

Eucalyptus phoenix Brumby Mallee-gum

Taxonomy

Eucalyptus phoenix Molyneux & Forrester

Eucalyptus phoenix is a new taxon with affinities to *E. mackintii* (Molyneux and Forrester 2013). The taxon is tentatively placed within *Eucalyptus* series *Pachyphloiae*, noting that *E. phoenix* is not unique amongst the stringybarks in having smooth or flaky bark and mallee habit. The degree of uniformity in seedling characters proved to be consistent with a stable entity rather than a hybrid taxon (SAC 2016).

Eucalyptus phoenix appears to have its nearest affinity with *E. mackintii* through the shared hispid seedling leaves and stems, the buds with a conical operculum and similar fruit shape. The new species differs in its mallee habit, smooth bark, occasionally paired peduncles, pedicellate buds (sessile in *E. mackintii*) and fruit with a narrow, more or less level disc (broader, more or less ascending in *E. mackintii*). Superficially, plants resemble *E. kybeanensis*, but are clearly distinguished from that species by the broader juvenile leaves and larger buds with a conical (c.f. hemispherical) operculum (VicFlora 2021).

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2016).

Proposed conservation status

Critically Endangered in Australia

Criteria B1ab(iii)+2ab(iii)

Species Information

Description and Life History

The taxon is a mallee to 5 m tall; bark smooth, white to light grey, sometime with a short basal stocking of flaky bark. Seedling leaves initially subsessile and opposite with hispid margins; juvenile leaves petiolate, alternate, ovate, to 8 cm long, 4 cm wide, slightly discolourous, light green or blue-green; adult leaves petiolate, alternate, lanceolate to ovate-lanceolate, 8-10 cm long, 1-2 cm wide, concolorous, glossy, green; intramarginal vein remote from edge; reticulation sparse, with numerous island oil glands. Inflorescences axillary, unbranched, sometimes paired; peduncles to 1.4 cm long, 5-11-flowered; buds pedicellate, clavate, to 0.8 cm long, 0.4 cm diam., faintly warty, no scar; operculum conical; stamens irregularly flexed; anthers dorsifixed, reniform; ovules in 2 vertical rows; flowers white. Fruit subsessile or shortly pedicellate, hemispherical, 0.8 cm long and wide; disc narrow, more or less level; valves 3 or 4, rim level; seed dark brown, pyramidal but distorted by one curved face, hilum ventral. The taxon flowers late spring to early summer (VicFlora 2021).

The only collection taken at the time the taxon was first observed in May 2002 was a small amount of vegetative material. While fruiting material was noted, none was collected at the time. In late spring of 2003, the authors returned to the fire devastated landscape of Brumby Point and recovered a small number of unopened seed capsules from one of the severely burnt mallees at the eastern end of Brumby Point Track. It was from these that seedlings were grown at Facey's Nursery, Cranbourne, Victoria in an attempt to clarify the identity of this enigmatic dwarf mallee. Subsequent collection of flowering type material was taken from the field in November 2010, by which time post-fire regeneration had advanced sufficiently to confirm the distinctive characters demonstrated by seedling and growth trials at a field population level (Molyneux and Forrester 2013).

Generation Length

The generation length of *Eucalyptus phoenix* is inferred to be 50 to 250 years. The taxon has a lignotuberous mallee habit vigorous basal resprouting. This habit which extends the life of the taxon well beyond the inferred pre-settlement fire interval of 45-150 years. Additionally, it extends the life well beyond the inferred episodic post-fire seed-based recruitment.

Distribution

The taxon is endemic to Victoria. It is restricted to a single small known population of fewer than 100 individuals at Brumby Point on the Nunniong Plateau in the Alpine National Park (SAC 2016; VicFlora 2018). The population comprises three small stands near the eastern end of Brumby Point Track and upper northerly slopes immediately to the west.

The taxon was first observed this new entity at Brumby Point on the Nunniong Plateau in May 2002, prior to the severe summer fires of early 2003 (Molyneux and Forrester 2013). One small stand of about 30 dwarf mallees was noted at the eastern end of the Brumby Point Track. Two additional stands were noted on rocky outcrops north of the track: c. 20 dwarf mallees c. 100 m west of the first stand and c. 40 dwarf mallees c. 250 m west of the first stand. In late spring of 2003, the fire devastated landscape of Brumby Point was revisited and a small number of unopened seed capsules were recovered from one of the severely burnt mallees at the eastern end of Brumby Point Track. Subsequent collection of flowering type material was taken from the field in November 2010 (Molyneux and Forrester 2013).

