

## *Scleranthus brockiei* Brock Knawel

### Taxonomy

*Scleranthus brockiei* P.A. Will.

Prior to publication of *Flora of Victoria Volume 3* in 1996, the taxon was included within a broad circumscription of *S. biflorus*. Since an overwhelming majority of site records of the two taxa, as well as some specimen records, are assigned to *S. biflorus* s.l., a significant but unknown proportion of these records could be referable to *S. brockiei*.

### Current conservation status

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

### Proposed conservation status

Endangered in Victoria

Criteria A2ce; B2ab(i,ii,iii,iv,v)

### Species Information

#### Description and Life History

The taxon is a dense, compact, cushion-like perennial with non-woody base; stems to 12 cm long, glabrous. Leaves (2-)2.5-10(-13) mm long, (0.3-)0.4-0.9 mm wide, keeled, incurved, glabrous; apex apiculate; margin very narrow, scarios, papillose, rarely minutely denticulate to undulate. Inflorescence a pedunculate pair of sessile (rarely subsessile) flowers; peduncle (2-)5-18(-23) mm long in fruit, glabrous; bracts glabrous; pedicels absent or rarely up to 0.2 mm long. Sepals 5, triangular-ovate, 0.4-0.8 mm long, 0.2-0.5 mm wide, overlapping at base, margin scarios, midrib keeled; stamens 1, enclosed within the calyx, caducous. Fruit not ribbed, veins obscure, 1.7-2.3 mm long, 0.6-0.8 mm wide. The taxon flowers from November to March (VicFlora 2018).

#### Generation Length

The generation length of *Scleranthus brockiei* is estimated to be 30 to 50 years (midpoint 40 years). The taxon is a long-lived perennial, which is likely to be a fire-sensitive obligate seed regenerator killed by intense fire and recruiting episodically from a moderately persistent soil-stored seedbank at pre-settlement fire intervals of 50-90 years or more. The taxon may also recruit opportunistically following localised disturbance events or in optimal seasons, and may rely on freeze-thaw action to cause adult mortality and create small-scale inter-tussock gaps in grasslands to promote recruitment. In addition to frost heave, a range of other localised disturbance events, including both biotic and abiotic agents, are likely to promote recruitment. An estimate of generation length integrates rare fire events with a range of more continuous recruitment cues.

#### Distribution

The taxon is largely restricted in Victoria to alpine and montane districts in the east, with disjunct occurrences at lower elevations at Mt Buangor, Mt Cole, Mt Warrenheip (where it is likely to be extinct), Springbank, and Trentham in central western Victoria. In eastern Victoria, the taxon extends from Lake Mountain east to Haydens Bog near the NSW border, and from the Bogong High Plain south to Mt Useful. It is also found in NSW, the ACT, Tasmania, and New Zealand (VicFlora 2018).

### Habitat

The taxon is typically found in subalpine to alpine grasslands (VicFlora 2018).

### Threats

The taxon is likely to have suffered significant historic decline through habitat loss to agriculture, particularly at lower elevations in western and far eastern Victoria, and habitat degradation throughout its range resulting largely from intensive stock grazing which has ceased at higher elevations within the Alpine National Park and associated ski villages. Intensive stock grazing was often accompanied by intentional burning to promote fresh pick at intervals well below the tolerable fire interval (TFI) for the taxon, which is likely to be in the 10-20 year range, with graziers' fires often imposed almost annually. Occurrences at higher elevations may have undergone some recovery following cancellation of alpine grazing licences, however cessation of alpine grazing may have promoted grass dominance which may compete strongly with the taxon for space and other resources. Any post-grazing recovery may now have been overtaken by increases in population density of feral horses and Sambar Deer (*Rusa unicolor*).

The taxon is likely to be at increasing risk from climatic warming and drying and associated increases in fire frequency. Although the taxon is likely to be reasonably drought tolerant, it is likely to be at increasing long-term risk of adult mortality and, in particular, recruitment failure in response to extreme and protracted drought stress resulting in seedbank depletion and local extinction. The taxon may also be at long-term risk of seedbank depletion and local extinction in response to repeat fire events at intervals approaching the TFI for the taxon. The taxon is likely to be at continuing risk of trampling by Sambar Deer, feral horses, and goats, and by rabbit activity including browsing, digging, and warren construction. Weed competition is not considered a significant threat although some sites in partially cleared farming districts are likely to be threatened by a suite of agricultural weeds.

### 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>			

**Evidence:**

**Eligible under Criterion A2 as Endangered**

The population reduction over the past 90 to 150 years is estimated to be 30 to 60% (midpoint 45%), based on (c) and (e) above.

Past decline is based on the historic impact of the identified threats.

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

**Eligible under Criterion A4 as Vulnerable**

The population reduction over any 90 to 150-year period, including both past and future (up to 100 years in the future), is estimated to be 30 to 50% (midpoint 40%), based on (c) and (e) above. The causes of the reduction may not have ceased, be understood or be reversible.

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 <sup>2</sup>	< 5,000 km <sup>2</sup>	< 20,000 km <sup>2</sup>
B2. Area of occupancy (AOO)	< 10 km <sup>2</sup>	< 500 km <sup>2</sup>	< 2,000 km <sup>2</sup>
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 B2 as Endangered**

The Area of Occupancy (AoO) across the taxon's range is estimated to be 52 to 250 km<sup>2</sup>, based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas.

The taxon is estimated to be severely fragmented naturally at the regional, subregional, and landscape scales, and anthropogenically at the landscape scale in some districts. Seed is likely to be dispersed by ants (myrmecochory), which operate at the metre scale only.

It is estimated to have 3 locations, and has a continuing decline in (i), (ii), (iii), (iv) and (v) above based on the impact of the identified threats such as climatic warming and drying, and trampling and grazing by Sambar Deer, feral horses, goats, and rabbits.

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 as Data Deficient**

There is no available estimate of total population size for the taxon in Victoria.

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: AoO < 20 km <sup>2</sup> 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**

DEPI (2014). *Advisory list of rare or threatened plants in Victoria - 2014*. Department of Environment and Primary Industries, Melbourne.

VicFlora (2018). Flora of Victoria, Royal Botanic Gardens Victoria: *Scleranthus brockiei*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/b3d5df5f-d7fa-4817-b552-5d328e27379a>



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