Threatened Species Assessment

Euphorbia tannensis subsp. *eremophila*
Desert Spurge

Taxonomy

Euphorbia tannensis subsp. *eremophila* (A. Cunn. ex Hook.) D.C. Hassall

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1992).

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

Proposed conservation status

Critically Endangered in Victoria

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

Species Information

Description and Life History

The taxon is an erect annual or perennial subshrub, mostly 5-50 cm high, rarely more; lower stems and branches becoming woody; upper branches green, glaucous. Leaves alternate below, subopposite in upper parts, linear to narrow-ovate, 5-70 mm long, 1-7 mm wide, acute to obtuse, base cuneate, margins entire or serrulate; petiole to c. 4 mm long; stipules subulate, c. 0.2 mm long. Cyathia solitary, terminal or axillary; peduncles to c. 1 mm long; involucre campanulate, 1-2 mm long, lobes incurved; glands more or less elliptic, c. 1 mm long, yellow to red, margins entire, crenulate or palmatifid; male flowers usually 4 per fascicle at anthesis; female flowers with styles cleft to the middle into 2 filiform recurved stigmas. Capsule ovoid-globose, 4-5 mm long and wide, erect, keeled, smooth, green; seeds quadrangular-oblong, 2.5-3 mm long, smooth, wrinkled or granular; caruncle hat-shaped, yellow-brown. The taxon flowers throughout the year (VicFlora 2018).

Generation Length

The generation length of *Euphorbia tannensis* subsp. *eremophila* is estimated to be 5 to 25 years. By analogy with *Abutilon fraseri* (Dwarf Lantern-flower), another highly threatened sympatric taxon at the Boundary Point site, it may be inferred that the taxon is likely to be transient, with potential longevity of 1-15 years, that can be absent from a site for many years before re-appearing (Parsons and Browne 2000). Parsons and Browne (2000) found that a major abiotic determinant of recruitment in the area was warm season rainfall. They also found that a minimum of 26 mm rainfall between November and March was needed for germination, however favourable rainfall may not occur for up to 8 years in the taxon's habitat. It appears to be confined to Belah Woodland which was apparently rarely subject to extensive bushfire at the time of European settlement. Generation time may therefore exceed longevity many-fold.

Distribution

The taxon is known in Victoria from only a few sites in the far north-west, where it is found at sites overlooking the Murray River. There is also an outlying 1905 record purportedly from near Kerang, however this, along with specimens purportedly collected from Inglewood in 1910, are presumed to be from long extinct stands.

In 1948 Willis collected the taxon from the Millewa homestead at Neds Corner, 80 km west of Mildura, where it grew on sandhills at the time. Intensive survey in the area in recent decades has failed to relocate this occurrence

which is likely to have become extinct in the last 72 years. The taxon is now known in Victoria from a single surviving stand at Boundary Point in the far north-west corner of the state on freehold land. It is also found in WA, NT, SA, Qld, and NSW (VicFlora 2018).

Habitat

Across its very wide interstate range, the habitat range of the taxon includes skeletal rocky hills, sandy plains, sandy and rocky alluvial watercourses, and sandy dune swales. In Victoria, it is known from only a few sites where it is found on sandhills and rocky cliffs (VicFlora 2018).

The habitat on the freehold land at Boundary Point is a shallow erosion gully on a low rocky red sandstone cliff overlooking the Murray River in a low Black Bluebush Shrubland, dominated by *Maireana pyramidata* (Sago Bush), *Olearia pimeleoides* (Pimelea Daisy-bush), and *Scaevola depauperata* (Skeleton Fan-flower), with scattered *Casuarina pauper* (Belah) on a very shallow veneer of soil above a rocky outcrop. Other associates include *Abutilon fraseri* (Dwarf Lantern-flower), *Arabidella trisecta* (Shrubby Cress), *Calotis hispidula* (Hairy Burr-daisy), the invasive exotic *Carrichtera annua* (Ward's Weed), *Dodonaea viscosa* (Sticky Hop-bush), *Enneapogon avenaceus* (Common Bottle-washers), *Hakea leucoptera* (Silver Needlewood), *Lycium australe* (Australian Box-thorn), *Maireana sedifolia* (Pearl Bluebush), *M. turbinata* (Satiny Bluebush), and *Rhagodia spinescens* (Hedge Saltbush). Soil at the site is brown sandy loam of Bunyip Sand origin.

