Threatened Species Assessment

Celmisia costiniana
Carpet Snow-daisy

Taxonomy

Celmisia costiniana M. Gray & Given

This taxon may be difficult to separate from other *Celmisia* taxa. Indeed, all Victorian *Celmisia* taxa except for *C. sericophyllla* were once combined as *C. asteliifolia.*

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

Species Information

Description and Life History

Rootstock woody, branched, creeping and rooting to form more or less extensive patches, occasionally tufted from erect or ascending rootstock, the base of the plant covered with fibrous remains of old leaves. Leaves are narrowly oblanceolate to narrowly elliptic or linear, flat or recurved with recurved or revolute margins, upper surface green to grey-green; pellicle silvery, shining, soon rupturing beneath to expose the greyish or silvery short, more or less woolly, tomentum on the leaf.

The taxon shows very extensive stolon development when burnt. It shows limited recruitment, including occasionally in wet heath. It can be outcompeted by *Poa* spp. and shrubs, can recruit successfully into burnt areas, and resprouts readily. The pre-settlement fire frequency was likely to be approximately 50-150 years with a mean of 100 years at higher elevations, and 60 -80 years at subalpine elevations.

Generation Length

The generation length of *Celmisia costiniana* is inferred to be 20 to 60 years. The Vital Attribute database suggests a plant longevity of 100 years for the similar *C. pugioniformis* and *C. latifolia,* and cites McCarthy et al. (2000). However, that report suggests a lifespan of 15 years only, or substantially less. The similar *C. tomentella* has an estimated lifespan of 50+ years, so a mid-range value was used because of this discrepancy, noting that decadal persistence of this resprouting taxon suggests a lifespan that is relatively long. In undisturbed vegetation, the average age of the plant is likely to be towards the older end of the range.

Distribution

The taxon is mainly restricted to the Snowy Range from Mt Wellington north to Mt Cobbler, with short extensions west to Mt Buller and environs, and east along the Barry Mountains toward Mt Hotham (Gray and Given 1999a). The taxon occurs in alpine and upper subalpine tracts of the Australian Alps in New South Wales and Victoria (Gray and Given 1999b).

Habitat

The taxon is locally common in alpine and higher subalpine tracts, often dominant (with *Poa* spp.) in tall alpine herbfields, and form extensive carpets, often in association with *C. pugioniformis*. It is also found in open heaths, herbfields, grasslands, in cold-air drainage valleys, and along gravelly stream banks (Gray and Given 1999b).

Threats

The taxon is long lived, and mortality is caused principally fire. It is assumed to be highly resistant to herbivory, but possibly more sensitive to stock trampling which is assumed to have resulted in historic reduction in population density, as indicated by increase in *Celmisia* density in exclusion plots. It is presumably less palatable than *Craspedia, Podolepis,* and *Asterolasia* spp., which are often cited as preferentially grazed by cattle.

C. asteliifolia (later spilt into *C. costiniana, C. pugioniformis,* and *C. tomentella*) was preferentially grazed by cattle, making up a large part of their diet, especially in Autumn (van Rees 1984). This has clearly had a substantial impact on plant cover, as that of *Celmisia* spp. increased from 5% to 44 % after 47 years without grazing (Wahren et al. 1994). Grazing is now removed from most of this plant's range, although feral horses and deer are still active.

Alpine taxa are prone to range contraction due to climate change, of which the impacts are likely to be seen first in marginal, lower-elevation sub-populations. Large fires are becoming more frequent, and two fires at a short interval may be detrimental. The increasing impacts of feral horses and deer might be countered in some areas by recovery from cattle grazing, making future population trends difficult to estimate.

The taxon is a preferred grazing taxon and is still subject to grazing over some of its range in Victorian National Parks (Gray and Given 1999b). In addition, the most westerly population near the summit of Mt Buller, must be regarded as seriously threatened due to over-development of skiing facilities on this mountain (Gray and Given 1999a).

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:

Eligible under Criterion A2 as Vulnerable

The population reduction over the past 60 to 180 years is estimated to be 30 to 50% (midpoint 40%), based on (c) and (e) above.

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 4,076 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented since wind dispersal is limited to landscape scale rather than geographic scale. Furthermore, alpine taxa tend to exist in variable-sized islands of habitat within a matrix of lower-altitude forest. This tends to isolate sub-populations reproductively, and fragmentation is of most concern for small outlying subpopulations.

It is estimated to have 3 to 5 locations, and has a continuing decline in (i), (ii), (iii), (iv) and (v) above, based on climatic drying and warming, competitive interaction with grasses, shrubs and exotics, and herbivory by hares, rabbits, feral horses, and Sambar Deer (*Rusa unicolor*).

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 152 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

As above, the taxon is severely fragmented, has 3 to 5 locations, 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 suspected that there are 20,000 to 40,000 mature individuals, which exceeds the thresholds for criterion C.

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

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