Threatened Species Assessment

Eucalyptus leucoxylon subsp. *connata*
Melbourne Yellow-gum

Taxonomy

Eucalyptus leucoxylon subsp. *connata* Rule

Current conservation status

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

Proposed conservation status

Endangered in Australia

Criteria A2abcde+3bcde+4abcde; B2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The taxon is a tree to 20 m tall. Not waxy. Juvenile leaves to 8 cm long, 7.5 cm wide, pairs often connate, persisting sometimes into the mature tree; adult leaves to 14 cm long, 2.5 cm wide; buds globular. Flowers yellowish-white; ovules in 4 vertical rows. Fruit to 0.8 cm long, 1.1 cm diam.; valves (5-)6(-7;) pedicel as long as or longer than the fruit.

The taxon is sometimes included in *E. leucoxylon* subsp. *pruinosa*. It is morphologically similar to *E. leucoxylon* subsp. *leucoxylon*, but is distinguished from that taxon by its connate juvenile leaves, generally shorter adult leaves, globular buds, and fruits that are wider than long. Plants with a stocking of rough bark from coastal areas are now included in *E. leucoxylon* subsp. *bellarinensis* (VicFlora 2018).

Generation Length

The generation length of *Eucalyptus leucoxylon* subsp. *connata* is inferred to be 100 to 150 years. This is based on longevity estimated to exceed 200 years, and the integration of post-fire episodic recruitment at plausible pre-settlement frequencies of 25-80 years. It is also based on some post-fire mortality, the capacity of the taxon to resprout basally and from epicormic buds on the trunk and within the crown, as well as some mortality during periods of extreme drought stress.

Distribution

The main concentration of the taxon is in the Brisbane Ranges between Bacchus March and Geelong. It also occurs at Long Forest between Bacchus Marsh and Melton, and at Studley Park at Kew (VicFlora 2018).

The taxon is endemic to central southern Victoria, and occurs on land that has commonly been cleared for grazing or cropping. Small, isolated pockets and individual trees may be found in suitable habitats south of the Dividing range. The largest populations are within the Brisbane ranges, in the You Yangs, and on a privately owned block of land adjacent to the Bannockburn Recreation Reserve, known as the Harvey block. It does not appear in the nearby Inverleigh Flora and Fauna Reserve (SAC 1997). It also occurs in isolated pockets near the coastal towns of Torquay and Anglesea, in the eastern and outer north-eastern suburbs of Melbourne, and in the Sunbury area, however it is never in abundance in these isolated populations due to clearing for farms and urban purposes. Outside these locations it may be found in roadside reserves and as isolated shelter trees in grazing land.

Populations of ssp. *connata* are at the south-eastern extremity of the range for the species. They are isolated from other subspecies by the Great Dividing Range in the north and north-west, and the generally treeless basaltic plains of Western Victoria in the west. The nearest other subspecies is ssp. *pruinosa* in Central Victoria. The taxa is strongly represented in the You Yang Ranges, but this occurrence should be treated with caution as it appears to have been derived from an artificial seeding program of many decades ago.

Habitat

The taxon grows on skeletal soils at Long Forest and the Brisbane Ranges, and at Studley Park in Kew it grows on soil derived from Silurian sandstone (VicFlora 2018). It occurs on dry, flat sites on heavier soils with less than 600mm rainfall per annum, or Silurian sandstone soils in hilly terrain with slightly higher rainfall.

Like other subspecies of *E. leucoxylon*, ssp. *connata* usually grows in pure stands with numerous other taxa found in the vicinity. These include *E. melliodora, E. sideroxylon* ssp. *tricarpa, E. ovata, E. viminalis* ssp. *viminalis*, *E. polyanthemos, E. macrorhyncha* and *E. obliqua*. Above the Djerriwarrh Creek near Bacchus Marsh, a disjunct population of E. *behriana* is nearby (Rule 1991). It occurs with Manna gum, Golden wattle, Hedge wattle, Kangaroo grass and Common Wallaby-grass to form an open grassy woodland (SAC 1997).

Threats

The taxon has declined significantly in distribution since settlement as it grows in areas that are also valuable for grazing, cropping, housing, roads, and waste disposal. Changes in management regimes along roadside reserves and along rail reserves where herbicides are replacing burning off, are also having a significant threat impact on previously safe sites. Similarly, many paddock specimens are suffering from dieback or tree decline due to disease or excessive exposure (SAC 1997).

The identified threats to the taxon include habitat loss for agriculture, urban development, road widening, firewood collection, rural tree decline, and changes in management practices by utilities. The threats also include browsing pressure from sheep, rabbits, hares, horses, cattle and macropods, the imposition of inappropriate fire regimes including the risk of repeat fire events, the increasing risk of recruitment failure particularly during extreme drought events, death of mature adults due to drought stress, weed invasion, and competition from overabundant native taxa such as Hedge Wattle, which excludes other plants as well as providing additional shelter for rabbits and foxes.

Specimens appear widely throughout central Victoria, however, due to their preferred habitat, they are often on sites at risk from clearing, firewood extraction, dieback, tree decline due to exposure, or from road widening. Some large, secure populations exist, such as the Brisbane Ranges. A population within the Harvey block adjacent to the Bannockburn recreation Reserve is of particular interest as it contains many very old, approx. 150 years, specimens with well-developed canopies and nesting hollows as faunal food and refuge (SAC 1997).

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 last 300 to 450 years is inferred to be 50 to 75%, based on (a), (b), (c), (d) and (e) above.

Past decline is based on extensive habitat loss to agriculture and urbanisation across most of the range of the taxon.

Eligible under Criterion A3 as Vulnerable

The population reduction over the next 100 years is projected to be 20 to 50%, based on (b), (c), (d) and (e) above.

Future decline is based on identified threats, including habitat loss for agriculture, urban development, road widening, the impact of firewood collection, rural tree decline, and changes in management practices by utilities. The threats also include browsing pressure from sheep, rabbits, hares, horses, cattle and macropods, the imposition of inappropriate fire regimes including the risk of repeat fire events, the increasing risk of recruitment failure particularly during extreme drought events, death of mature adults due to drought stress, weed invasion, and competition from overabundant native taxa such as Hedge Wattle.

Eligible under Criterion A4 as Endangered

The population reduction over any 300 to 450 year period, including both past and future (up to 100 years in the future), is inferred to be 50 to 70%, based on (a), (b), (c), (d) 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 Vulnerable

The Extent of Occurrence (EoO) is estimated to be 5014 km^2, based on accepted, post 1970 records in the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented, has 3 locations, and has a continuing decline in (i), (ii), (iii), (iv) and (V) above.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) is estimated to be 376 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, the taxon is severely fragmented, has 3 locations, and 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 as Data Deficient

No reliable estimate of the total population size for the taxon is available.

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.

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

Rule, K. (1991). Two new subspecies within *Eucalyptus leucoxylon* F. Muell and notes on that species. *Muelleria, 7*(3), 389-403.

SAC (1997). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Flora and Fauna Guarantee, Nomination No. 448 *Eucalyptus leucoxylon* subsp. *connata.*

VicFlora (2018). Flora of Victoria, Royal Botanic Gardens Victoria: *Eucalyptus leucoxylon* subsp. *connata.* Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/17040263-53cf-407f-8f09-ee264607cfc2