



Usnea acromelana Black-beard Lichen

Taxonomy

Usnea acromelana (Stirt.)

The taxon was described by Stirton in 1898 as *Usnea acromelana*, based on a New Zealand type specimen collected in the Selwyn Gorge in Canterbury. In 1939 Lamb transferred the taxon to the segregate genus *Neuropogon* with the combination *Neuropogon acromelanus* (Stirton) Lamb. *N. acromelanus* is a bipolar genus of around 15 species of fruticose lichens attached by a basal holdfast, all of which are exclusively saxicolous (attached to rock substrates), distinguishing the genus from the great majority of species in the highly speciose genus *Usnea* (Galloway 1985). More recently, the genus *Neuropogon* has been returned to a broad circumscription of *Usnea*.

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* as *Neuropogon acromelanus* (SAC 2000).
Categorised as Endangered in the 2014 Advisory list of rare or threatened flora (DEPI 2014).

Proposed conservation status

Critically Endangered in Victoria

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

Species Information

Description and Life History

The taxon is a fruticose rock-inhabiting (saxicolous) lichen with a rather straggling, tufted thallus, to 9 cm tall, attached to the rock substrate by a basal holdfast. Branches are 1-2 mm wide at base, becoming thinner and more densely branching, entangled towards apices. Surface yellow to yellow-green at base, continuous, smooth, waxy or shining, often wrinkled or faveolate (honeycombed) in large specimens, bluish-black with black cracks towards apices (Galloway 1985).

Generation Length

The generation length of *Usnea acromelanus* is estimated to be 25 to 50 years. This is based on the inferred longevity of individual thalli which are tufted and attached to outcropping rock by a basal holdfast and potentially quite long-lived but with mortality induced by stochastic events such as rock falls, animal activity, exfoliation of granitic rock faces induced by weathering action, particularly freeze-thaw action following penetration of water into fine crevices and cracks, or by intense radiant heat from wildfires or, potentially, following prolonged and intense drought although, like most lichens, the taxon is inferred to be quite drought-tolerant. The basal holdfast may be capable of some resprouting following trampling or mild scorching by fire. Recruitment is inferred to occur infrequently from airborne spore in response to optimal seasonal conditions but is unlikely to be successful in the absence of mortality of adult thalli of any fruticose, foliose or crustose lichens which already occupy the available habitat.

Distribution

The taxon is reliably recorded in Victoria from a single site, Basalt Hill, on the Bogong High Plains in the Victorian Alps, where collected by Rex Filson on 22 January 1967, by Cliff Beauglehole on 29 January 1967 and by Ilma Stone on 12 February 1977.

The taxon is also reliably recorded at numerous sites in the alpine regions of Tasmania and New Zealand, at the southern tip of Argentina and one site on the coast of Antarctica.

Habitat

Specimen data suggests the taxon is a habitat specialist confined, in Victoria, to basalt outcrops at alpine elevations. Filson records the taxon at Basalt Hill growing on the south-west side of the hill on a basalt face. The elevation of Basalt Hill is 1750 m. In Tasmania the taxon is consistently associated with alpine dolerite rocks and boulders. In New Zealand the taxon is recorded on rock outcrops and in fellfield at elevations of 550-2800 m (Galloway 1985).

The taxon has been collected on the Australian mainland only three times in two years a decade apart at a single site with a distinctive geology in a well studied area visited by numerous collectors and recorders including the three collectors at this one site. It is reasonable to speculate that the taxon is a habitat specialist restricted, at least on the Australian mainland, to basalt outcrops, a restricted habitat in the Australian Alps and one which has attracted considerable attention from botanists since there are a number of other rare and threatened plants known from such habitats, including Basalt Hill itself.

The taxon is distinctive among lichens in its combination of morphology and saxicolous substrate and is neither small nor cryptic and therefore very unlikely to have been overlooked at other sites by the three collectors at Basalt Hill or by other collectors.

Threats

The taxon is inferred to be a habitat specialist highly dependent on the stability of its elevated basalt outcrop habitat. Any disruption to the stability of this habitat, to which the taxon is apparently restricted, threatens the ability of the taxon to produce mature fruit bodies and release spore onto a receptive substrate.

