

## *Eucalyptus goniocalyx* subsp. *laxa* Gum-barked Bundy

### Taxonomy

*Eucalyptus goniocalyx* subsp. *laxa* Rule

This subspecies is somewhat intermediate between *E. cypellocarpa* and *E. goniocalyx*, but retained in the latter taxon due to the fruits and buds resembling those of *E. goniocalyx*. It is distinguished from other subspecies by the largely smooth bark (VicFlora 2016).

### Current conservation status

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

### Proposed conservation status

Endangered in Australia

Criterion C1

### Species Information

#### Description and Life History

The taxon is a tree to 12 m high; bark smooth, white or grey on upper trunk, with some rough bark on lower part of trunk. Juvenile leaves orbicular, discolorous, subglaucous or blue-green. Peduncles 10-16 mm long; operculum conical, as wide as or wider than hypanthium. Fruit 8-10 mm long. Flowers late winter and spring (VicFlora 2016).

#### Generation Length

The generation length of *Eucalyptus goniocalyx* subsp. *laxa* is inferred to be 150 to 300 years. This is based on a plausible pre-settlement frequency of bushfire, estimated in the 40-80 year range. It is also based on episodic post-fire recruitment, the ability of the taxon to resprout post-fire, and the likelihood of some continuous recruitment in response to optimal seasons, independent of bushfire.

#### Distribution

The taxon is apparently restricted to the Brisbane Ranges, in relatively damp, heavy soils, with the bulk of its numbers being protected within the Brisbane Ranges National Park. It occurs at the intersection of Mt. Wallace Road and Old Thompson Road, Brisbane Ranges, to the south-west of Bacchus Marsh, with only a small number of individuals being known to occur along roadsides and on private property at the southern extremity of the distribution. Initially, the taxon was thought to consist of only a few hundred trees, but surveys focussing particularly in the southern part of the distribution have shown the numbers are now thought to exceed 2000 trees (Rule 2011).

#### Habitat

The taxon occurs in relatively damp, well-watered, heavy soils (VicFlora 2016). Associated taxa either occur with, or adjacent to *E. goniocalyx* subsp. *laxa*, and include *E. aromaphloia*, *E. tricarpa* subsp. *tricarpa*, *E. radiata* subsp. *radiata*, *E. macrorhyncha*, *E. dives*, *E. viminalis* subsp. *viminalis*, *E. obliqua*, *E. baxteri*, and *E. ovata* var. *ovata*. Populations of typical *E. goniocalyx* also occur in the Brisbane Ranges on drier, more exposed sites but contact with the new subspecies has not been observed (Rule 2011).

# *Eucalyptus goniocalyx* subsp. *laxa* Gum-barked Bundy

## Threats

Current and future threats to the taxon include the increasing risk of recruitment failure and adult mortality in response to extreme drought stress, increasing risk of repeat fire events, and targeted herbivory of juveniles and resprouts.

## 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> <ul style="list-style-type: none"> <li>(a) direct observation [except A3]</li> <li>(b) an index of abundance appropriate to the taxon</li> <li>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</li> <li>(d) actual or potential levels of exploitation</li> <li>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</li> </ul>			

## Evidence:

### Eligible under Criterion A2 as Vulnerable

The population reduction over the past 450 to 900 years is inferred to be 30 to 45%, based on (c) above.

Past decline is based on post-settlement clearance for agriculture, occurring peripherally to the Brisbane Ranges National Park, particularly in the Anakie district.

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

### Eligible under Criterion A4 as Vulnerable

The population reduction over any 450 to 900 year period, including both past and future (up to 100 years in the future), is inferred to be 35 to 55% (midpoint 40%), based on (c) above. The causes of reduction may not have ceased, be understood or be reversible.

Future decline is based on the increasing risk of recruitment failure and adult mortality in response to extreme drought stress, increasing risk of repeat fire events, and targeted herbivory of juveniles and resprouts.

# *Eucalyptus gonicalyx* subsp. *laxa* Gum-barked Bundy

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 <sup>2</sup>	< 5,000 km <sup>2</sup>	< 20,000 km <sup>2</sup>
B2. Area of occupancy (AOO)	< 10 km <sup>2</sup>	< 500 km <sup>2</sup>	< 2,000 km <sup>2</sup>
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 126 km<sup>2</sup> and the Area of Occupancy (AoO) is estimated to be 84 km<sup>2</sup>, 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:

### Eligible under Criterion C1 as Endangered

It is estimated that there are 2,000 to 3,000 mature individuals, as (Rule 2011) considers that the numbers are now thought to exceed 2000 trees.

# *Eucalyptus goniocalyx* subsp. *laxa* Gum-barked Bundy

There is an estimated continuing decline of 10 to 25 % within two generations, based on the increasing risk of recruitment failure and adult mortality in response to extreme drought stress, increasing risk of repeat fire events and targeted herbivory of juveniles and resprouts.

Criterion D - Very small or restricted population <sup>Ⓜ</sup>			
	Critically Endangered <sup>Ⓜ</sup>	Endangered <sup>Ⓜ</sup>	Vulnerable <sup>Ⓜ</sup>
Number of mature individuals (observed or estimated) <sup>Ⓜ</sup>	<50 <sup>Ⓜ</sup>	<250 <sup>Ⓜ</sup>	<1,000 <sup>Ⓜ</sup>
D2 - Only applies to the VU category <sup>Ⓜ</sup> 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. <sup>Ⓜ</sup>	- <sup>Ⓜ</sup>	- <sup>Ⓜ</sup>	D2 - Typically: <sup>Ⓜ</sup> AoO < 20 km <sup>2</sup> or number of locations ≤ 5 <sup>Ⓜ</sup>

## Evidence:

### Eligible under Criterion D2 as Vulnerable

The taxon is estimated to be very restricted. It has a restricted distribution, occurring in a single location, 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 identified threats. These threats include the increasing risk of recruitment failure and adult mortality in response to extreme drought stress, increasing risk of repeat fire events, and targeted herbivory of juveniles and resprouts.

**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](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. (2011). Six new infraspecific taxa in *Eucalyptus* (Myrtaceae) for Victoria. *Muelleria*, 29(1), 3-15.
- VicFlora (2016). Flora of Victoria, Royal Botanic Gardens Victoria: *Eucalyptus goniocalyx* subsp. *laxa*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/42a49c27-7e8e-4c11-b192-1b8579b31cb2>