



Celmisia tomentella Silver Snow-daisy

Taxonomy

Celmisia tomentella M. Gray & Given

This taxon may be difficult to separate from other *Celmisia* species. Indeed, all Victorian *Celmisia* species except for *C. sericophylla* were once combined as *C. asteliifolia*. According to VicFlora (2019), the thin scaly rhizomes are diagnostic for this species in Victoria, however they are fleshy and brittle when fresh and readily detach unless specimens are carefully dug up. The leaves of this species are extremely variable in shape and size. Large plants from upper montane Sphagnum bogs may have leaves to 30 cm long and 2.5 cm wide. Plants from the Baw Baw Plateau have a silvery aspect and superficially resemble the closely related rhizomatous *C. asteliifolia* from Tasmania.

Current conservation status

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

Proposed conservation status

Vulnerable in Victoria

Criteria A2ce; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v); D2

Species Information

Description and Life History

The taxon has thin spreading scaly rhizomes, sometimes (in Sphagnum mossbeds) extensive. Leaves oblanceolate to narrowly oblanceolate or linear, 5-20(-30) cm long, (1.5)-5-15(-25) mm wide, dark green to grey-green above, pellicle silvery, shining, tomentum beneath very short, dull, cream to greyish, hairs flattened (under high magnification), midrib usually raised and conspicuous, margins recurved or revolute. Scape woolly-tomentose, to 60 cm high; capitulum c. 6(-8) cm diam.; intermediate involucre bracts narrowly triangular to narrowly triangular-subulate, c. 9-18 mm long, 1.7-3.3 mm wide, tomentose to woolly-tomentose or glabrescent at least in the lower third, usually reddish-purple distally, margins more or less fimbriate; ligules c. 10-25 mm long, white, sometimes mauve-tipped beneath. Cypselas c. (5-)10-11(-13) mm long, with short antrorsely appressed hairs, occasionally subglabrous; pappus c. 7-12 mm long. The taxon flowers from December to February (usually slightly later than *C. costiniana* and *C. pugioniformis*) (VicFlora 2019).

Generation Length

The generation length of *Celmisia tomentella* is inferred to be 20 to 60 years. DELWP's Vital Attribute database suggests that the taxon recovers post-fire from both a long-lived soil seedbank and vegetatively from protected buds. It is also tolerant of establishment in mature vegetation. In undisturbed vegetation, the average age of plants is likely to be towards the older end of the range. The seedlings take 2 years to reach reproductive capacity, individual plants live for more than 50 years and seeds survive in the soil for more than 50 years. Resprouting post-fire is rapid (McDougall 2007), with new shoots several centimetres long within a month. Fire is historically rare in alpine areas, occurring perhaps once or twice a century, and plants are likely to live to a long age.

Distribution

The taxon is the most common in subalpine areas (Mt Buffalo, the Bogong High Plains, and south to the Baw Baw Plateau) (VicFlora 2019).

The taxon also occurs in the Australian Alps and associated ranges in NSW, and north to the Brindabella Range in the ACT, with a disjunct occurrence in the Oberon area in the Blue Mountains of NSW. Of the 4 areas where the taxon occurs, there is uncertainty about the Mount Delusion State Forest (Gray & Given 1999b).

Habitat

The taxon is most common in subalpine areas. It forms more or less open patches or scattered colonies in Snow Gum woodland, heaths, herbfields and Sphagnum mossbeds. It also occurs in lower alpine and upper montane bogs (Gray & Given 1999b; VicFlora 2019). This taxon is a constant feature of sub-alpine Sphagnum bogs, especially around the Bogong High Plains (Whinam et al. 2003).

Threats

The past decline can be attributed to the impacts of introduced herbivores. Van Rees (1984) showed that *Celmisia 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. This had a substantial impact on plant cover, as the plant cover of *Celmisia* spp. increased from 5% to 44% after 47 years without grazing (Wahren et al. 1994). Alpine bogs, which comprise part of the taxon's habitat, have also decreased substantially since settlement.

