2010) and Cogger (2000) report maximum lengths of 33 and 40 cm respectively. The largest specimen measured by Shine (1981) had a snout-vent length (SVL) of 25.3 cm. Size at birth is around 8 cm SVL (Shine 1981).

Coventry (1996) reports that this species is diurnal and viviparous. Based on the stomach contents of 4 specimens, the species consumes only skinks. Coventry (1996) noted that this was "the most common elapid trapped or observed during the survey" that he conducted in the late 1970s and early 1980s. Shine (1981) reports a mean litter size of 2.8 (range 2 to 3) based on a sample of 4 female Masters' Snakes.

Generation Length

The generation length of Masters' Snake is suspected to be 2 to 6 years. These figures are based on other elapid species such as *Acanthophis antarcticus* and *Hoplocephalus* spp., which can live for 10 or more years, at least in captivity (Greer encyclopedia). The usual longevity in the wild is assumed to be around 8 years.

Distribution

The species occurs in two disjunct areas: in a narrow band along the south-west coast of Western Australia and southern South Australia as far east as the Spencer Gulf, and in the Victorian and South Australian mallee (north-west Victoria and south-eastern South Australia)

Habitat

Masters' Snake occurs in mallee and heath communities, usually in association with porcupine grass *Triodia scariosa* (Robertson et al. 1989, Coventry and Robertson 1991). Beyond Victoria, it has also been recorded in dense heath on coastal dunes and limestones.

Threats

Unlike most small snakes that occur in far northwestern Victoria, Masters' Snake is not a burrowing species; instead it relies on live vegetation, and possibly ground debris and plant litter, for shelter from very high ground temperatures in summer and predators (P. Robertson pers. obs.). It is likely that long unburnt vegetation provides critical habitat and drought refuges, so loss of these shelter sites is likely to represent a major threat to this snake. In recent years much of the range of Masters' Snake has been burnt by wildfire and planned burning. This is likely to have resulted in a severe reduction in available shelter for this species, with concomitant declines in geographic range and numbers.

It is likely that the 'Millennium Drought', which affected southeastern Australia between 1995 and 2009, adversely affected Masters' Snake by increasing the severity of fires, and perhaps through less immediate effects on the snake's habitat and prey.

Red Foxes *Vulpes vulpes* and Cats *Felis catus* are known predators of small reptiles (e.g., Read and Bowen 2001), but their specific impacts on Masters' Snake have not been quantified. It is likely that these exotic predators take Masters' Snake, and the snake is likely to be particularly vulnerable in areas where shelter is scarce, such as areas that have been burnt. The area in Victoria where Masters' Snake occurs has been subject to intense wild dog control in recent years; it is plausible that a reduction in dogs may have resulted in greater numbers of foxes and cats in this area (i.e. 'mesopredator release' Ritchie and Johnson (2009)). The track network through this landscape is likely to facilitate the movements of feral predators (Woinarski 1989). The impact of elevated predation rates due to exotic predators will be most devastating to populations of Masters' Snakes that are already fragmented and/or small due to other pressures.

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>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>
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Evidence:

Eligible under Criterion A2 as Critically Endangered

The population reduction over the past 6 to 18 years is estimated to be 40 to 98 %, based on (a), (b) and (c) above.

The taxon has very clearly declined precipitously in recent decades (Robertson et al. 2012, Clemann and Robertson 2015, Clemann et al. 2017). Re-trapping the area around Chinaman Well trapped by Coventry (1996) where Masters' Snakes were the most frequently trapped snake, no Masters' Snakes were recorded over three field seasons.

The precipitous declines in this taxon's numbers are most likely due to burning of the taxon's habitat, by both planned burns and bushfires. In the last few decades large swathes of this taxon's probable range in the Mallee in Victoria and South Australia have been too frequently burned.

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

Eligible under Criterion A3 as Critically Endangered

The population reduction over the next 6 to 18 years is projected to be 50 to 100 %, based on (b) and (c) above.

If Masters' Snake persists in the Victorian and South Australian Mallee, continued burning of these areas is likely to result in total loss of the taxon from the public land estate. A single record on private property in late 2017 suggests that the taxon persists on that (and perhaps some other) private property. However, the taxon's future in these small fragments is precarious.

Eligible under Criterion A4 as Critically Endangered

The population reduction over any 6 to 18 year period, including both past and future (up to 100 years in the future), is inferred to be 50 to 100 %, based on (b) and (c) above. The causes of reduction may not have ceased, be understood or be reversible.

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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 B as Endangered

The Extent of Occurrence (EoO) is estimated to be 4,824 km², based on accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

The Area of Occupancy (AoO) is estimated to be 135 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

Any two of (a), (b) or (c) above are also satisfied.

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 <u>C1</u> or <u>C2</u>				
<u>C1</u>	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)	
<u>C2</u>	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. Although this taxon was at least locally relatively abundant when Coventry (1996) trapped the area around Chinaman Well in 1979-1981, it has very clearly declined precipitously in recent decades (Robertson et al. 2012, Clemann and Robertson 2015, Clemann et al. 2017). Re-trapping the area around Chinaman Well trapped by Coventry (1996) where Masters' Snakes were the most frequently trapped snake, no Masters' Snakes were recorded over three field seasons (2015-2018). Extending this trapping further north still failed to find the species in Wyperfeld National Park (Clemann unpublished data). Although it is possible the species persists in some long unburnt patches of the Big Desert in Victoria, it is also possible that recent fire regimes have eliminated this snake from the Big Desert and corresponding areas in South Australia.

However, Clemann and Robertson trapped a single individual on private property south of the Big Desert late in 2017. Absence of funding has prevented further work in that area to determine the status of the population on the private property.

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 km ² or number of locations ≤ 5

Evidence:

Eligible under criterion D2 as Vulnerable

The taxon is inferred to be very restricted.

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

References

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