The climate is semi-arid, with a mean annual rainfall of 290 mm at Red Cliffs, with the wettest months being from May to October. The rainfall is highly variable, especially in summer when rain usually occurs as heavy downpours during thunderstorms (Parsons and Browne 2000).

Threats

The taxon is likely to have suffered severe historic decline through habitat loss and degradation due to agriculture, most notably stock grazing resulting in soil erosion and the facilitation of weed invasion. This decline is based on the apparent extinction of the taxon at the Millewa homestead at Neds Corner, Kerang, and Inglewood. The association of the taxon with *Casuarina pauper* (Belah) supports this inference, since Belah Woodlands have been targeted for agricultural clearance on account of their high fertility (DSE 2003).

Parsons and Browne (2000) considered browsing to be the most serious threat to *Abutilon fraseri*, which is another highly threatened taxon sympatric with *E. tannensis* subsp. *erempophila* at Boundary Point, as it is palatable to stock and kangaroos. They considered the provision of kangaroo-proof fencing to be the most important management recommendation, which is likely to apply also to *E. tannensis* subsp. *eremophila.*

Parsons and Browne (2000) also found that one of the major abiotic determinants of recruitment success in highly threatened members of the Malvaceae sympatric with *Euphorbia tannensis* subsp. *eremophila* in Victoria is warm season rainfall. They found that a minimum of 26 mm rainfall between November and March is needed for germination, that future climatic drying and drought stress as a result of climate change will result in less favourable rainfall events, and that a favourable rainfall event followed by a drought will lead to 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%

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:

Eligible under Criterion A2 as Endangered

The population reduction over the past 15 to 75 years is suspected to be 50 to 80% (midpoint 65%), based on (c) and (e) above.

Past decline cannot be estimated with any confidence although it is likely to have been very significant, since the taxon is associated with Belah Woodland which has been highly depleted and often grossly degraded (DSE 2003). Further circumstantial evidence for past decline is the likely extinction of the taxon at the Millewa homestead at Neds Corner, where intensive field survey has failed to relocate the taxon since it was last collected by Willis 72 years ago in 1948. The taxon is also inferred to have become extinct at Kerang and Inglewood where it was last collected in 1905 and 1910 respectively.

Eligible under Criterion A3 as Endangered

The population reduction over the next 15 to 75 years is suspected to be 50 to 80% (midpoint 65%), based on (c) and (e) above.

Future decline in population size is difficult to estimate with any confidence since the identified threats are likely to act stochastically and with unpredictable intensity.

Eligible under Criterion A4 as Endangered

The population reduction over any 15 to 75 year period, including both past and future (up to 100 years in the future), is suspected to be 50 to 80% (midpoint 65%), based on (c) and (e) above.

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 a single location, since the taxon is now apparently restricted in Victoria to a single occurrence at Boundary Point, and all threats apply.

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

It is suspected to have extreme fluctuations in (iv) above, as the taxon is an annual or perennial subshrub with a generation time which may exceed its longevity many-fold. Depending on the success or failure of episodic recruitment, it may be absent from a site for at least 6 years before re-appearing (Parsons & Browne 2000).

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, the taxon has 1 location, has a continuing decline in (i), (ii), (iii), (iv) and (v), and extreme fluctuations in (iv) 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 current population size. In 2011, Ian Sluiter noted 15 plants at the Boundary Point site, but since population size at any one site may fluctuate significantly between successive recruitment events, this is no guide as to current population size.

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

DSE (2003). Action Statement - Dwarf Lantern-bush *Abutilon fraseri*. (No. 48). Department of Sustainability and Environment, East Melbourne.

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

Parsons, R.F. and Browne, J.H. (2000). Causes of rarity in *Abutilon oxycarpum* and *Hibiscus brachysiphonius* (Malvaceae) on the River Murray floodplain, South-eastern Australia. *Transactions of the Royal Society of South Australia* 124(1):41-44.

SAC (1992). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 232 *Euphorbia tannensis*.

VicFlora (2018). Flora of Victoria, Royal Botanic Gardens Victoria: *Euphorbia tannensis* subsp. *eremophila*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/717dc137-dcba-4718-8387-69676048d0ac