Threatened Species Assessment

Polyscias murrayi
Pencil Cedar

Taxonomy

Polyscias murrayi (F. Muell.) Harms

Current conservation status

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

Proposed conservation status

Critically Endangered in Victoria

Criteria B1ab(iii,v)+2ab(iii,v); C1+2a(i); D

Species Information

Description and Life History

Glabrous, sparingly-branched tree to 24 m high. Leaves once-pinnate, up to 1.3 m long with 11-17 pairs of leaflets; leaflets narrowly ovate-elliptic, 6-16 cm long, 3-9 cm wide, acute to acuminate, base truncate or shortly attenuate and often asymmetric, margin minutely toothed, not aromatic when crushed; petiole U-shaped in transverse section. Inflorescence a large compound panicle with umbels of flowers arranged more or less racemosely along the branches, covered with minute simple hairs; calyx with 5 small teeth; petals cream to light green; ovary 2- or 3-locular. Fruit subglobose, purple-blue when ripe. Flowers March-April. (VicFlora 2018)

Generation Length

The generation length of *Polyscias murrayi* is estimated to be 50 to 100 years. This is based on an indirect observation in 2016, noting that the largest tree was about 25 metres high and the trunk about 70 cm in diameter. In 1998, the largest tree then was 21 metres high, with a circumference of 167 cm. The collecting notes on the Mayo, Youl and Willis collection held at MEL from 1972 indicate that the tallest trees were 12 metres high.

Distribution

The taxon is exceedingly rare in Victoria, where it is confined to the extreme east, in the catchment of Harrisons Creek. It is common in New South Wales and Queensland (VicFlora 2018)

Habitat

In Victoria, the taxon grows at the edge of warm temperate rainforest, with *Eucryphia moorei* and *Syzygium smithii*, as well as in the ecotone between warm temperate rainforest and tall open forest, mostly on the slopes of Harrisons Creek.

Threats

Like most rainforest species, this taxon is very likely to be fire sensitive, and is at risk of increased fire frequency and intensity, exacerbated by climate-change-driven drying and warming. The taxon may not have been directly impacted by the 2019-20 bushfires, but the proximity of nearby burnt areas could result in post-fire impacts from browsing pressure and increase the likelihood of future fire.

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 A2 as Endangered

The population reduction over the past 150 to 300 years is estimated to be 35 to 80% (midpoint 50%), based on (b) and (c) above.

The taxon's habitat has suffered significant declines (DSE 2009), so by inference, so has the number of mature individuals. The area has not experienced serious land clearance. It is unlikely that the taxon would have persisted over three generations on less than 20 plants, so it is assumed to have suffered a considerable decline.

The causes of the reduction may not have ceased, be understood or be reversible.

Eligible under Criterion A3 as Endangered

The population reduction over the next 100 years is projected to be 30 to 60%, based on (c) and (e) above.

Potential increasing drying events may result in reduced rainfall, loss of warm temperate rainforest, and increased fire frequency and intensity.

Eligible under Criterion A4 as Endangered

The population reduction over any 150 to 300 year period, including both past and future (up to 100 years into the future), is estimated to be 30 to 80% (likely 65%), based on (b), (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

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).

The taxon is considered to occur in one location as all key identified threats apply across its range and can rapidly affect all individuals of the taxon present.

It has a continuing decline in (iii) and (v) above, based on predicted climate change -induced drying, warming, and increasing fire frequency and intensity.

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. As above, it has 1 location and a continuing decline in (iii) 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:

Eligible under Criterion C1 as Critically Endangered

It is estimated that there are 11 to 13 mature individuals. Mayo, Youl and Willis recorded 16 trees in 1972. Neville Walsh recorded 11 mature trees in 1998. Stajsic, Ohlsen and Seaton recorded 11 mature trees in 2016, but the area was not thoroughly surveyed due to time constraints. No progeny were seen, however, Neville Walsh found two younger plants (to "20 feet high) in the 1980s away from the core population.

There is estimated to be a continuing decline of 30 to 60% within one generation.

Eligible under Criterion C2a as Critically Endangered

It is estimated that there are 11 to 13 mature individuals, the number of mature individuals in the each subpopulation is fewer than 50.

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 Critically Endangered

The taxon is estimated to have 11 to 13 mature individuals.

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)

DSE (2009). Action Statement No. 238. Cool Temperate Rainforest, Dry Forest (Limestone), Warm Temperate Rainforest (Coastal East Gippsland), Warm Temperate Rainforest (Cool Temperate Overlap, Howe Range), Warm Temperate Rainforest East Gippsland Alluvial Terraces), Warm Temperate Rainforest Far East Gippsland), Human activity which results in artificially elevated levels of Myrtle Wilt within *Nothofagus*-dominated Cool Temperate Rainforest. Department of Sustainability and Environment. East Melbourne. https://www.environment.vic.gov.au/__data/assets/pdf_file/0016/32452/Human-activity.pdf Industries, Melbourne.

VicFlora (2019). Flora of Victoria, Royal Botanic Gardens Victoria: *Polyscias murrayi.* Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/a1e07a4f-7617-4ad4-a9b4-118921dfc443