Threatened Species Assessment

Muehlenbeckia axillaris
Matted Lignum

Taxonomy

Muehlenbeckia axillaris (Hook. f.) Endl.

Current conservation status

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

Proposed conservation status

Vulnerable in Victoria

Criterion D2

Species Information

Description and Life History

The taxon is a glabrous, prostrate or nearly prostrate subshrub, forming loose mats to c. 40 cm diam., stems dark and wiry. Leaves more or less orbicular or broadly elliptic, sometimes broadly emarginate, 4-9 mm long, bright green; petioles 1-4 mm long. Flowers usually solitary, or up to 3 in upper axils, pedicels not or barely exceeding the subtending bract; perianth segments 2-3 mm long, opening widely, yellow-green, free almost to base, subfleshy in fruit; anthers pink. Nut trigonous, 2-3 mm long, smooth, dark brown to black. The taxon flowers from December to February (VicFlora 2019).

Generation Length

The generation length of *Muehlenbeckia axillaris* is estimated to be 35 to 80 years. This is based on a plausible longevity of 25-50 years or more and likely episodic and sporadic or opportunistic recruitment from a long-persistent soil-stored seedbank. The taxon is likely to recruit post-fire at pre-settlement intervals of 35-80 years with most fires of patchy incidence and highly variable intensity on account of the rocky habitat with low rates of fuel accumulation. The taxon is likely to be a fire-sensitive obligate seed regenerator with limited capacity to resprout from the rootstock under all except the lowest fire intensities. It is likely to recruit opportunistically in response to optimal seasonal conditions and small-scale disturbance events.

Distribution

In Victoria, the taxon is confined to the eastern subalps at the Moroka River, Limestone Creek near the Cobberas, and the Tubbut district. It also occurs in New South Wales, Tasmania, and New Zealand (VicFlora 2019).

Habitat

The taxon is uncommon to rare at montane to subalpine elevations, usually amongst rocks near streams (VicFlora, 2019).

Although most collectors describe the habitat of the taxon as riparian, at Limestone Creek the taxon is recorded in rock crevices of limestone cliffs.

The few site and specimen records suggest the taxon is most frequently associated with woodlands or shrublands dominated by *Eucalyptus pauciflora* subsp. *pauciflora* (White Sallee), *E. stellulata* (Black Sallee), *E. dalrympleana* (Mountain Gum) or *E. rubida* (Candlebark) with the understorey dominated by *Acrothamnus hookeri* (Mountain

Beard-heath), *Baeckea gunniana* (Alpine Baeckea), *Bossiaea alpina* (Alpine Bossiaea), *Epacris paludosa* (Swamp Heath), *Gahnia sieberiana* (Red-fruit Saw-sedge), *Hakea microcarpa* (Small-fruit Hakea), *Hibbertia exposita* (Wellington Guinea-flower), *Leionema phylicifolium* (Alpine Leionema), *Leptospermum grandifolium* (Mountain Tea-tree), *L. myrtifolium* (Myrtle Tea-tree), *Melicytus angustifolius* subsp. *divaricatus* (Tangled Shrub-violet), *Oxylobium ellipticum* (Common Oxylobium), *Poa labillardierei* (Common Tussock-grass), *P. sieberiana* var. *cyanophylla* (Blue-leaf Tussock-grass), *Rhodanthe anthemoides* (Chamomile Sunray) and *Rubus parvifolius* (Small-leaf Bramble).

Threats

Historic decline due to habitat loss through agricultural activity is likely to be negligible given the rocky habitat of the taxon.

Current threats are difficult to identify with confidence. All occurrences in strictly riparian habitats are at ongoing stochastic risk from floodwaters which have the potential to uproot or bury adult plants. Weed invasion by *Rosa rubiginosa* (Sweet Briar) and *Rubus fruticosus* spp. agg. (Blackberry) has been identified as a current and future threat at the only Victorian population monitoring site for the taxon at Limestone Creek.

Future threats are likely to include adult mortality and recruitment failure in response to extreme drought stress and targeted browsing by Sambar Deer (*Rusa unicolor*) or other native and exotic herbivores, particularly during extended droughts and during the early stages of seed-based recruitment. The taxon may also be at long-term risk of recruitment failure in response to repeat fire events at intervals approaching the tolerable fire interval for the taxon.

The bushfires of 2019/2020 are believed to have impacted around 30% of the taxon's habitat, however the overall impacts of the fire are yet to be determined. The taxon is likely to be threatened by feral herbivores, notably Samba Deer, and soil and vegetation disturbance because of fire recovery activities such as machinery impacts and the removal of hazardous trees. Drought, hot weather, and repeat fires have the potential to damage or destroy recovering plants and/or seedlings. The taxon's recovery depends on the effective control of the impacts of herbivores and by preventing machinery soil disturbance from fire recovery activities.

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

The past population reduction does not meet the threshold for eligibility under criterion A2. There is insufficient evidence to determine whether will be a future reduction in population size (criterion A3).

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:

Ineligible under Criterion B

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 5,903 km² and the Area of Occupancy (AoO) is estimated to be 52 km², but other thresholds under this criterion have not been met.

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.

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 D2 as Vulnerable

The taxon is estimated to be very restricted. The taxon has a restricted distribution, occurring in a single location, such that this restriction makes the taxon capable of becoming Critically Endangered or Extinct within a time frame of one or two generations. This is in response to the impact of the identified long-term threats, notably extreme drought stress, targeted browsing by herbivores, and repeat fire events.

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

VicFlora (2019). Flora of Victoria, Royal Botanic Gardens Victoria. *Muehlenbeckia axillaris*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/0e70e98c-135d-4bfd-90e2-4349c2cf8b3c