Threatened Species Assessment

Eucalyptus kybeanensis
Mallee Ash

Taxonomy

Eucalyptus kybeanensis Maiden & Cambage

This is a green mallee-ash unique in the Victorian high country, with its slender habit and erect glossy green leaves. Its squat, sessile buds and fruits and densely round-glandular leaves distinguish it from the true green mallee-ashes, e.g. *E. stricta* (VicFlora, 2019).

Current conservation status

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

Proposed conservation status

Vulnerable in Victoria

Criteria A3ce+4ce; D2

Species Information

Description and Life History

The taxon is a mallee or rarely small tree to 5 m tall; bark rough in short stocking, smooth above, often ribbony. Juvenile leaves sessile, opposite for few pairs then petiolate, alternate, elliptic to lanceolate, to 10 cm long, 2 cm wide, glossy, green; adult leaves petiolate, alternate, lanceolate or falcate, usually held erect, 5.5-9 cm long, 0.7-1.2 cm wide, concolorous, glossy, green; intramarginal vein remote from edge; reticulation very sparse, with numerous island oil glands. Inflorescences axillary, unbranched, 7-11-flowered; peduncles obscure or to 0.5 cm long; buds sessile or shortly pedicellate, clavate to turbinate, warty, to 0.5 cm long, 0.4 cm diam., no scar (single operculum); operculum hemispherical or flattened; stamens inflexed; anthers dorsifixed, reniform; ovules in 2 vertical rows; flowers white. Fruit sessile, hemispherical to obconical, to 0.5 cm long, 0.8 cm diam.; disc more or less level; valves 4 or 5, rim level; seed pale brown, glossy, smooth, pyramidal but distorted by one curved face, hilum terminal. The taxon flowers from September to December (VicFlora, 2019).

Generation Length

The generation length of *Eucalyptus kybeanensis* is estimated to be 120 to 250 years. This is based on a plausible longevity of 120-250 years. 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 90-150 years. The rocky elevated habitat is unlikely to carry fire to any threatening intensity or local frequency under current conditions. Nevertheless, 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, and a majority resprouting 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

The taxon has two highly disjunct concentrations of stands in Victoria, one in the west, from Mounts Useful and Skene to the Upper Moroka at Bleak Hill, and one in the east, from Brumby Point to Mt Seldom Seen in the Upper Buchan. The taxon also occurs in New South Wales (VicFlora, 2019).

Habitat

The taxon is restricted to mountain peaks where it is often locally dominant in subalpine mallee scrubs (VicFlora, 2019).

Threats

Key long term threats to the taxon include climatic warming and drying, operating synergistically with imposed anthropogenic fire regimes, and browsing pressure from native and exotic herbivores, particularly during early stages of post-fire vegetative resprouting and seed recruitment. These threats can result in an increased risk of adult mortality and recruitment failure, and the long-term risk of local extinction. However, given the inferred drought tolerance of the taxon, its great longevity, and its ability to resprout successfully from the lignotuber or main stems, the full impact on population size of adult mortality and recruitment failure in response to these threats may take decades to become evident.

The rate at which any projected decline is likely to occur is dependent on the frequency, intensity and landscape scale of future fire events, and the intensity and duration of extreme drought events. The taxon may also be at risk of recruitment failure due to targeted intense browsing pressure by Sambar Deer (*Rusa unicolor*), which are known to occur at high density throughout the alpine region and may target seedling recruits or vegetative resprouts. The taxon may be further threatened by the projected impact of climate change on the recruitment potential of the taxon, based on the modelled impact on almost every Eucalypt species in the Central Highlands of Victoria (Nitschke and Hickey, 2007). By analogy with similar mountain summit specialists such as *E. glaucescens*, it is suggested that by 2085 the taxon will have nil to very low potential to recruit from seed anywhere within its current range.

Since the taxon is inferred to be well adapted to at least a significant level of drought stress, with precipitation supplemented by fog, it is likely that a moisture threshold is more critical than a temperature threshold for future recruitment success.

Given the restriction of the taxon to mountain summits, all stands are at potential risk from the repeated practice of clearing the summits of prominent mountains for lines of sight for fire-spotting, trig stations, telecommunications facilities, or visitor access and enjoyment of 360 degree panoramas.

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 15 to 30%, based on (c) and (e) above.

The magnitude of future decline cannot be estimated with significant confidence since the identified threats operate stochastically and with unpredictable intensity and may take decades to result in a significant decline in population size.

Eligible under Criterion A4 as Vulnerable

The population reduction over any 360 to 750 year period, including both past and future (up to 100 years in the future), is estimated to be 15 to 30%, based on (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

It is unclear whether the taxon has suffered significant historic decline in response to the identified threats. Almost all stands occur in remote or protected public lands where the only habitat loss has been associated with site-specific targeted clearance for road access, infrastructure targeting mountain summits or the construction and maintenance of fire breaks. The proportion of stands subjected to such activity is unclear, as is the method employed to clear vegetation, some methods permitting the lignotubers to resprout while others intentionally remove all stumps.

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 4,006 km² and the Area of Occupancy (AoO) is estimated to be 108 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 no available estimate of population size for the taxon.

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 2 locations, such that this restriction makes the taxon capable of becoming Critically Endangered or Extinct within a time frame of one or two generations, in response to the impact of the identified long term threats, notably climatic warming and drying, operating synergistically with imposed anthropogenic fire regimes, and browsing pressure from native and exotic herbivores.

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

Nitschke, C.R., and Hickey, G.M. (2007). Assessing the Vulnerability of Victoria's Central Highlands Forests to Climate Change. Technical Report.

VicFlora (2019). Flora of Victoria, Royal Botanic Gardens Victoria: *Eucalyptus kybeanensis*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/e9f7891c-45b8-4b88-b5b9-ac755512a3c0