



Styphelia exarrhena Desert Styphelia

Taxonomy

Styphelia exarrhena (F. Muell.) F. Muell.

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; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The taxon is an erect shrub to c. 60 cm high; branchlets puberulent. Leaves erect or spreading, ovate, 3.2-9 mm long, 1.4-4.5 mm wide, mucronate, glabrous or rarely puberulent above; margins plane to slightly recurved. Flowers erect, solitary or 2 close together in a much reduced spike, often sparse on plant; bracts, bracteoles and sepals ovate, acuminate-aristate; bracts, 0.7-1.2 mm long; bracteoles 1.3-2 mm long; sepals 2.4-3.2 mm long; corolla cream; tube cylindric or widening towards apex, 3-4.3 mm long, inside with scattered hairs in the upper half, glabrous below; lobes aristate, revolute to recoiled, bearded, 3.2-5 mm long, style 5-7 mm long. Fruit narrowly ellipsoid, c. 2.5 mm long. The taxon flowers from April to August (VicFlora 2019).

Generation Length

The generation length of *Styphelia exarrhena* is estimated to be 35 to 70 (midpoint 50) years. Although longevity is plausibly 20-40 years or more, this estimate of generation time is based on the frequency of episodic recruitment events. It is unclear whether the taxon is a fire-sensitive, obligate-seed-regenerator (OSR) or if it recruits episodically post-fire from a persistent soil-stored seedbank. The estimated pre-European settlement fire interval is estimated as 35-70 years or more. The taxon may have some capacity to resprout from its rootstock, thereby extending longevity beyond the fire interval. Circumstantial evidence to support this estimate of pre-European settlement fire frequency is the observation that the Malleefowl (*Leipoa ocellata*) requires long-unburnt, old-growth mallee vegetation, at least 50 years post fire, 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

The taxon is rare in Victoria where it is confined to the Big Desert area in the far west of the state. It also occurs in South Australia (VicFlora 2019).

Habitat

In Victoria, the taxon occurs on sandy soil in mallee scrub with a heathy understorey (VicFlora 2019). It is associated with deep, white, siliceous sand which is highly infertile and exceptionally free-draining with little moisture even at depth. Only the most deep-rooted perennials can access this moisture. This infertile habitat has not been subject to agricultural clearance and is not usually subject to weed invasion.

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Limited quadrat data indicates that dominant associates include *Allocasuarina mackliniana* subsp. *xerophila* (Western Sheoak), *A. muelleriana* (Slaty Sheoak), *Callitris verrucosa* (Scrub Cypress-pine), *Eucalyptus arenacea* (Desert Stringybark), *E. costata* (Yellow Mallee), *Hakea mitchellii* (Desert Hakea), *Hysterobaeckea behrii* (Broom Baeckea), *Leptospermum myrsinoides* (Heath Tea-tree), *L. coriaceum* (Mallee Tea-tree), *Phyllota pleurandroides* (Heathy Phyllota), *Spyridium subochreatum* (Velvet Spyridium), *Triodia scariosa* (Porcupine Grass) and *Xanthorrhoea caespitosa* (Austral Grass-tree).

All sampled vegetation is remarkably weed free reflecting the low nutrient status of the substrate. Occurrences in fragmented landscapes are likely to be 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

Records of the taxon in partially cleared farmlands south of Wyperfeld National Park in the Yarrangook, Telopea Downs and Yanac districts, suggest a proportion of its pre-settlement population has been eliminated by historic clearing.

Sites of *Styphelia exarrhena* in remnant stands of native vegetation within partially or heavily cleared rural landscapes are at continuing risk from edge effects. These include weed invasion, incremental habitat loss, browsing by stock, rabbits and kangaroos, chemical spray drift, eutrophication resulting from fertilizer application in adjacent croplands, inappropriate roadside management and fire management activities including the construction of mineral earth fire breaks. Invasive perennial as well as annual exotics in fragmented rural landscapes include *Amsinckia* species (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).

Sites within intact landscapes such as Wyperfeld National Park and the Big Desert Wilderness are remarkably weed free and weed invasion is considered a minor threat only. The most prominent exotics include False Hair-Grass, Squirrel-Tail Fescue and Spreading Night-Phlox.

Inappropriate fire regimes are considered a plausible, but not existential, threat. The current planned burning fire interval on public and freehold land is unlikely to approach the tolerable fire-interval (TFI) for the taxon. It may have some capacity to resprout from the rootstock following low to moderate intensity fire.

The projected increase in the frequency, duration and intensity of extreme drought events as a consequence of climatic drying is a potentially serious threat. Victorian records of the taxon are located at the drier end of its range and already likely to be close to its limit of drought tolerance. Shrubs lacking deep root systems that inhabit deep, siliceous sands are exceedingly vulnerable to extreme drought stress on account of the sand's exceptionally free drainage.

The greatest current and future threat, however, is the combination of fire and drought since more frequent fire exposes each species cohort to the hazards of seed-based recruitment and drought increases the risk of recruitment failure.

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>(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> <p><i>based on any of the following:</i></p>			

Evidence:

Eligible under Criterion A3 as Endangered

The population reduction over the next 100 years is suspected 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 suspected 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.

The estimate of past decline is based on historic habitat loss to agriculture and the early effects of unfavourable fire regimes in combination with climatic drying. As stated above, future decline cannot be estimated with confidence.

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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 Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 1,729 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

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

Two locations can be identified based on landscape context, tenure and fire regime: one for occurrences in relatively intact native mallee or heathland vegetation within Wyperfeld National Park or the Big Desert Wilderness and one for occurrences in remnant stands of mallee or heathland vegetation within fragmented rural landscapes on the southern edge of the Dig Desert in the Yarrangook, Telopea Downs and Yanac districts.

It has a continuing decline in (i), (ii), (iii), (iv) and (v) above.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 120 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As stated above, the taxon is severely fragmented, has two 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. It may not exceed 1000 mature individuals since the taxon is typically recorded, at the quadrat scale, with projective foliage cover less than 1%.

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

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.

DEPI (2014). *Advisory list of rare or threatened plants in Victoria - 2014*. Department of Environment and Primary Industries, Melbourne.

VicFlora (2019). Flora of Victoria, Royal Botanic Gardens Victoria: *Styphelia exarrhena*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/4af5c95f-569c-4d82-b0b1-8fdb66e66c27>