

# NSW Threatened Species Scientific Committee

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## Notice of and reasons for the Final Determination

The NSW Threatened Species Scientific Committee, established under the *Biodiversity Conservation Act 2016* (the Act), has made a Final Determination to list Snowpatch Herbfield in the Australian Alps bioregion as a CRITICALLY ENDANGERED ECOLOGICAL COMMUNITY in Part 1 of Schedule 2 of the Act. Listing of Critically Endangered Ecological communities is provided for by Part 4 of the Act.

### This determination contains the following information:

- Parts 1 & 2:** Section 1.6 of the Act defines an ecological community as “an assemblage of species occupying a particular area”. These features of Snowpatch Herbfield in the Australian Alps bioregion are described in Parts 1 and 2 of this Determination, respectively.
- Part 3:** Part 3 of this Determination describes the eligibility for listing of this ecological community in Part 1 of Schedule 2 of the Act according to criteria prescribed by the *Biodiversity Conservation Regulation 2017*.
- Part 4:** Part 4 of this Determination provides additional information intended to aid recognition of this community in the field.

### Part 1. Assemblage of species

- 1.1 Snowpatch Herbfield in the Australian Alps bioregion (hereafter referred to as Snowpatch Herbfield) is characterised by the assemblage of species listed below.

<i>Blechnum penna-marina</i> subsp. <i>alpina</i>	<i>Neopaxia australasica</i>
<i>Brachyscome nivalis</i>	<i>Oreomyrrhis pulvinifera</i>
<i>Cardamine robusta</i>	<i>Plantago glacialis</i>
<i>Carex canescens</i>	<i>Plantago muelleri</i>
<i>Carex cephalotes</i>	<i>Poa costiniana</i>
<i>Carex hypandra</i>	<i>Polystichum proliferum</i>
<i>Epilobium tasmanicum</i>	<i>Ranunculus anemoneus</i>
<i>Luzula acutifolia</i> subsp. <i>nana</i>	<i>Ranunculus niphophilus</i>

- 1.2 The total species list of the community across all occurrences is likely to be considerably larger than that given above. Due to variation across the range of the community, not all of the above species are present at every site and many sites may also contain species not listed above.

Characteristic species may be abundant or rare and comprise only a subset of the complete list of species recorded in known examples of the community. Some characteristic species show a high fidelity (are relatively restricted) to the community, but may also occur in other communities, while others are more typically found in a range of communities.

The number and identity of species recorded at a site is a function of sampling scale and effort. In general, the number of species recorded is likely to increase with the size of the site and there is a greater possibility of recording species that are rare in the landscape.

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Species presence and relative abundance (dominance) will vary from site to site as a function of environmental factors such as soil properties (chemical composition, texture, depth, drainage), topography, climate and through time as a function of disturbance (e.g. fire, logging, grazing) and weather (e.g. flooding, drought, extreme heat or cold).

At any one time, above ground individuals of some species may be absent but the species may be represented below ground in the soil seed bank or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers.

The species listed above are vascular plants, however the community also includes micro-organisms, fungi and cryptogamic plants as well as vertebrate and invertebrate fauna. These components of the community are less well documented.

## **Part 2. Particular area occupied by the ecological community**

- 2.1 The assemblage of species listed in Part 1.1 above which characterises Snowpatch Herbfield occurs within the Australian Alps bioregion. This bioregion is defined by SEWPaC (2012) Interim Biogeographic Regionalisation for Australia, Version 7. Department of Sustainability, Environment, Water, Population and Communities.  
<http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/maps.html>
- 2.2 It is the intent of the NSW Threatened Species Scientific Committee that all occurrences of the ecological community (both recorded and as yet unrecorded, and independent of their condition) that occur within this bioregion be covered by this Determination.

