Threatened Species Assessment

Varanus rosenbergi
Rosenberg's Goanna

Taxonomy

Varanus rosenbergi Mertens, 1957

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1997).

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

Proposed conservation status

Critically Endangered in Victoria

Criteria A2ce+3ce+4ce

Species Information

Description and Life History

Rosenberg's Goanna is a large terrestrial carnivore and top-order predator, taking vertebrate and invertebrate prey, but also carrion. It is oviparous, with a mean clutch size of 15 eggs (range 12-19) which are laid in active termite mounds. It is diurnal and excavates a burrow or hides in rock crevices or tree and log hollows. Individuals require large areas of habitat (mean average 20ha on Kangaroo Island).

Generation Length

The generation length of Rosenberg's Goanna is inferred to be 11 to 12 years. Estimates of longevity vary widely in the published literature (from average 8 years (extrapolating from King and Green 1999) to approximately 30 years (Ehmann et al. 1991)). Thus, longevity is assumed to be about 15 years, and about 4 years has been allowed for time to develop to sexual maturity. Juvenile survival rates on Kangaroo Island are low, with only one out of 12 surviving the first year.

Distribution

Rosenberg's Goanna is disjunctly distributed across southern Australia, including southern NSW, northern and western Victoria, southern South Australia and southern Western Australia. The taxon's stronghold is Kangaroo Island (SA). In Victoria, it occurs in two disjunct populations - one in the semi-arid north-west of the state (Big and Little Deserts) and the other, based on very few individuals, in forest with heathy understorey in the north-east. Most Victorian records originate from the Big Desert.

Habitat

Rosenberg's Goanna is found in heathlands, open woodlands, and sclerophyll forest with a heathy understorey.

Threats

Rosenberg's Goanna is threatened by habitat loss and fragmentation as land is cleared for residential, agricultural and industrial developments, as well as the removal of habitat elements, such as termite mounds and fallen timber. Inappropriate fire regimes are also likely to threaten the taxon. Animals can be killed by moving vehicles - upgrading of dirt roads to bitumen, which increases the speed of through traffic, is likely to increase the instances

of road kills. Predation by introduced predators, as well as inappropriate management of such predators, are also considered threats, as is the probable impact of baits used to control introduced mammalian predators (as to the latter, there have been noticeable declines in the occurrence of both *Varanus rosenbergi* and *V. gouldii* in the Big Desert since widespread poisoning of 'dogs' commenced several decades ago: P. Robertson pers. comm.).

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 33 to 36 years is inferred to be 50 to 85%, based on (c) and (e) above.

The taxon has been impacted by multiple recent fires. There is a history of fires in the Big Desert, and few animals have been recorded there in recent times. Most or all of its range in the north-east was burnt in the 2019/20 bushfires and earlier fires, and it is possible that all of the eastern Victorian distribution has been lost.

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 33 to 36 years is projected to be 50 to 80%, based on (c) and (e) above.

Following intense ground fires, refuges such as logs would be lost, as well as food sources, and survivors in the north-east would be facing difficult conditions. However the taxon is quite mobile so there may be a chance of recolonization. Western populations are likely to continue to decline in the face of increasing fire frequency and intensity.

Eligible under Criterion A4 as Critically Endangered

The population reduction over any 33 to 36 year period, including both past and future, is suspected to be 50 to 80%, based on (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

Although the taxon has almost certainly experienced significant historic decline, the proportion of this decline which has occurred in the last three generations is difficult to estimate in the absence of longitudinal observations or monitoring data. However, an estimated 50% decline over a quarter of a century seems reasonable, given the rarity and diminishing rate of records.

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 Endangered

The Area of Occupancy (AoO) is estimated to be 60 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas.

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 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 suspected that there are 100 to 200 mature individuals, but this qualifier is too weak to meet this criterion.

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:

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

Cogger, H.G., (2018). *Reptiles and amphibians of Australia*. Updated Seventh edition. CSIRO Publishing, Collingwood, Victoria.

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

Ehmann, H., Swan, G., Swan, G., Smith, B., (1991). Nesting, egg incubation and hatching by the Heath Monitor *Varanus rosenbergi* in a termite mound. *Herpetofauna* 21, 17-24

Green, B., Dryden, G., Dryden, K., (1991). Field energetics of a large carnivorous lizard, *Varanus rosenbergi. Oecologia* 88, 547-551

King, D., Green, B., (1993). Goannas. *The Biology of Varanid Lizards*. New South Wales University Press, Kensington, NSW.

Pianka, E.R., King, D.R., King, R.A. (Eds.), (2004). *Varanoid Lizards of the World.* Indiana University Press, Bloomington, Indiana.

Rismiller, P.D., McKelvey, M.W., Green, B., (2010). Breeding Phenology and Behavior of Rosenberg's Goanna (*Varanus rosenbergi*) on Kangaroo Island, *South Australia. Journal of Herpetology* 44, 399-408

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

SAC (1997) Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Flora and Fauna Guarantee, Nomination No. 427 *Varanus rosenbergi*

Smith, W., Scott, I.A.W., Keogh, J.S., (2007). Molecular phylogeography of Rosenberg's goanna (Reptilia: Varanidae: *Varanus rosenbergi*) and its conservation status in New South Wales. *Systematics and Biodiversity* 5, 361-369. 10.1017/s1477200007002460

Vincent, M., Wilson, S., (1999) *Australian Goannas.* New Holland Publishers, Sydney.