Threatened Species Assessment

Baeckea linifolia
Swamp Baeckea

Taxonomy

Baeckea linifolia Rudge

Victorian plants often have smaller, more rigid leaves compared to plants in New South Wales and Queensland, and have previously been included in *Baeckea linifolia* var. *brevifolia* F.Muell. ex Benth. (VicFlora 2017).

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 B1ab(iii)+2ab(iii)

Species Information

Description and Life History

Erect shrub 1-3 m high; branches with drooping tips. Leaves rather widely spaced, linear, sometimes more or less terete, not widely spreading, 5-15 mm long; apex acute; base tapered. Flowers solitary in axils, white, to 5 mm across; pedicel 1.5-2 mm long; bracteoles 2, linear, caducous; hypanthium obconical; calyx-lobes triangular, acute; petals ovate to orbicular, 1.5-2.5 mm long; stamens 8-15, none opposite the petals, filaments curved; ovary 2-celled, flat-topped. Fruit cup-like, to 2 mm diam.; seeds angular. The taxon flowers mainly from December to March (VicFlora 2017).

Generation Length

The generation length of *Baeckea linifolia* is estimated to be 45 to 75 years. This is based on an estimate of pre-settlement fire intervals and an interpretation of the taxon as an obligate seed regenerator (OSR), recruiting episodically following rare fire events. The taxon develops a woody rootstock in cultivation, suggesting some capacity to resprout. However, the swampy habitat of the taxon is subject to intense fire events at a lower frequency than the surrounding lowland forest. Such fires may consume all canopies with the risk of incineration of both rootstocks and peaty substrate, as witnessed at Anglesea after the 1983 Ash Wednesday bushfires, which also consumed much of the lowland forests in far East Gippsland. Under such circumstances, the taxon is likely to behave as a fire sensitive OSR. Longevity of the taxon is likely to be limited by the interval between intense fire events within its habitat range.

Distribution

In Victoria, the taxon is confined to East Gippsland, from about Cann River eastward. Additionally, reliable site records indicate that the taxon occurs eastward from the Cabbage Tree Creek - Bemm River area, extending inland of the Princes Highway only in the Genoa district. The taxon also occurs in Queensland and New South Wales (VicFlora 2017).

Habitat

The taxon is restricted to lowland, swampy heaths (VicFlora 2017).

Quadrat data in the Victorian Biodiversity Atlas (VBA) and specimen records in the Australian Virtual Herbarium indicate that the habitat range of the taxon includes Wet Heath, Melaleuca Swamp Thicket, Grass Tree Plains dominated by *Gymnoschoenus sphaerocephalus* (Button Grass) and *Xanthorrhoea resinosa* (Spear Grass-tree), occasionally stream banks, and extending into drier ecotones with Lowland Forest.

Quadrat data indicates that the taxon typically occurs with projective foliage cover less than 5% at the quadrat scale, and less commonly with projective foliage cover of 5-25% that is typically in wet heath, swamp, swamp thicket, Grass Tree Plain or Button Grass Plain, and only occasionally in Lowland Forest with projective foliage cover that is less than 1%.

Threats

The key threat to the taxon is the increasing risk of repeat fire events at intervals below or approaching the tolerable fire interval for the taxon. Such events may result in high mortality of adults, with some risk of seedbank depletion and complete mortality of the last cohort of episodic post-fire recruits.

Climatic drying and warming and imposed fire regimes, particularly the extensive use of planned burning across the region, operate synergistically to increase the risk of repeat fire events, overall affecting the habitat of the taxon.

Plants in cultivation at the Canberra Botanic Gardens are reported to survive drought well, suggesting that the taxon is not directly threatened necessarily by climatic drying or even drought stress. Extreme drought events, however, indirectly increase the risk of recruitment failure and, potentially, seedbank exhaustion if the taxon is dependent of seedbanking.

Seed held in seed capsules on the adult plant for 1-2 years may represent a prime seedbanking strategy, since most *Baeckea* taxa appear to not retain fruit and seed as long as *Leptospermum* or *Melaleuca*. The taxon may therefore be at potential risk of sterilisation of elevated seedbanks in extreme fire events.

The taxon may be susceptible to Sambar Deer (*Rusa unicolor*) browsing and pig activity, both targeting the habitat range of the taxon. However, it is unclear whether Sambar are likely to target the taxon given its Myrtaceous oil content.

The habitat of the taxon is not considered to be susceptible to invasion by exotic weeds.

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 Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 1,673 km², based on accepted, post-1970 records from the VBA.

The taxon is estimated to be severely fragmented naturally at the landscape scale, since the taxon is restricted to drainage line habitats in numerous isolated catchment systems, with short range dispersal potentially facilitated by water movements within each subcatchment only. This precludes the possibility of recolonisation in the event of local extinction.

It is estimated to have 1 location, and has a continuing decline in (iii) above, based on the identified threats.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 188 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 1 location, 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 as Data Deficient

There is no available estimate of population size for the taxon.

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.

VicFlora (2017). Flora of Victoria, Royal Botanic Gardens Victoria: *Baeckea linifolia*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/27e79dc9-2bec-4c90-964b-fe248cff7121