## **Part 3. Eligibility for listing**

- 3.1 Reasons for determining eligibility for listing
  - 3.1.1 The geographic distribution of Snowpatch Herbfield is very highly restricted. The extent of occurrence of Snowpatch Herbfield is 270 km<sup>2</sup> based on a minimum convex polygon enclosing the estimated extent of the community and using the method of assessment recommended by IUCN (Bland *et al.* 2016). The estimated area of occupancy (AOO) is zero: that is, the Community does not comprise at least 1 km<sup>2</sup> (1%) of any 10 x 10 grid cell, the method recommended for assessing AOO by IUCN (Bland *et al.* 2016). The distribution of Snowpatch Herbfield was estimated using Costin *et al.*'s (2000) map of native vegetation of the Snowy Mountains Main Range and from an old record of the community from the Gungahran area. Snowpatch Herbfield is a component of Short Alpine Herbfield *sensu* Costin *et al.* (2000).
  - 3.1.2 The distribution of Snowpatch Herbfield is strongly associated with late-lying snowpatches, the area of which is in decline. Davis (2013) demonstrated that snow depth and cover duration have declined in the Snowy Mountains since the late 19th century, with the greatest decline in the most recent years. Edmonds *et al.* (2006) have shown that the area of late-lying snowpatches is correlated with snow depth as measured at several locations within Kosciuszko National Park. Modelling of future snow conditions in the Australian alpine regions has projected continuing declines in both the area and the length of time those areas are covered by snow (Hennessy *et al.* 2003). Pickering *et al.* (2014) have linked earlier thaw of snowpatches to changes in floristic composition caused by the invasion from surrounding communities of species which presently rarely occur in areas of late-lying snow cover. While weeds have rarely been recorded in Snowpatch Herbfield in the past (McDougall and Walsh 2007), possible increases in temperature due to climate change may facilitate the invasion of weed species (Pickering 2007). 'Anthropogenic climate change' is listed as a Key Threatening Process under the Act.

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## 3.2 Criteria for listing

Snowpatch Herbfield in the Australian Alps bioregion is eligible to be listed as a Critically Endangered Ecological Community in accordance with Part 4 of the Act as, in the opinion of the NSW Threatened Species Scientific Committee, it is facing an extremely high risk of extinction in Australia in the immediate future, as determined in accordance with the following criteria as prescribed by the *Biodiversity Conservation Regulation 2017*:

Clause 4.10 - Restricted geographic distribution of ecological community  
(Equivalent to IUCN criterion B)

<b>The ecological community's geographic distribution is:</b>			
	(a)	for critically endangered ecological communities	very highly restricted.
<b>and the following conditions apply:</b>			
	(e)	There are threatening processes that are likely to cause continuing decline in either geographic distribution, environmental quality or biotic interactions within the near future,	
	(f)	The ecological community exists at:	
	(i)	for critically endangered ecological communities	an extremely low number of locations.

Clause 4.12 – Disruption of biotic processes or interactions in ecological community  
(Equivalent to IUCN criterion D)

<b>The ecological community has undergone or is likely to undergo within a time span appropriate to the life cycle and habitat characteristics of its component species:</b>			
	(a)	for critically endangered ecological communities	a very large disruption of biotic processes or interactions.

Dr Marco Duretto  
Chairperson  
NSW Threatened Species Scientific Committee

Exhibition period: 27/04/18 – 22/06/18

Proposed Listing date: 27/04/18

## **Part 4. Additional information about the ecological community**

The following information is additional to that required to meet the definition of an ecological community under the Act, but is provided to assist in the recognition of Snowpatch Herbfield in the Australian Alps bioregion in the field. Given natural variability, along with disturbance history, Snowpatch Herbfield may sometimes occur outside the typical range of variation in the features described below.

4.1 Snowpatch Herbfield is a variable community often dominated by *Neopaxia australasica* or *Plantago muelleri*. Other common species include *Poa costiniana*, *Carex cephalotes*, *C. hypandra*, *Polystichum proliferum*, *Ranunculus anemoneus* and *R. niphophilus* (McDougall and Walsh 2007). Snowpatch Herbfield typically occurs as “a single continuous herbaceous stratum, closely appressed to the ground, although a taller, discontinuous herbaceous stratum may also be present” (Costin 1954). Snowpatch Herbfield falls within the Alpine Herbfields vegetation class of Keith (2004).

