Threatened Species Assessment

Boronia citrata
Lemon Boronia

Taxonomy

Boronia citrata N.G. Walsh

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 B1ab(iii)+2ab(iii)

Species Information

Description and Life History

The taxon is an erect shrub to 0.8(-1.5) m high, minutely hispid throughout (not obviously glandular), pungently lemon-scented. Leaves pinnate with 5-11 leaflets, to 15 mm long and wide; leaflets narrowly obovate, 2-7 mm long, 1-3 mm wide, obtuse, c. concolorous, margins entire or slightly and irregularly indented; petioles 1.5-3.5 mm long. Inflorescence terminal or in upper axils, 1-5-flowered; peduncle 0-5 mm long; pedicels 3-7 mm long. Sepals deltoid, 1-1.6 mm long, imbricate; petals 4-6.5 mm long, pale to rosy pink, imbricate, midrib not raised, deciduous; stamen filaments pilose; style glabrous, subequal to globular stigma. Follicles, 3-3.5 mm long; seeds 2-3 mm long, dark brown, shiny. The taxon flowers from spring-summer (VicFlora 2017).

Generation Length

The generation length of *Boronia citrata* is inferred to be 50 years. This is based on a pre-settlement fire frequency of 1-2 wildfires per century and predominantly pulse recruitment in response to fire, with only a small contribution of continuous recruitment in response to better seasons and localised site disturbance. It is also based on the observation that the taxon is an obligate seed regenerator. As is the case with most Rutaceae, the seed is hard, very long-lived and can survive in the soil-stored seed-bank potentially for many decades or even centuries. The longevity of the taxon is estimated to be 5-15 years and a proportion of subpopulations are likely to persist in the soil-stored seed bank.

Distribution

The taxon is known from two areas on the Macalister River in the upper catchment in areas to the north and east of Licola (Albrecht & Walsh 1993; SAC 1994; VicFlora 2017). One site containing about 5 distinct populations (including the type) ranges over about 1 kilometre within the Alpine National Park (Wonnangatta-Moroka Unit). The other site, near Mt MacDonald, contains about four populations spanning about 0.5 kilometres, is within uncommitted Crown land. A third population was reported to exist outside the Alpine National Park near the Mt. MacDonald site on a ridge across from Bull Plains Spur. Within most of the populations, plants of *B. citrata* are plentiful. Another population was reported to occur apparently near to the Mt MacDonald site, but this population has not been confirmed and details of its location are sketchy (Albrecht & Walsh 1993; SAC 1994).

Habitat

The few known populations occur in subalpine mallee and heath communities (VicFlora 2017). The taxon occurs on shallow, shaly soils based on Carboniferous and Ordovican sandstones at altitudes of about 950-1140 m. At the type locality *Eucalytpus sieberi* and a mallee form of *E. dives* form a low open-forest with understorey species including *Epacris impressa, Daviesia buxifolia, Comesperma ericinum, Monotoca scoparia, Oxylobium ellipticum, Tetratheca labillardieri, Dillwynia phylicoides* and *Hibbertia obtusifolia*. Near Mt MacDonald, *B. citrata* occurs in similar vegetation, but with *E. mannifera* and *E. dives* being the principal canopy species, and *Acacia obliqueinvervia* and *Pultenaea muelleri* prominent components of the shrub stratum (along with most of the shrub species present at the type locality) (Albrecht & Walsh 1993; SAC 1994).

Threats

The key threat identified for this taxon is the increasing risk of recruitment failure in response to extreme drought stress and the increasing frequency of severe fire events. However, the risk of repeat fire at intervals below the tolerable fire interval for the taxon is considered low, since the taxon is likely to replenish seed banks within ten years of seed recruitment. The risk impacts from Sambar deer (*Rusa unicolor*) is also considered low since Sambar tend to avoid browsing of Rutaceae in general, although the oil content is regarded as an attractant for Sambar rubbing of taller species. This risk is low for this taxon since the plant rarely exceeds 1 m in height and Sambar are unlikely to access sites at the elevation at which this taxon is recorded.

The taxon is reserved with one population occurring within the Alpine National Park. The second is within uncommitted Crown land, but at sites unlikely to experience altered land management. Details of the third location are sketchy (SAC 1994).

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:

Ineligible under Criterion A

There is insufficient evidence to determine whether there has been or will be a reduction in population sufficient to meet any threshold for Criterion A.

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 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 two locations as all key identified threats apply across the range of the taxon and can rapidly affect all individuals of the taxon present, but they may apply differently within the National Park and outside it, on uncommitted Crown land.

It has a continuing decline in (iii) above, based on the increasing risk of extreme drought stress and the increasing frequency of severe fire events. However, the risk of repeat fire at intervals below the tolerable fire interval for the taxon is considered low, as is the risk of Sambar since they are unlikely to access sites at the elevation at which this taxon is recorded.

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 2 locations, and has a continuing decline in (iii) 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 estimated that there are 300 to 900 individuals, based on field observations by Neville Walsh made in 2018, but 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:

Eligible under criterion D as Vulnerable

It is estimated that there are 300 to 900 individuals, and 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

Albrecht, D.E., & Walsh, N.G. (1993). Two new species of *Boronia* (Rutaceae) endemic in Victoria. *Muelleria, 8*(1), 21-25.

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SAC (1994). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 330 *Boronia citrata*. Department of Environment and Primary Industries, Victoria

VicFlora (2017). Flora of Victoria, Royal Botanic Gardens Victoria: *Boronia citrata*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/47d399d0-62d9-48e0-b8bd-6e5a160eefc7

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