

## *Actinotus forsythii* Ridge Flannel-flower

### Taxonomy

*Actinotus forsythii* Maiden & Betche

### Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2003).

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

### Proposed conservation status

Critically Endangered in Victoria

Criteria B1ab(iii)c(iv)+2ab(iii)c(iv)

### Species Information

#### Description and Life History

The taxon is an annual, diffuse herb with procumbent stems to 50 cm long. Leaves glabrous (sparsely pubescent when young); lamina 0.5-1.5 cm long, 1.0-1.5 cm wide, 3-7-lobed, lobes lanceolate to linear-lanceolate, acute; petiole 4-25 mm long. Scape procumbent to ascending, to 10 cm long in fruit, with white spreading hairs; inflorescence terminal or axillary, 1-2 cm diam.; involucre bracts 10-12, spreading, elliptic, c. 7 mm long, white to pink and densely silky hairy above, green to white-pink and sparsely hairy below. Flowers to c. 80 per umbel, all unisexual; outer flowers male, petals papery; inner flowers female, sepals minute and forming skirt on ovary, petals absent. Fruit ovate 1.5-2.5 mm long, dark grey-brown, with a light brown margin, villous and with 2 median ridges on both faces, sepals persistent. The taxon flowers January to May (rarely September to October) (VicFlora 2017).

The taxon is a short-lived, monocarpic fire ephemeral, retreating solely to the soil seed store by the second year after fires. The soil seed store may be the taxon's only site occurrence for many decades between fires (and hence is not reproductive then), appearing in abundance over a very limited area immediately after fires.

The taxon requires disturbances such as fire or soil upheaval to stimulate germination and flowering (VicFlora 2017).

#### Generation Length

The generation length of *Actinotus forsythii* is estimated to be 50 to 150 years. This is a short-lived monocarpic fire ephemeral, that dies after setting seed. It then retreats to the soil seed store and stays there until the next site disturbance. Hence the time between germination events is determined by fire interval, which although variable, is estimated to have been in the range of 50-150 years at the time of European settlement.

#### Distribution

The single Victorian occurrence is some hundreds of kilometres from the nearest occurrences in central NSW (south from Katoomba to the mid South Coast). The only Victorian records are from Brumby Point, at the northern margin of the Nunniong Plateau in East Gippsland, where it is restricted to a few square kilometres, approximately 2 km west from the end of the Brumby Point Track.

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### Habitat

The taxon is restricted to shaley soils in exposed, cold sites with relatively high rainfall but limited water holding capacity in the skeletal soil substrate (which is more gravel than soil), and cold winter temperatures with mild to warm summer temperatures. The taxon has a long-term soil seed store (many decades) and germinates in response to either fire or other soil disturbance. However, it requires ample light at ground level to flower and set viable seed, so growth is usually restricted to immediately after fires or only in the shoulder of track(s).

This taxon's site of occurrence is perhaps the most uniquely distinctive small site in the state as regards plant taxa. There are endemic and near-endemic eucalypts here, a site specific *Acacia* (*A. lucasii*), a site-specific heath (*Monotoca rotundifolia*) and other otherwise rare taxa. The habitat is subalpine mallee woodland (VicFlora 2017).

### Threats

The local population and area of occurrence is small enough that a site specific disturbance (such as the construction of a helipad) could threaten the species. Although the site conditions and/or history appear to be unique, it is unclear which aspects of these unique conditions are critical to long-term persistence of the taxon at the site. Its longevity in the soil seed store is unknown (but potentially many decades long), and the bushfires in 2003 fires enabled a major germination and seeding event, so its short-term future is likely secure as regards viable seed in the soil.

Other threats include climate change. Increasing temperatures driven by climate change could pose a substantial future threat.

The sole Victorian occurrence is within the Alpine National Park, where the site is well-managed, but Sambar Deer (*Rusa unicolor*) and feral horse populations are increasing. They present a substantial threat, following future fires.

### 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:

#### 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 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 B1 as Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 4 to 8 km<sup>2</sup>, based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA). EoO is made equal to AoO to comply with the definition of AoO as an area contained within the EoO. However a proportion of records based on imprecise localities.

The taxon is estimated to have 1 location. It is apparently restricted to a single subpopulation at Brumby Point. Although well adapted to recurrent fire, it is vulnerable to any stochastic event which may influence seedbank viability and persistence, recruitment success and seed set. It has a continuing decline in (iii), based on the current and projected impact of the identified threats.

It is estimated to have extreme fluctuations in (iv) above. The soil seed store may be the taxon's only site occurrence for many decades between fires. The population size in successive cohorts is likely to fluctuate significantly, potentially at the tenfold threshold, in response to seedbank size and viability, local extent and intensity of fire or other site disturbance events and recruitment success.

#### Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 4 to 8 km<sup>2</sup>, based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it is severely fragmented, has 1 location, a continuing decline in (iii) and extreme fluctuations in (iv) above.

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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 insufficient evidence to determine the number of mature individuals. By 2010, no plants were seen at the sole site in Victoria. It is strongly suspected that the soil seed store was the sole remnant occurrence of this taxon at that time and that will remain viable until the next major disturbance (likely to be a bushfire).

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.



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NSW Flora (2019) Flora of NSW. *Actinotus forsythii*. Retrieved from: <http://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Actinotus~forsythii>

SAC (2003). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 668 *Actinotus forsythii*. Department of Environment and Primary Industries, Victoria.

VicFlora (2017) Flora of Victoria, Royal Botanic Gardens Victoria. *Actinotus forsythii*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/f2221fec-ad39-4862-9b7d-1d01202b19ed>