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- 4.2 Snowpatch Herbfield is known to occur in the alpine area of Kosciuszko National Park (Costin 1954; McDougall and Walsh 2007). It has been recorded from the wet areas immediately below late-lying snowpatches, that is, snowdrifts that persist into summer after the surrounding snow has melted (Edmonds *et al.* 2006; Costin *et al.* 2000). Costin's (1954) *Plantago muelleri* – *Montia australasica* Alliance (which includes Snowpatch Herbfield as described here) is generally covered by snow for at least 8 or 9 months of the year (Costin 1954), and for much of the snow-free period is copiously irrigated with snow-melt (McDougall and Walsh 2007). McDougall and Walsh (2007) recorded Snowpatch Herbfield between 1,920 and 2,170 m a.s.l.
- 4.3 Snowpatch Herbfield is a component of Short Alpine Herbfield *sensu* Costin *et al.* (2000), which they mapped in the alpine areas above 1,800m a.s.l. between Mount Kosciuszko in the southwest and Mount Tate in the north east, Mount Townsend in the north west and Mount Stilwell in the south east.
- 4.4 Wimbush and Costin (1979) noted the presence of Short Alpine Herbfield (*sensu* Costin 1954, of which Snowpatch Herbfield as described here is a component) at the bottom of late-lying snow patches near Gungartan, a mountain 2,068 m a.s.l situated 9 km northeast of Mount Tate. It is not known if Snowpatch Herbfield exists in this area at present. Gungartan is north of, and disjunct from, other known locations of Snowpatch Herbfield and has only a small area above 1,800m m. Late lying snowpatches in this area are rarer and potentially more vulnerable to climate warming.
- 4.5 Drier snowpatch affected areas, typically uphill from Snowpatch Herbfield, often support Snowpatch Feldmark (Community 12, *Coprosma niphophila* – *Colobanthus nivicola* snowpatch feldmark of McDougall and Walsh (2007)). Snowpatch Feldmark in the Australian Alps bioregion is listed as a Critically Endangered Ecological Community in Part 1 of Schedule 2 of the Act. Well drained areas near Snowpatch Herbfield but away from the influence of late-lying snowpatches support the Tall Alpine Herbfield (*sensu* Costin 1954) equivalent to Communities 18, 19 and 22 of McDougall and Walsh (2007).
- 4.6 Snowpatch Herbfield is likely to contain several threatened plant species including those listed in the table below.

Species	BC Act*	EPBC Act+
<i>Ranunculus anemoneus</i>	Vulnerable	Vulnerable
<i>Carex raleighii</i>	Endangered	Not Listed
<i>Argyrotegium nitidulum</i>	Vulnerable	Vulnerable

\*Biodiversity Conservation Act 2016

+ Environment Protection and Biodiversity Conservation Act 1999

## References:

- Bland LM, Keith DA, Miller RM, Murray NJ, Rodríguez JP (2017) Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria, Version 1.1. (IUCN: Gland, Switzerland)
- Costin AB (1954) 'A study of the ecosystems of the Monaro Region of New South Wales with special reference to soil erosion.' (A.H. Pettifer, Government Printer: Sydney)
- Costin AB, Gray M, Totterdell CJ, Wimbush DJ (2000) 'Kosciuszko Alpine Flora. (2nd edn) (CSIRO Publishing; Collingwood, Australia)

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- Davis CJ (2013) Towards the development of long term winter records for the Snowy Mountains. *Australian Meteorological and Oceanographic Journal* **63**, 303–313.
- Edmonds T, Lunt ID, Roshier DA, Louis J (2006) Annual variation in the distribution of summer snowdrifts in the Kosciuszko alpine area, Australia, and its effect on the composition and structure of alpine vegetation. *Austral Ecology* **31**, 837–848.
- Hennessy K, Whetton P, Smith I, Bathols J, Hutchinson M, Sharples J (2003) 'The Impact of Climate Change on Snow Conditions in Mainland Australia. (CSIRO Atmospheric Research: Aspendale, Victoria)
- Keith D (2004) 'Ocean shores to desert dunes: the native vegetation of NSW and the ACT.' (Department of Environment and Climate: Hurstville)
- McDougall K, Walsh N (2007) Treeless vegetation of the Australian Alps. *Cunninghamia* **10**, 1–57.
- Pickering C (2007) Climate change and other threats in the Australian Alps. In: 'Protected Areas: buffering nature against climate change. Proceedings of a WWF and IUCN World Commission on Protected Areas symposium, 18–19 June 2007, Canberra.' (Eds M. Taylor & P. Figgis) pp. 28–34. (WWF-Australia: Sydney)
- Pickering C, Green K, Barros A, Venn S (2014) A resurvey of late-lying snowpatches reveals changes in both species and functional composition across snowmelt zones. *Alpine Botany* **124**, 93–103.
- SEWPaC (2012) Interim Biogeographic Regionalisation for Australia, Version 7. Department of Sustainability, Environment, Water, Population and Communities.  
<http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/maps.html>
- Wimbush DJ, Costin AB (1979) Trends in vegetation at Kosciusko. III. Alpine range transects, 1959–1978. *Australian Journal of Botany* **27**, 833–871.