Threatened Species Assessment

Calotis pubescens
Mountain Burr-daisy

Taxonomy

Calotis pubescens (F. Muell. ex Benth.) N.G. Walsh & K.L. McDougall

Prior to its elevation by Neville Walsh and Keith Mc Dougall in 2002 to species rank, the taxon was known as *Calotis cuneata* var. *pubescens*. Apart from the inner ring of secondary awns, the cypselas are virtually identical to those of *C. scabiosifolia* var. *integrifolia* which grows in areas close to the type locality, as well as at the Cobungra locality.

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2013).

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

Proposed conservation status

Critically Endangered in Victoria

Criteria B1ab(iii)+2ab(iii); D

Species Information

Description and Life History

The taxon is a tufted, rhizomatous, villous perennial to 17 cm high. Basal leaves shortly petiolate, obovate-cuneate, entire or up to 5-toothed distally, sometimes emarginate, 15-50 mm long, 6-12 mm wide; scape leaves smaller (c. 1 cm long) and sessile, but otherwise similar. Scapes unbranched; capitula to ?25 mm diam.; involucral bracts obovate, 3.5-5 mm long; ray florets mauve or white, c. 40, c. 9 mm long; disc florets yellow, sterile. Cypsela body c. 2.5 mm long, reddish-brown, villous at apex; major awns 4 or 5, stout, divergent, 3-5 mm long, villous near base, smooth near apex; secondary awns fine, 3-5 between each pair of major awns, to 1.5 mm long, plumose; a narrow inner ring of fine, erect, plumose awns to c. 1 mm long is present at the apex of the cypsela. The taxon flowers December to January (2 records) (VicFlora, 2018).

Generation Length

The generation length of *Calotis pubescens* is estimated to be 100 years. A nominal generation time of 100 years is based on the rhizomatous habit of the taxon, which forms extensive dense mats that field observation suggests may represent a single genet comprising at least 100 rosettes extending over at least 100 square metres. Under undisturbed pre-European settlement conditions, each genet is likely to have been essentially immortal with indeterminate longevity. Recruitment is likely to be both episodic, in response to very rare fire events, and opportunistic, in response to localised site disturbance events and seasonal conditions. In the absence of mortality of established clones, seed recruitment does not contribute to generational turnover, being a strategy for colonisation of new sites and recolonisation of sites following exceptionally rare catastrophic events.

Distribution

In Victoria the taxon was known only by the type specimen from ‘grassy mountains on the Mitta Mitta River’ collected in 1854, until rediscovered in 2009 near Cobungra (VicFlora 2018).

The taxon is currently known in Victoria by a single occurrence on the Upper Spring Creek Plain in the headwaters of Spring Creek, about 1.6 km west of the intersection of Jim and Jack Track and Zig Zag Track, about 8.9 km SSW of Cobungra. The stand comprises of thousands of rosettes scattered over an area of approximately 175-190 m x 100 m or 2 ha. The type specimen collected by Ferdinand von Mueller in 1854 (Walsh and McDougall 2002) may also have been taken from Spring Creek Plain.

In NSW, the taxon has been recorded from the Nungar Plain in Kosciuszko National Park and the Snowy Plain at the headwaters of the Gungahlin River on private land. A survey in February 2001 of Snowy Plain in Kosciuszko National Park, where the taxon had been collected by M. Mueller in 1956, failed to relocate the taxon (Walsh and McDougall 2002).

Habitat

In Victoria the taxon is known only from a subalpine herbfield plain (VicFlora 2018), which occurs at an elevation of 1230-1244 m. Whilst the precise habitat of the Victorian stand is not documented, the habitat of the taxon in New South Wales is described by Walsh and McDougall (2002) as a herbfield community, in which it may be dominant, on gentle slopes between *Eucalyptus pauciflora* woodland and the valley floor which is vegetated by a mosaic of *Poa*-dominated tussock grasslands, open heaths dominated by *Hovea montana,* and Cyperaceae-rich wetland communities.

Threats

The taxon is currently threatened by recreational vehicle activity. When the site was last inspected by Val Stajsic on the 21st January 2010, some disturbance was caused by 4-wheel drives near the edge of the site.

The habitat of the taxon is also threatened by exotic herbivores. The site is grazed by feral horses and is also legally grazed by cattle since it occurs in unreserved State Forest. To what degree horses and cattle constitute a threat is unclear. The plants have evidently tolerated intermittent grazing, but the site is arguably subject to continuing decline in quality of habitat due to grazing, soil compaction, possible increase in nutrient loads from cattle and horses, soil disturbance, and weed invasion.

Walsh and McDougall (2002) note that the taxon is threatened by feral pigs, which have excavated large areas of vegetation, especially the herbland community containing *C. pubescens*, on Nungar Plain in the Kosciuszko National Park in New South Wales.

The taxon may also be threatened by Sambar Deer (*Rusa unicolor*) which are currently undergoing a large eruption in population size, density, habitat range, and penetration throughout the alpine region, and are observed to congregate in great numbers in open grassy or herb-rich sites.

The taxon may also be threatened in the longer term by climate change and imposed fire regimes which are likely to result in the drying of habitat, woody invasion, and an increasing risk of mortality of adult clones and recruitment failure in response to extreme drought stress compounded by intense and targeted herbivory.

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 Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 4 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

It is estimated to have 1 location, and has a continuing decline in (iii) above, based on the current and projected impact of the identified threats.

Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 4 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

As above, it has 1 location, and a continuing decline in (iii) 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 1 to 50 (midpoint 20) 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 D as Critically Endangered

The taxon is estimated to have 1 to 50 (midpoint 20) mature individuals. Walsh and McDougall (2002) noted that in NSW 'Colonies of *C. pubescens* may comprise a single genet developed by rhizomatous growth and can be up to 10 m in diameter.'

Field observations of the only known Victorian stand support the inference that the stand may comprise only one or very few genets which may have taken decades or even centuries to achieve their current extent. In 2010 Val Stajsic observed that 'colonies of varying size are scattered over an area of about 190 x 100 m. Thousands of scapes present.'

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.

SAC (2013). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 842 *Calotis pubescens*

VicFlora (2018) Flora of Victoria, Royal Botanic Gardens Victoria: *Calotis pubescens*. retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/90b50a03-ccab-4f94-931b-11ef2f6bb85a

Walsh, N.G. and McDougall, K.L. (2002). *Calotis cuneata* var. *pubescens* (Asteraceae), change in rank and notes on its distribution and ecology. *Muelleria* 16: 44.