

Phebalium stenophyllum Narrow-leaf Phebalium

Taxonomy

Phebalium stenophyllum (Benth.) Maiden & Betche

Plants from near Dimboola have narrow-oblong leaves with moderately recurved margins and approach *P. squamulosum* subsp. *squamulosum* in appearance. However, *P. stenophyllum* has leaves with an obscure or hardly impressed midrib (VicFlora 2019).

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 A3ce+4ce; B2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The taxon is a shrub to 1.5 m high; branchlets silvery- to ferruginous-lepidote. Leaves shortly petiolate; lamina narrow-oblong, 4-20 mm long, 0.8-3 mm wide, obtuse, subterete, upper surface glabrous or glabrescent, midrib not apparent, lower surface lepidote, margins recurved to revolute. Inflorescence a terminal 3-10-flowered umbel-like cluster; peduncle absent; pedicels 3-9 mm long. Calyx hemispherical, c. 1-1.5 mm long, silvery- to ferruginous-lepidote, smooth; petals 5 (rarely 6), imbricate, elliptic, 3-4 mm long, yellow, lepidote outside and ferruginous in upper half, silvery in lower half; stamens exserted, anthers yellow; disc not apparent; ovary silvery-lepidote. Follicles c. erect, ferruginous-lepidote, c. 3 mm long. The taxon flowers in spring (VicFlora 2019).

Generation Length

The generation length of *Phebalium stenophyllum* is estimated to be 35 to 70 (midpoint 50) years. Although longevity is plausibly 20-40 years or more, as suggested by Carter (2010) for a sibling taxon (*P. lowanense*) in similar habitats to the immediate north, an estimate of generation time is based on the frequency of episodic recruitment events. The taxon is likely to be a fire-sensitive obligate seed regenerator which recruits episodically following intense bushfires at pre-settlement intervals of 35-70 years or more from a persistent soil-stored seedbank. Circumstantial evidence to support this estimate of pre-settlement fire frequency is the observation that, in the Little Desert, Malleefowl (or Lowan; *Leipoa ocellata*) require old-growth Mallee vegetation at least 50 years old before litter accumulation is sufficient for the construction of nesting mounds required for successful reproduction. Episodic post-fire pulse recruitment may be supplemented by some opportunistic recruitment in response to localised disturbance events or optimal seasonal conditions.

Distribution

In Victoria the taxon occurs mainly in the far west, but is also recorded from Mt Zero and Mt Abrupt in the Grampians and from near Blackwood (VicFlora 2019). It is a Victorian near-endemic, extending into South Australia between Bordertown, Bangham, and Frances, and with highly disjunct occurrences in New South Wales at Mt Canobolas west of Orange, and in the Warrumbungle Ranges near Coonabarabran.



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The taxon is largely restricted in Victoria to the Western Wimmera where most records are concentrated within the central and eastern sectors of the Little Desert, both within the Little Desert National Park, Wail State Forest, and on adjacent freehold land and other smaller parcels of public land. It extends north to the Yarrangook Flora and Fauna Reserve at the southern edge of the Big Desert, and south to the northern Grampians.

The taxon is likely to be long extinct at Mt Abrupt near Dunkeld if the provenance of the undated Dallachy collection is reliable. A 1968 collection from the Lerderderg State Park south-east of Blackwood and an 1892 collection from Cape Otway are of doubtful provenance.

Habitat

The taxon is found in eucalypt woodland on shallow, rocky soils, or in heath or mallee on sand (VicFlora 2019).

Quadrat data indicates that dominant associates include *Allocasuarina mackliniana* subsp. *xerophila* (Western Sheoak), *A. muelleriana* (Slaty Sheoak), *A. pusilla* (Dwarf Sheoak), *Banksia ornata* (Desert Banksia), *Baeckea ericaea* (Mat Baeckea), *Brachyloma daphnoides* (Daphne Heath), *Callitris gracilis* (Slender Cypress-pine), *C. rhomboidea* (Oyster Bay Pine), *Calytrix tetragona* (Common Fringe-myrtle), *Clematis microphylla* (Small-leaved Clematis), *Eucalyptus arenacea* (Desert Stringybark), *E. camaldulensis* (River Red-gum), *E. costata* (Yellow Mallee), *E. largiflorens* (Black Box), *E. leucoxyton* subsp. *stephaniae* (Desert Yellow-gum), *E. viminalis* subsp. *siliceana* (Wimmera Manna-gum), *E. wimmerensis* (Wimmera Mallee-box), *Hakea mitchellii* (Desert Hakea), *Hibbertia riparia* (Erect Guinea-flower), *Hypolaena fastigiata* (Tassel Rope-rush), *Hysterobaeckea behrii* (Broom Baeckea), *Lepidobolus drapetocoleus* (Scale Shedder), *Lepidosperma carphoides* (Black Rapier-sedge), *L. congestum* (Clustered Sword-sedge), *L. viscidum* (Sticky Sword-sedge), *Leptospermum myrsinoides* (Heath Tea-tree), *Melaleuca brevifolia* (Mallee Honey-myrtle), *M. uncinata* (Broombush), *M. wilsonii* (Violet Honey-myrtle), *Neurachne alopecuroidea* (Fox-tail Mulga-grass), *Phyllota pleurandroides* (Heathy Phyllota), *Senecio spanomerus* (Mallee Groundsel) and *Xanthorrhoea australis* (Austral Grass-tree).