Habitat

The taxon is known a spur at an elevation of about 1360 m ASL supporting sub-alpine woodland dominated by a unique suite of mallee and dwarf eucalypts. Geology is strongly tilted and banded metamorphosed siltstone of Palaeozoic age (Molyneux and Forrester 2013; SAC 2016).

A suite of other Eucalypt species has been observed growing near or adjacent to the taxon. *Eucalyptus dalrympleana* subsp. *dalrympleana*, *E. glaucescens* and *E. perriniana* also occur in the vicinity of Brumby Point (Molyneux and Forrester 2013; SAC 2016). The site has outstanding biogeographic significance as a 'hot spot' for a suite of endemic and rare species and disjunct plant populations. The site supports the type populations of three other highly restricted Victorian endemics: *Eucalyptus forresterae*, *E. elaeophloia* and *Leptospermum jingera* (Molyneux and Forrester 2013; SAC 2016).

Threats

The bushfires of 2019/20 that the entire small population may have been impacted, but Brumby Point burnt at fairly low intensity, and there have probably been no losses (D. Tonkinson pers. comm.), whereas the 2003 fires in this area were at high intensity and resulted in some plant mortality. As a mallee, the taxon recovers well from fire.

The taxon is subject to continuing decline in the quality of its habitat, as a consequence of the inferred and projected impact of climatic drying and elevated temperature thresholds on the recruitment potential of almost all Victorian montane to subalpine Eucalypts (Nitschke and Hickey 2007) and, by inference, *E. phoenix* (Molyneux and Forrester 2013).

The projected impacts of climate change are likely to threaten the small population, which could lead to its extinction in the long term (SAC 2016). The lack of young individuals indicates a lack of recruitment (SAC 2016).

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>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 A3 as Endangered

The population reduction over the next 100 years is suspected to be 30 to 80 (midpoint 50%), based on (c) above.

The taxon is arguably subject to continuing decline in the quality of habitat as a consequence of the inferred and projected impact of climatic drying and elevated temperature thresholds on the recruitment potential of almost all Victorian montane to subalpine Eucalypts and, by inference, *E. phoenix* (Molyneux & Forrester 2013). However, it is unclear at what rate the population size is likely to decline.

Eligible under Criterion A4 as Endangered

The population reduction over any 150 to 750 year period, including both past and future (up to 100 years in the future), is suspected to be 30 to 80% (midpoint 50%), based on (c) above.

There is no evidence to suggest that the taxon has experienced significant past decline. The taxon is subject to continuing decline in the quality of habitat.

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 Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 4 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA). The EoO has been made equal to the AoO to ensure consistency with the definition of AoO as an area within EoO.

It is estimated to have 1 location, as it is restricted to a single known population comprising fewer than 100 mature individuals in three small stands (Molyneux & Forrester 2013).

It is inferred to have a continuing decline in (iii) above as a consequence of the inferred and projected impact of climatic drying and elevated temperature thresholds (Molyneux & Forrester 2013).

Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 4 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it has 1 location and has a continuing decline in (iii).

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 estimated that there are 50 to 100 mature individuals, but other thresholds under this criterion have not been met.

Criterion D. Very small or restricted population ^a				
^a		Critically Endangered ^a	Endangered ^a	Vulnerable ^a
Number of mature individuals (observed or estimated) ^a		< 50 ^a	< 250 ^a	< 1,000 ^a
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. ^a		- ^a	- ^a	D2. Typically: [†] AoO < 20 km ² or number of locations ≤ 5 ^a

Evidence:

Eligible under Criterion D as Endangered

It is estimated that there are 50 to 100 mature individuals, as the taxon is restricted to a single known population comprising fewer than 100 mature individuals in three small stands (Molyneux & Forrester 2013; SAC 2016).

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

DELWP (2020) *Victoria's bushfire emergency: biodiversity response and recovery*. Version 2 August 2020. Department of Environment, Land, Water and Planning, Victoria



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Molyneux, W.M., and Forrester, S.G. (2013). A new mallee species *Eucalyptus phoenix* (Myrtaceae) from Brumby Point, East Gippsland, Victoria. *Muelleria*, 31, 66-68.

Nitschke, C.R. and Hickey, G.M. 2007. Assessing the vulnerability of Victoria's Central Highland forests to climate change. Technical Report. Peer reviewed and unpublished. Prepared for the Department of Sustainability and Environment. School of Forest and Ecosystem Science, University of Melbourne

SAC (2016). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 871 *Eucalyptus phoenix*.

VicFlora (2021). Flora of Victoria, Royal Botanic Gardens Victoria: *Eucalyptus phoenix*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/4e40e05b-62bb-4ad0-b697-f86cc7fbae26>