Threatened Species Assessment

Lepyrodia anarthria
Broom Scale-rush

Taxonomy

Lepyrodia anarthria F. Muell.

Johnson and Briggs (in Morley and Toelken 1983) recognize the genus *Sporodanthus* F. Muell. as distinct from *Lepyrodia*, proposing that it include six species, one of which is *L. anarthria*. However, until the formal combination has been made, this taxon must be retained in the genus *Lepyrodia* (VicFlora 2019).

Current conservation status

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

Proposed conservation status

Endangered in Victoria

Criterion B2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The taxon is a perennial, dioecious herb. Rhizomes creeping. Stems erect, 30-70 cm long, terete or slightly flattened, unbranched. Sheathing leaves not striate, confined to base stem or a single sheath on the aerial part, those at the base appressed and 10-100(-150) mm long, the distal ones loose, reflexed and 10-40 mm long. Inflorescence with clusters of flowers subtended by floral bracts 8-16(-18) mm long, erect, narrowly ovate, often much longer than the subtending branch of the inflorescence, pale and membranous; apex attenuate (those immediately subtending the flower attenuate and often thread-like). Perianth pale, 2.5-4.5 mm long, narrow, the inner and outer parts ± equal or the outer slightly longer; styles 1-3, if 3 then their bases widely separated on the ovary. The taxon flowers December to February (VicFlora 2019).

Generation Length

The generation length of *Lepyrodia anarthria* is estimated to be 35 to 90 (midpoint 50) years. The taxon is a long-lived perennial with a horizontal creeping rhizome, potentially spreading indefinitely and resprouting following all but the most intense fire events, which occurred at pre-settlement intervals of 35-90 years, depending on proximity to the coast and permanence of local water tables. Extreme fire events during extended drought conditions have the potential to destroy the peaty substrate, incinerating the buried rhizome system. Recruitment is likely to be episodic and opportunistic following rare fire events, or other major site disturbance events such as soil erosion by extreme flood or animal excavation.

Distribution

The taxon is mostly confined in Victoria to near-coastal lowlands of far East Gippsland where it is recorded disjunctly on the Marlo Plain near Orbost and more continuously in inland sites between Cann River and the Genoa district near the NSW border. The only collection from Victoria which appears to belong to this taxon and occurs outside East Gippsland comes from the Mt Samaria State Park (between Benalla and Mansfield) in the North East (VicFlora 2019). The taxon has been collected twice in the Mt Samaria State Park (1978 and 1994) and once at Boho South in the nearby Strathbogie Ranges in 2005. It has also been recorded at a second site at Boho South in 2008.

Habitat

In East Gippsland, the taxon occurs in swampy areas of low sedge/heathlands, *Xanthorrhoea*-dominated heathlands or in *Eucalyptus* woodlands, in peaty soils. The occurrence in the Mt Samaria State Park occurs in *Eucalyptus ovata* / *E. globulus* subsp. *bicostata* woodland (VicFlora 2019). The occurrences at Boho South occur in closed shrubland dominated by *Baeckea utilis* (Mountain Baeckea), *Baumea rubiginosa* (Soft Twig-sedge) and *Epacris breviflora* (Drumstick Heath) on saturated peat soils.

Threats

The taxon may have suffered minor historic decline through habitat loss to agriculture in the Strathbogie Ranges, on the Marlo Plain, along the Wingan River near Wingan Swamp and along the Genoa River and Maramingo Creek near Genoa.

Key threats to the taxon include climatic drying, extreme drought stressand the increasing frequency and intensity of fire events. Climatic drying, extreme drought stress and extensive regrowth forests all have the potential to lower water tables in swampy habitats, resulting in a local contraction in the extent of available habitat.

Intense fire also increases the risk of incineration of the peaty substrate, destroying the buried rhizome and potentially exposing mineral earth unable to support the wet heathland or sedgeland habitat on which the taxon depends. The taxon may also be threatened by targeted wallowing or pugging by Sambar Deer (*Rusa unicolor*) and by excavation of the substrate by feral pigs. Occurrences in the Strathbogie Ranges are also threatened by weed invasion, notably by the exotic perennial grasses *Anthoxanthum odoratum* (Sweet Vernal-grass) and *Holcus lanatus* (Yorkshire Fog).

Most occurrences in East Gippsland were burnt in January 2020 under extreme drought conditions, exacerbating the impact of the identified threats to the habitat of the taxon.

Spatial analysis of likely habitat on all land tenures for the taxon indicates that 58% occurs within the CAR reserve system, including parks, reserves and special protection zones in State forest. Other areas are excluded from harvesting by prescription under the Victorian Code of Practice for Timber Production 2014 (the Code). In recent years, modified harvesting and forest regeneration practices have been implemented in native forest that are designed to further mitigate the potential threat from forestry operations to threatened species and their habitats.

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:

Eligible under Criterion A3 as Vulnerable

The population reduction over the next 100 years is projected to be 20 to 50% (midpoint 30%), based on (c) and (e) above.

Eligible under Criterion A4 as Vulnerable

The population reduction over any 105 to 270 year period, including both past and future (up to 100 years in the future), is estimated to be 20 to 60% (midpoint 35%), based on (c) and (e) above.

The taxon may have suffered minor historic decline through habitat loss to agriculture in the Strathbogie Ranges, on the Marlo Plain, along the Wingan River near Wingan Swamp and along the Genoa River and Maramingo Creek near Genoa.

Future decline is difficult to estimate with confidence since the identified threats operate incrementally or stochastically with unpredictable intensity.

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 Vulnerable

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 11,763 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented, naturally at the regional and landscape scales with most occurrences separated at spacings likely to exceed the dispersal range of the taxon. The only plausible dispersal agents are ants (myrmecochory), which operate at the metre scale, and, potentially, floodwaters, which operate at the 10-1000 m scale within subcatchment units.

Six locations can be identified: three for occurrences in East Gippsland, which are subject to a consistent suite of identified threats, and one for the highly disjunct occurrences at Boho South and in the Mt Samaria State Park in the north east, which are subject to a smaller number of identified threats.

It has a continuing decline in (i), (ii), (iii), (iv) and (v) above, based on the current and projected 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 80 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it severely fragmented, has six locations 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 as Data Deficient

There is no available estimate of total population size for the taxon in Victoria. Estimates of population size or density are complicated by the exceedingly dense vegetation structure of sedgelands in particular, and the difficulty of distinguishing individuals without excavation of rhizomes.

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.

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: *Lepyrodia anarthria*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/76ceedc9-f2ce-4534-982b-e24f9e9aaa7e