Some sites are moderately weedy with the most prominent exotics including *Pentameris airoides* (False Hair-grass), *Vulpia bromoides* (Squirrel-tail Fescue) and *Zaluzianskya divaricata* (Spreading Night-phlox).

Threats

The taxon has undoubtedly suffered historic decline through habitat loss to agriculture in all districts abutting the Little Desert National Park and on the southern edge of the Big Desert. Occurrences in remnant stands of native vegetation within partially or heavily cleared rural landscapes are at continuing risk from edge effects including weed invasion, incremental habitat loss, browsing by stock, rabbits and kangaroos, chemical spray drift, eutrophication resulting from fertilizer application in adjacent croplands, roadside management, and fire management activities including the construction of mineral earth fire breaks, which is a highly destructive practice resulting in weed invasion with little prospect of successful seed-based recruitment.

The most pervasive threat to the taxon is the routine application of planned burning to both public and freehold land including remnant stands of native vegetation along roadsides. Carter (2010) suggests the optimal fire frequency for taxa of *Phebalium* in the region is between 10 and 30 years, although this is likely to be at the limit of the tolerable fire interval for the taxon. Fire intervals shorter than this are likely to eliminate adult plants before adequate replenishment of the soil-stored seedbank has occurred. Carter (2010) also suggests that fire intervals greater than 30 years may cause much of the seed in the seedbank to lose its viability before it has an opportunity to germinate. This is unlikely, however, given the capacity of many members of the Rutaceae to successfully recruit many decades after the last fire.

Within the Little Desert National Park weed invasion is considered a minor threat only with quadrat data and observations indicating that such sites are often relatively intact or only moderately weedy with the most prominent exotics including False Hair-grass, Squirrel-tail Fescue) and Spreading Night-phlox (David Cameron pers. comm). Occurrences in highly fragmented rural landscapes, however, are clearly threatened by a wider range of invasive perennials as well as annual exotics including, most notably, *Amsinckia* taxa (Yellow Burrweed), *Asparagus asparagoides* (Bridal Creeper), *Briza minor* (Lesser Quaking-grass), *Echium plantagineum* Paterson's Curse), *Ehrharta calycina* (Perennial Veldt-grass) and *Marrubium vulgare* (Horehound).

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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 style="text-align: center;"><i>based on any of the following:</i></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>			

Evidence:

Eligible under Criterion A3 as Endangered

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

Future decline cannot be estimated with confidence since the identified threats operate incrementally or stochastically with unpredictable intensity.

Eligible under Criterion A4 as Endangered

The population reduction over any 105 to 210 year period, including both past and future (up to 100 years in the future), is estimated to be 30 to 90% (midpoint 60%), based on (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

An estimate of past decline is based on historic habitat loss to agriculture and the early impact of imposed unfavourable fire regime.

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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 Vulnerable

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 5,058 km², based on accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented naturally and anthropogenically at the landscape scale, since the only plausible vectors are likely to be ants (myrmecochory) which are particularly diverse within mallee vegetation and operate at the metre scale only (Berg 1975).

It is estimated to have 3 locations, and has a continuing decline in (i), (ii), (iii), (iv) and (v) above based on the current and projected impact of the identified threats.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 180 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.

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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 total population size for the taxon in Victoria, although it is likely to exceed 1,000 mature individuals since the taxon can sometimes be recorded with projective foliage cover exceeding 5% at the quadrat scale.

Criterion D. Very small or restricted populations				
		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 km ² 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

Berg, R.Y. (1975). Myrmecochorous plants in Australia and their dispersal by ants. *Australian Journal of Botany* 23: 475-508.



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Carter, O. (2010). National Recovery Plan for the Lowan Phebalium *Phebalium lowanense*. Department of Sustainability and Environment, Melbourne.

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

VicFlora (2019). Flora of Victoria, Royal Botanic Gardens Victoria: *Phebalium stenophyllum*. Retrieved from:

<https://vicflora.rbg.vic.gov.au/flora/taxon/d0ced9ad-e833-460a-9224-e46666aca805>