The taxon is highly palatable, and it is still subject to grazing over some parts of its range. Feral horses and deer are still active on the Bogong High Plains and around the Cobungra State Forest to the south. Alpine species are also prone to range contraction due to climate change, of which the impacts, particularly in wetter habitats, are likely to be seen first in marginal, lower-elevation subpopulations. Fire is historically rare in alpine areas, occurring perhaps once or twice a century, and the plants are likely to live to a long age.

The small disjunct population in the Oberon area is restricted to a roadside surrounded by pine plantations and may therefore be at risk from road maintenance or other land management operations (Gray & Given 1999b). The original vegetation at this locality was Snow Gum Woodland, consisting of *Eucalyptus pauciflora* - *E. dalrympleana* association, much of which was cleared for pine plantations in this region. Remnants of this association in the area should be searched for any further populations of this taxon (Gray & Given 1999b).

Spatial analysis of likely habitat for the daisy on all land tenures indicates that 84% occurs within the CAR reserve system, including parks and reserves,

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> <ul style="list-style-type: none"> (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. The causes of the reduction may not have ceased, be understood or be reversible.

As noted by Van Rees (1984) *Celmisia* spp. were preferentially grazed by cattle, making up a large part of their diet, especially in autumn. This led to reduction in plant cover (Wahren et al. 1994). Alpine bogs, which comprise part of the taxon's habitat, have also decreased substantially since settlement. Anecdotal evidence suggests up to a 50% decrease in the area of bogs due to livestock grazing, in combination with increased frequency of fire.

Celmisia tomentella

Silver Snow-daisy

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 ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
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 and B2 as Vulnerable

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 7258 km², based on accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

The Area of Occupancy (AoO) across the taxon's range is estimated to be 188 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

The taxon is estimated to have six locations. The subpopulations exist in 'islands' of habitat with a matrix of lower-altitude forest. However threats such as fire, in particular, can affect large areas. It has been assumed that the subpopulations from Wellington to Buller could all be burnt by a fire such as the one that occurred in 2007.

It has a continuing decline in (i), (ii), (iii) (iv) and (v) above, based on the current and projected impact of the identified threats, including the impacts of herbivory, climate change and increased fires.

Celmisia tomentella

Silver Snow-daisy

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 50,000 to 100,000 mature individuals, which exceeds the thresholds for criterion C.

Criterion D. Very small or restricted population ^a				
		Critically Endangered ^a	Endangered ^a	Vulnerable ^a
Number of mature individuals (observed or estimated) ^a		< 50 ^a	< 250 ^a	< 1,000 ^a
D2. Only applies to the VU category ^b 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. ^a		- ^a	- ^a	D2. Typically: ^b AoO < 20 km ² or number of locations ≤ 5 ^a

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. 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



Celmisia tomentella Silver Snow-daisy

Gray, M., & Given, D.R. (1999a). *Celmisia*. In N.G. Walsh and T.J. Entwisle (Eds.), *Flora of Victoria Vol. 4, Cornaceae to Asteraceae*. Melbourne: Inkata Press.

Gray, M., & Given, D.R. (1999b). New species and a new combination in Australian *Celmisia* Asteraceae-Astereae. *Australian Systematic Botany*, 12(2), 201-206.

VicFlora (2019). Flora of Victoria, Royal Botanic Gardens Victoria: *Celmisia tomentella*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/a4264cfe-17b1-4723-b31c-2f8ba0479e11>

van Rees, H. (1984). *Behaviour and Diet of Free-ranging Cattle on the Bogong High Plains Victoria*. Victoria: Department of Conservation, Forests and Lands.

Wahren, C-H. A., Papst, W. A., & Williams, R. J. (1994). Long-term vegetation change in relation to cattle grazing in subalpine grassland and heathland on the Bogong High Plains: An analysis of vegetation records from 1945 to 1994. *Australian Journal of Botany*, 42, 607-639.

Whinam, J., Chilcott, N. M., Morgan, J. W. (2003). Floristic composition and environmental relationships of Sphagnum-dominated communities in Victoria. *Cunninghamia*, 8, 162-174.