Threatened Species Assessment

Zieria oreocena
Grampians Zieria

Taxonomy

Zieria oreocena J.A. Armstr.

It is difficult to make inter-population comparisons of the morphological variation in this taxon because of the very limited amount of material available from the Victorian Range subpopulation. It appears, however, that the central leaflet length and breadth dimensions of the mature foliage on the specimens from Browns Creek are shorter than those from either Deep Creek or Flat Rock Creek.

Current conservation status

Categorised as Rare in the 2014 Advisory list of rare or threatened flora (DEPI 2014).

Proposed conservation status

Endangered in Australia

Criteria B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The taxon is a spindly shrub to 3.5m high; younger branches distinctly ridged, dotted with pellucid glands but not warted, glabrous. Leaves trifoliolate; leaflets lanceolate, 23-82mm long, 4-16mm wide, acute, slightly discolorous, upper surface glabrous to glabrescent, lower surface glabrous or with scattered stellate hairs, oil glands obvious, margins entire and somewhat recurved; petiole 11-36?mm long. Inflorescence shorter than leaves, 7-29-flowered. Sepals deltoid, 1.2-2?mm long, sparsely to moderately tomentose; petals 3.5-6mm long, white, imbricate, pubescent; ovary glabrous. Follicles dotted with oil glands, glabrous, with small terminal appendage, not warty; seed 3-3.5?mm long, red-brown to black, striated (VicFlora 2016).

The taxon flowers from July to November and fruiting occurs from September to November (Armstrong 2002). *Z. oreocena* possesses functional pollen, although collapsed grains have been observed. Vegetative apomixis has not been observed and regeneration from subsurface epicormic outgrowths has not been reported (Armstrong 2002).

Generation Length

The generation length of *Zieria oreocena* is estimated to be 50 years. This is based on an estimated pre-European settlement fire interval of 50-70 years and the expectation that the taxon is an obligate seed regenerator which recruits post-fire. Resprouting has not been observed and the taxon is likely to be fire-sensitive.

Distribution

The taxon is restricted to the Grampians in south-western Victoria (Armstrong 2002). The locations include Mt Zero, Flat Rock Creek at the northern end of the Mt Difficult Range (Northern Grampians), Deep Creek located in the Victoria Range (south-western Grampians), and Browns Creek located in the Victoria Range (south-western Grampians), situated c. 20 km south of Deep Creek. Apart from its restricted distribution pattern, *Z. oreocena* is rare in each of the three populations from which it is recorded. The Deep Creek population is contained within the reserved forest section of 'The Grampians State Forest', whereas both the Browns Creek and Flat Rock Creek populations occupy crown land at the periphery of this reserve (Armstrong 2002).

Habitat

At Flat Rock Creek, *Z. oreocena* grows in shallow grey-brown sandy soil derived from quartzose sandstone. At this locality it is tall and spindly (i.e., up to 3.5 m) and scattered along the creek sides amongst dense vegetation in association with *Eucalyptus obliqua, Correa aemula, Thryptomene* sp.*, Goodenia ovata,* and *Pteridium esculentum* (Armstrong 2002).

At Deep Creek, the taxon grows along a rocky creek bank in damp sandy loam of quartzised sandstone in riverine open-eucalypt forest associated with *Phebalium bilobum, Correa aemula, Gahnia* sp., *Melaleuca* sp., *Leptospermum* sp., and *Epacris impressa* (Armstrong 2002).

At the start of the walking track to the Fortress, the taxon is associated with *Eucalyptus obliqua, Banksia saxicola, Pultenaea scabra, P. juniperina, P. mollis, Goodenia ovata, Senecio linearifolius, Coprosma hirtella,* and *Leptospermum juniperinum* (Armstrong 2002).

There is no habitat information is available for the subpopulation at Browns Creek (Armstrong 2002).

Threats

The taxon is threatened by recruitment failure in response to extreme drought stress and targeted browsing by goats, Red Deer (*Cervus elaphus*), and Fallow Deer (*Dama dama*). It is further threatened by a current and projected increase in fire frequency, intensity, and scale due to inappropriate fire regimes and climatic drying and warming. Such changes in fire increases the risk of repeat fire events at intervals below the tolerable fire interval for the taxon, resulting in reduced seedbank replenishment and eventual seedbank exhaustion.

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:

Ineligible under Criterion A

There is insufficient evidence to determine whether there has been or will be a reduction in population sufficient to meet any threshold for Criterion A.

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 Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 345 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented naturally at the landscape scale, with most stands isolated from each other at separations greatly exceeding the very limited dispersal range of the taxon which has no specialised mechanism for long-range dispersal.

It is estimated to have 1 location, and has a continuing decline in (i), (ii), (iii), (iv) and (v) above based on the current and projected identified threats, such as extreme drought stress, browsing by goats and deer, and the effects of imposed fire regimes and climatic drying and warming.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 64 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

As above, the taxon is estimated to be severely fragmented, has 1 location, 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:

Ineligible under Criterion C

It is estimated that there are 500 to 2,000 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:

Eligible under criterion D2 as Vulnerable

The taxon is estimated to be very restricted.

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

References

Armstrong, J.A. (2002). *Zieria* (Rutaceae): A systematic and evolutionary study. *Australian Systematic Botany,* 15(3), 277-463.

DEPI (2014). *Advisory list of rare or threatened plants in Victoria - 2014.* Department of Environment and Primary Industries, Melbourne. Retrieved from: https://www.environment.vic.gov.au/__data/assets/pdf_file/0021/50448/Advisory-List-of-Rare-or-Threatened-Plants-in-Victoria-2014.pdf

VicFlora (2016). Flora of Victoria, Royal Botanic Gardens Victoria: *Zieria oreocena.* Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/70270f3c-d2cb-45ae-bbb6-f6040435919a