

Eucalyptus sideroxylon subsp. *sideroxylon* Mugga

Taxonomy

Eucalyptus sideroxylon subsp. *sideroxylon* A. Cunn. ex Woolls

Current conservation status

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

Proposed conservation status

Endangered in Victoria

Criteria A2bce+4bce; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The taxon is a tree to 25 m tall; bark rough over whole trunk and branches, thick, hard, furrowed, black (ironbark). Juvenile leaves petiolate, opposite for few pairs then alternate, lanceolate, to 15 cm long, 2 cm wide, green to greyish-green; adult leaves petiolate, alternate, lanceolate to narrowly lanceolate, 7-14 cm long, 1.2-1.8 cm wide, concolorous, dull, green to bluish-green; reticulation dense, fine. Inflorescences axillary, unbranched; peduncles to 2 cm long, 7-11-flowered; buds pedicellate, broadly fusiform, to 1.2 cm long, 0.5 cm diam., no scar (2 opercula intact); operculum conical to beaked; stamens inflexed with outer staminodes; anthers adnate, cuboid; ovules in 4 vertical rows; flowers white, pink or red. Fruit pedicellate, truncate-globose, to 1.1 cm long, 1 cm diam.; staminal ring broad and deciduous; disc descending; valves usually 5, below rim; seed brown, irregularly ovoid and slightly flattened, surface shallowly reticulate, hilum ventral. The taxon flowers from May to October (VicFlora, 2018).

Generation Length

The generation length of *Eucalyptus sideroxylon* subsp. *sideroxylon* is estimated to be 150 to 200 years. This is based on a plausible longevity of 300 years or more. It is also based on the ability of the taxon to resprout from the lignotuber and larger stems, thereby extending the life of the individual beyond the pre-settlement fire interval estimated at 45-90 years or more.

Like most eucalypts in fire-prone dryland habitats, the taxon recruits episodically from an elevated or soil-stored seedbank following intense bushfire events. With only a proportion of adults killed by fire, a majority resprout successfully following each successive fire event. In addition, there may be a low level of opportunistic trickle recruitment in response to outstanding seasonal conditions or localised site disturbance events.

Distribution

In Victoria, the taxon is confined to the Chiltern area, northern Warby Range, and south of Winton, while the other ironbark, *E. tricarpa*, with its 3-budded inflorescences and larger fruit, is widespread. It also occurs in South Australia (sparingly established), Queensland, and New South Wales (VicFlora, 2018).

The taxon is widely planted and occasionally escapes cultivation. Numerous records of the taxon in the Australian Virtual Herbarium (AVH) and the Victorian Biodiversity Atlas (VBA) across much of Victoria beyond the North East of the state being either plantings, naturalised occurrences of *E. sideroxylon* subsp. *sideroxylon*, or else reflect an earlier circumscription of *E. sideroxylon* which included the more recently segregated *E. tricarpa* which is

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indigenous across much of southern and eastern Victoria. Some unvouchered site records of *E. sideroxylon* may also represent naturalised occurrences of *E. tricarpa* which is also widely planted and occasionally escapes cultivation.

Habitat

The taxon always occurs on very rocky sites (VicFlora, 2018). It is a habitat specialist restricted to skeletal soils on rocky mountain summits, spurs, or steep rocky slopes of gorges and chasms, where it is often associated with other mallee eucalypts including mallee forms of *E. albens*, *E. dives*, *E. goniocalyx*, *E. macrorhyncha*, *E. mannifera*, *E. sieberi* and, most notably, distinctive mallee forms of *E. elata* and *E. smithii*. Other associated taxa include *Acacia falciformis*, *A. kettlewelliae*, *A. kybeanensis*, *A. silvestris*, *Boronia anemonifolia*, *Dodonaea viscosa* subsp. *cuneata*, *Kunzea peduncularis*, *Leionema lamprophyllum*, *Olearia iodochroa*, *Ozothamnus obcordatus*, *Philotheca trachyphylla*, *Podolobium alpestre*, *Veronica perfoliata* and *Westringia eremicola*.

Threats

The taxon is likely to have suffered significant historic decline through habitat loss to agriculture, habitat degradation in response to agricultural activity, habitat fragmentation, and a wide range of localised edge effects including weed invasion, fire prevention activity, and road construction and maintenance.

Current and future threats include climatic drying and warming, imposed anthropogenic fire regimes which act synergistically to increase fire risk, repeat fire events, and extreme drought stress. Recruiting stands may also be threatened by targeted browsing by native and exotic herbivores including wallabies, kangaroos, rabbits, Sambar Deer (*Rusa unicolor*), and stock.

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 style="text-align: center;">based on any of the following:</p> <p>(a) direct observation [except A3]</p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</p>			

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Evidence:

Eligible under Criterion A2 as Endangered

The population reduction over the past 450 to 600 years is estimated to be 30 to 50%, based on (b), (c) and (e) above.

Past decline is based largely on habitat loss to agriculture, as well as habitat degradation in response to agricultural activity, habitat fragmentation, and a wide range of localised edge effects including weed invasion, fire prevention activity and road construction and maintenance.

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

Eligible under Criterion A4 as Endangered

The population reduction over any 450 to 600 year period, including both past and future (up to 100 years in the future), is estimated to be 35 to 65% (midpoint 45%), based on (b), (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

Future decline is based on the projected impact of the identified threats.

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			

Evidence:

Eligible under Criterion B1 as Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 2,680 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

It is estimated to have 2 locations, based on landscape context and tenure: one for occurrences within the reserve system and one for occurrences in highly fragmented rural landscapes that are subject to a range of site-specific threats not likely to operate within larger stands of remnant vegetation within reserved public land.

It has a continuing decline in (i), (ii), (iii), (iv) and (v) above, based on the continuing 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 196 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it has 2 locations, and has a continuing decline in (i), (ii), (iii), (iv) and (v) above.

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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.

Criterion D. Very small or restricted populations				
		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.

VicFlora (2018). Flora of Victoria, Royal Botanic Gardens Victoria: *Eucalyptus sideroxylon* subsp. *sideroxylon*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/018f3a83-d75d-42da-8047-faf278a3cbb>