Threatened Species Assessment

Eucalyptus brookeriana
Brooker's Gum

Taxonomy

Eucalyptus brookeriana A.M. Gray

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 A2abce+4abce; B2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

Tree to 40 m tall; bark rough, fibrous for lower 1–6 m, smooth above. Juvenile leaves petiolate, soon alternate, ovate to oblong or orbicular, crenulate, to 14 cm long, 8 cm wide, discolorous, glossy, green, glandular; adult leaves petiolate, alternate, ovate to lanceolate, to 15 cm long, 2.5 cm wide, more or less concolorous, glossy, green; reticulation dense, with numerous, mostly intersectional oil glands. Inflorescence axillary, unbranched, peduncle to 1.2 cm long, 7-flowered; buds pedicellate, diamond-shaped to slightly elongate, to 1 cm long, 0.5 cm diam., scar present; operculum conical or beaked; stamens inflexed; anthers dorsifixed, cuneate; ovules in 4 vertical rows; flowers white. Fruit pedicellate, obconical to cupular, to 0.8 cm long, 0.7 cm diam.; disc level to descending; valves 3 or 4, rim level or slightly exserted; seed black, flattened-ellipsoid, lacunose, very shallowly reticulate, hilum ventral. Flowers summer–autumn. (VicFlora 2019).

These are relatively long-lived trees compared with other woody plants in this habitat, but it does not compare with other eucalypts. Wetter sites often have high herbaceous, but low shrub covers, thus enabling rare inter-fire regeneration. But most regeneration is expected to be after (rare) fires.

Generation Length

The generation length of *Eucalyptus brookeriana* is inferred to be 100 to 200 (midpoint 150) years. Unlike many other eucalypts, particularly those known to have long generation times, this taxon is largely restricted to poorly drained sites in high rainfall areas. This leads to structural instability (in swampy/boggy sites which cannot support large, heavy trees) and relatively rapid rotting. There is a high probability of heartwood rot even in standing trees.

Distribution

According to VicFlora (2019), this taxon occurs in two areas in Victoria: on the northern foothills of the Otway Ranges and north of the Great Dividing Range in the Bells Reef-Trentham area. It also occurs in Tasmania.

Habitat

The taxon occupies the coldest, most poorly drained sites, often in shallow and broad valley bottoms, with the moist slopes inhabited by other species. The habitat is similar to that of the very restricted *E. aggregata*, but this latter taxon is more frost tolerant, whereas *E. brookeriana* is flanked by taller, protective forests. In Tasmania it is more often found on forested slopes.

Threats

The main past threat is land clearing. Much of the suitable habitat within the known range has been cleared for intensive agriculture, notably including horticulture.

Climate change and associated droughts and altered fire regimes are a major threat, due to this taxon's preferred local habitat. The taxon re-sprouts/coppices post-fire but has relatively thin outer bark, and so is not as capable of re-sprouting/coppicing as most other eucalypts. Weed invasion (e.g. *Ulex europeus, Sarothamnus* species) is a minor threat.

Spatial analysis of likely habitat on all land tenures for *E. brookeriana* indicates that 25% occurs within the Comprehensive, Adequate and Representative (CAR) reserve system, including parks, reserves and special protection zones In State forest. Further areas are excluded from harvesting by prescription under the Victorian Code of Practice for Timber Production 2014 (the Code). Species-specific protections for the taxon are included in the Code in the Otway Forest Management Area. Other more general prescriptions such as protection and buffering of waterways also provide protection from forestry operations. It should be noted that only small-scale community forestry still occurs in native forest on public land in the Otway Ranges.

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 300 to 600 years is suspected to be 55 to 75 (midpoint 65%), based on (b), (c) and (e) above.

Much of the suitable habitat within the known range has been cleared for intensive agriculture, notably including horticulture.

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

Eligible under Criterion A3 as Vulnerable

The population reduction over the next 100 years is suspected to be 10 to 60% (midpoint 35%), based on (c) and (e) above.

Future declines depend substantially on the taxon's response to climate change and to forest management practices. Part of the range is proposed to be included within large national parks but these may be subject to inappropriate fire regimes.

Eligible under Criterion A4 as Endangered

The population reduction over any 300 to 600 year period, including both past and future (up to 100 years in the future), is inferred to be 25 to 70% (midpoint 50%), based on (b), (c) and (e) 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 B as Vulnerable

The Extent of Occurrence (EoO) is estimated to be 1,444 km², based on accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

The Area of Occupancy (AoO) is estimated to be 188 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

The taxon is severely fragmented naturally at the regional scale and naturally and anthropogenically at the landscape scale, with geographically isolated occurrences at separations confidently exceeding the dispersal range of the taxon. The only plausible and consistent vectors of seed are ants (myrmecochory) which operate at the metre scale.

Two locations can be identified, based on significant differences in landscape context, local climate and fire regime between the Otways and the Bells Reef-Trentham districts.

It 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

It is inferred that there are 5,000 to 35,000 (midpoint 12,000) mature individuals, but this qualifier is too weak and other thresholds under this criterion have not been met.

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:

Ineligible under Criterion D

It is inferred that there are 5,000 to 35,000 (midpoint 12,000) 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

VicFlora (2019). Flora of Victoria, Royal Botanic Gardens Victoria: *Eucalyptus brookeriana* Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/66006c52-46be-4fbc-8c3c-c6922a617111