The taxon is threatened by any physical disturbance to the highly localised habitat including road construction and maintenance, fire management activity, the construction and maintenance of tourist infrastructure and telecommunications and fire management infrastructure. Whilst the only known mainland site is within the Alpine National Park, the site has been subject to significant management pressures in the past and the legacy of these impacts are evident in the field. Basalt outcrops on the Bogong High Plains such as Basalt Hill and Ruined Castle have been exploited for road surfacing material and the inherent fertility of these sites has been attractive to stock prior to the cancellation of alpine grazing licences throughout the Alpine National Park. Cattle grazing resulted in eutrophication and weed invasion throughout the alpine region and invasive weeds such as *Acetosella vulgaris* (Sheep Sorrel), *Achillea millefolium* (Milfoil), *Agrostis capillaris* (Brown-top Bent), *Festuca rubra* (Red Fescue), *Phleum pratense* (Timothy Grass) and *Trifolium repens* (White Clover) remain locally abundant around Basalt Hill.

As noted by SAC (2000), the only known site for the species in Victoria is potentially threatened by the operation of the Basalt Hill quarry.

Fruticose lichens are highly susceptible to foot traffic and can be easily dislodged and damaged by even a low frequency of pedestrian visitation events or the movement across the site of Sambar or feral horses (Brumbies). Many lichens are notoriously slow to develop to optimal thallus size, achieving full maturity and optimal dimensions only after decades of continuous undisturbed growth. Recurrent foot or animal traffic is a major threat impeding spore recruitment following mortality of mature individuals.

In the longer term, the taxon is at increasing risk from intense and repeat fire events, each of which threatens to incinerate adult thalli and truncate post-fire spore recruitment, limiting the availability of spore-bearing adult thalli to support recolonisation.

In the long term the taxon may be at risk from prolonged and extreme drought events and extreme temperatures in response to climatic drying and warming, particularly the cumulative impact of a succession of such extreme events. The magnitude of this threat is difficult to assess since lichens are well adapted to such extremes but may reach a limit of tolerance under repeat extreme events which impede successful recruitment following mortality

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resulting from other events such as extreme fire or chronic pedestrian or exotic herbivore pressure. Any occurrences are at constant stochastic risk from natural or anthropogenic events.

The fact that the taxon was collected only in 1967 and 1977 and not confirmed as extant in the last 42 years, despite numerous botanical surveys in the area and the close proximity of the site to the major tourist access road across the High Plains, invites the suspicion that the taxon has already become extinct on the Australian mainland.

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 style="text-align: center;"><i>based on any of the following:</i></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:

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. Past decline cannot be estimated with any confidence since there is no available monitoring data for the taxon. Future decline cannot be estimated with any confidence since the identified threats operate stochastically and with unpredictable intensity.

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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 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). The EoO has been made equal to the AoO to ensure consistency with the definition of AoO as an area within EoO

The taxon is severely fragmented naturally at the regional and landscape scales with the closest occurrences in Tasmania and New Zealand. If the taxon survives undetected at more than one Victorian site then any geographically isolated occurrences are very unlikely to be downwind of donor occurrences capable of releasing spore in sufficient numbers to facilitate successful spore recruitment in the event of local extinction. Predominant wind directions are westerly in seasons likely to support spore germination and north-westerly or northerly in dry seasons unlikely to support spore germination. This precludes the possibility of recolonisation in the event of local extinction.

It is estimated to have 1 location. It has a continuing decline in (i), (ii), (iii), (iv) and (v) above.

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 is severely fragmented, has 1 location and has a continuing decline in (i), (ii), (iii), (iv) and (v) above.

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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. There is no record of the population size of the only known Victorian occurrence of the taxon. All three collectors have since died.

Criterion D. Very small or restricted populations		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 km ² 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

DEPI (2014) *Advisory list of rare or threatened plants in Victoria - 2014*. Department of Environment and Primary Industries, Melbourne.

Galloway, D.J. (1985) *Flora of New Zealand: Lichens*. DSIR, Wellington.

SAC (2000). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 483 *Neuropogon acromelanus*.