

Xanthoparmelia suberadicata Foliose Lichen

Taxonomy

Xanthoparmelia suberadicata (Abbayes) Hale

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2000).

Categorised as Endangered 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

The taxon is a foliose rock-inhabiting lichen (Lepp 2011) which, as a member of the *Xanthoparmelia subnuda* complex, is very fine in appearance with very narrow thalli only loosely adnate to the substrate.

Generation Length

The generation length of *Xanthoparmelia suberadicata* is estimated to be 25 to 100 (midpoint 50) years. This is based on the inferred longevity of individual thalli which are loosely adnate to outcropping rock and potentially of indefinite longevity but with mortality induced by 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. 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 foliose or crustose lichen which already occupy the available habitat.

Distribution

The taxon is reliably recorded in Victoria from only three sites in two general localities in the Woodend and Romsey districts north-west of Melbourne and on the Baw Baw Plateau in the Central Highlands due east of Melbourne. It is also reliably recorded at three sites on Flinders Island in the Furneaux Group in north-east Tasmania and in the South Island of New Zealand, Madagascar and South Africa (Lepp 2011).

Habitat

Specimen data suggests the taxon is a habitat specialist confined to the summits of elevated mountain peaks of igneous geology. At Hanging Rock, the habitat is outcropping trachyte rock, a light-coloured, very fine-grained extrusive igneous or volcanic rock type. At Brock Monument the taxon is recorded growing on bare rock on the large solvsbergite boulders at the summit of the hill on the south face, in *Eucalyptus obliqua* (Messmate Stringybark), *E. radiata* (Narrow-leaf Peppermint) and *E. viminalis* (Manna Gum) forest. At Mt Erica the taxon is recorded growing on the summit on a large granite boulder.

At Strzelecki Peaks in Strzelecki National Park on Flinders Island the taxon is recorded on a granite bedrock outcrop at 200 m elevation and 940 m SW of the summit. At South Patriarch on Flinders Island the taxon is also



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recorded on an exposed granite bedrock face. At Survey Hill on Flinders Island the taxon is also recorded on a bedrock granite outcrop near a stand of *Kunzea ambigua* (White Kunzea).

Threats

The taxon is a habitat specialist highly dependent on the stability of its elevated igneous 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 and infrastructure, construction and maintenance of tourist infrastructure and telecommunications. Whilst several sites are within parks or reserves, the construction and maintenance of walking tracks is a significant threat to the local extent of the vulnerable habitat of the taxon. Perhaps the greatest current threat is the cumulative impact of visitor pressure since each of the three known sites is intentionally managed as a tourist destination, geological monument or key vantage point along designated walking tracks with highly concentrated visitor pressure. Foliose and crustose lichens are highly susceptible to foot traffic and can be easily dislodged and damaged by even a low frequency of pedestrian visitation events. Many lichens are notoriously slow to develop to optimal thallus size, achieving full maturity and optimal dimensions only after decades of continuous undisturbed growth. Constant foot traffic is a major threat impeding spore recruitment following mortality of mature individuals. Whilst it is unclear what proportion of thalli are on elevated boulders or on more accessible outcrops, visitors to such prominences often attempt to access the highest points for panoramic viewing or simply as a rock-climbing challenge. Thalli on large tors or boulders are not necessarily immune to visitor pressure.

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 sites of granite or granodiorite geology, the taxon is additionally threatened by exfoliation of the rock face of boulders and outcrops induced by extreme radiant heat at a frequency many orders of magnitude higher than is induced by weathering action alone. After each exfoliation event the taxon is required to colonize the newly exposed rock surface for the first time, a primary colonisation event far more tenuous than recolonisation of a rock surface from which the last cohort of adult thalli have been eliminated by fire, rockfall, animal activity or human activity including pedestrian traffic.

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 resulting from other events such as extreme fire or chronic pedestrian pressure.

All occurrences are at constant stochastic risk of natural or anthropogenic events.

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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:

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 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			

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Evidence:

Eligible under Criterion B1 as Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 128 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented naturally at the regional and landscape scales. Geographically isolated occurrences are interpreted as distinct subpopulations since they occur at sites which 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 2 locations. It has a continuing decline in (i), (ii), (iii), (iv) and (v) above. It is very likely to be subject to continuing decline in population size and habitat quality in response to the impact of the identified threats.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 12 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, the taxon is estimated to be severely fragmented, has 2 locations and 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 as Data Deficient

There is insufficient evidence to determine the number of mature individuals.

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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 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.

Lepp, H. (2011) *Xanthoparmelia*. Information about Australia's Flora: Australian Lichens. Sponsored by the Friends of the Australian National Botanic Gardens. Retrieved from: <https://www.anbg.gov.au/lichen/xanthoparmelia.html>

SAC (2000). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 495 *Xanthoparmelia suberadicata*