Threatened Species Assessment

Pultenaea costata
Ribbed Bush-pea

Taxonomy

Pultenaea costata H.B. Will.

One of several presumed hybrid populations involving *Pultenaea costata* and *P. mollis* occurs near Sundial Peak in the Wonderland Range. Very narrow-leafed plants at this and at 1 or 2 other localities in the Grampians have been confused with *P. acerosa. P. costata* can be distinguished by the very long hairs on the calyx lobes, the long, dark brown, glabrous, recurved stipules, and by the standard which is distinctly wider than long. There are no authentic records of *P. acerosa* from the Grampians.

Current conservation status

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

Proposed conservation status

Vulnerable in Australia

Criterion D2

Species Information

Description and Life History

The taxon is a spreading shrub to 1 m high; stems terete, with pale hairs when young. Leaves alternate, ovate to lanceolate, 7-15 mm long 2-5 mm wide, concave to conduplicate, glabrous; apex ± recurved, tapered to a long pungent point; surfaces ± concolorous; lower surface with 3-5 prominent veins; margin flat or slightly incurved, minutely scabrous; stipules lanceolate c. 7 mm long, dark brown, tapered to long, very slender, recurved tips. Inflorescence a dense head-like cluster of 5-8 flowers; floral leaves grading into floral bracts c. 8 mm long with apex divided into 2 slender tips; calyx c. 9 mm long, tube glabrous, lobes covered with long, white hairs; bracteoles attached at base of calyx tube, ovate c. 8 mm long with a basal tuft of hairs and ciliate margins; standard 13-15 mm wide; ovary and base of style covered with long, pale hairs. Pod turgid, enclosed by calyx. The taxon flowers from October to November (VicFlora 2019).

Generation Length

The generation length of *Pultenaea costata* is estimated to be 35 to 75 years. This is based on a plausible longevity of 25-45 years, and an inferred dependence on fire for mass episodic recruitment at pre-settlement intervals of 45-75 years. The taxon is likely to be a fire-sensitive obligate seed regenerator (OSR), recruiting predominantly post-fire with some continuous recruitment in response to localised site disturbance events and seasonal conditions. The taxon is unlikely to resprout following fire, and soil-stored seedbanks are expected to persist indefinitely in the absence of fire.

Distribution

The taxon is endemic to the Grampians National Park in western Victoria. The taxon is apparently restricted to the northern ends of the Victoria and Serra Ranges, the Wonderland Range, the Wallaby Rocks and associated elevated sites south-west of Zumsteins, and the southern end of the Mount Difficult Range (VicFlora 2019).

Habitat

Inspection of quadrat data and comparison with Ecological Vegetation Class (EVC) mapping suggests that the habitat range of the taxon includes Heathy Dry Forest and Lowland Forest, and some Rocky Outcrop Herbland. The taxon occasionally occurs in or abutting Grassy Dry Forest, or at the margins of Heathy Woodland. The habitat is frequently dominated by *Eucalyptus obliqua* and *E. baxteri*, and often also *Callitris rhomboidea*. Understorey associates often include *Leptospermum myrsinoides* and *Caustis flexuosa*. The taxon is often associated with minor drainage lines.

Threats

The habitat range suggests that the taxon is ecologically adaptable and it is likely to be resilient in the face of individual threats, such as climate change and imposed fire regimes. The key threat to the taxon in the medium to longer term, however, is the combined impact of these threats operating synergistically. Climatic drying and warming, coupled with increasing frequency and landscape scale of natural and anthropogenic fire, increases the risk of recruitment failure and adult mortality. This results in seedbank depletion, ultimate seedbank exhaustion and local extinction. The increasing risk of repeat fire events at intervals approaching or below the tolerable fire interval (TFI) for the taxon, which is likely to be 5-10 years, increases the risk of seedbank depletion and exhaustion. Further, the increasing frequency, duration and intensity of extreme drought events increases the risk of adult mortality and, particularly, recruitment failure during the early, vulnerable stages of post-fire recruitment.

The taxon may also be susceptible to targeted browsing by native and exotic herbivores, particularly during the early stages of post-fire recruitment.

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:

Ineligible under Criterion B

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 454 km² and the Area of Occupancy (AoO) is estimated to be 120 km², but other thresholds under this criterion have not been met.

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. However, quadrat data and circumstantial field observations suggest that it is likely to be in the thousands, with the taxon sometimes locally common with projective foliage cover in the 25-50% range at the quadrat scale.

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 has a restricted distribution because it occurs in a single location, such that this restriction makes the taxon capable of becoming Critically Endangered or Extinct within one or two generations in response to the identified threats, notably the combined impacts of climate change and imposed fire regimes operating synergistically.

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. 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 (2019). Flora of Victoria, Royal Botanic Gardens Victoria: *Pultenaea costata*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/73a91eaf-01bd-4781-bebc-3ac333bb9188