Threatened Species Assessment

Trichocolea rigida
Woodland Woollywort

Taxonomy

Trichocolea rigida R.M. Schust.

Current conservation status

Categorised as Rare 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

Trichocolea rigida is a frondose leafy liverwort. It is dioicous, but the only Victorian collections are not fertile (D. Meagher pers. obs.).

Generation Length

The generation length of *Trichocolea rigida* is estimated to be 11 to 25 years, as proposed by Hallingbäck et al. (2000) for 'long' life taxa ('long-lived shuttles - perennial stayers') that are known to produce sporophytes.

Distribution

In Victoria the taxon is known only from two sites, one in the Blackwood Ranges and the other on the Dargo High Plains. It also occurs in Tasmania, NSW and New Zealand (Scott 1985, Engel and Glenny 2008). Australian Virtual Herbarium (AVH) records records for Queensland are errors for *Trichocolea pluma*, an outwardly similar tropical species (D. Meagher, pers. obs.). Some NSW records might also be *T. pluma* (D. Meagher, pers. op.).

Habitat

In Victoria this taxon is known from riparian habitat in sclerophyll forest, where it was growing on a rotting log, and subalpine grassland. Elsewhere it is known from a wide range of open habitats, from alpine to coastal, usually growing on soil (Engel and Glenny 2008).

Threats

One of the two Victorian sites is in State forest, where it may be at risk of inadvertent impacts during forest management operations because its exact locality is not known. Fire and other random events are also ongoing risks at both sites. Fires have burnt in the vicinity of Lankeys Plain in 2003 and may have affected the population there.

The Victorian *Code of Practice for Timber Production 2014* provides general prescriptions such as protection and buffering of old growth forests and waterways, to provide protection from forestry operations.

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:

Ineligible under Criterion A

There is insufficient information to determine past or future trends for this taxon.

Bruce Fuhrer and David Meagher attempted to relocate the species at the Blackwood site in 2004 but could not do so, despite knowing the locality. It therefore is likely to be extinct there, perhaps because of the decomposition or destruction of the log on which it occurred. The Dargo High Plains site is believed to be still intact, but the status of the subpopulation there is unknown.

The drying effect of climate change at both sites is likely to lead to the loss of at least the Blackwood Range subpopulation (if it still exists). Both sites are extremely vulnerable to fire, especially because of the risk of more frequent and more severe fires under climate change.

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 Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 8 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA) and from AVH data.

The taxon is observed to be severely fragmented, as within Victoria, it is known only from two sites more than 400 km apart, and has no means of dispersing across this distance.

There is estimated to be one or two locations, as each site (if both still exist) are prone to stiochastic events and to drying of habitat.

It is estimated to have a continuing decline in (i), (ii), (iii), (iv) and (v) above. Climate change is predicted to reduce water availability in subalpine environments such as Lankeys Plain (the Dargo High Plains site), and the associated high risk of more frequent and more severe fires makes the survival of that subpopulation unlikely within 75 years.

Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 8 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA and AVH. As above, it is severely fragmented, 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 to 40 mature individuals, but other thresholds under this criterion have not been met.

The Blackwood Ranges subpopulation was found on a single rotting log and is therefore likely to be clonal, or at most a few individual plants (B. Fuhrer pers. comm. 2006, D. Meagher, pers. op.). The size of the Dargo High Plains subpopulation is unknown, but because the collection is mixed with a *Temnoma* species (which would be rare in Victoria) and another liverwort, it seem unlikely that it is extensive (and therefore warranting a separate collection).

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 D 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)

Engel J.J. and Glenny D. (2008). A Flora of the Liverworts and Hornworts of New Zealand. Volume 1. *Monographs in Systematic Botany from the Missouri Botanical Garden* 110. Missouri Botanical Garden Press: St Louis, USA.

Hallingbäck T, Hodgetts N, Raeymaekers G, Schumacker R, Sérgio C, Söderström L, Stewart N and Váòa L (2000). Guidelines for application of the 1994 IUCN Red List categories of threats to bryophytes. Appendix 1 in Hallingbäck T and Hodgetts N, *Mosses, Liverworts and Hornworts. Status Survey and Conservation Action Plan for Bryophytes. IUCN:* Gland, Switzerland.

Scott G.A.M. (1985). Southern Australian Liverworts. *Australian Flora and Fauna Series No*. 2. AGPS: Canberra.