Threatened Species Assessment

Maireana sedifolia
Pearl Bluebush

Taxonomy

Maireana sedifolia (F. Muell.) Paul G. Wilson

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 A2abce+4abce; B2ab(i,iv)

Species Information

Description and Life History

The taxon is a compact, densely-branched subshrub to c. 30 cm high, branches woolly-pubescent. Leaves narrowly terete or semi-terete, c. 10 mm long, flattened at base, loosely silky-hairy, becoming glabrous with age. Fruiting perianth shortly woolly, readily detaching from stem; tube barrel-shaped or broadly cylindric, c. 3 mm long, weakly 6-10-ribbed, centrally attached at base, attachment circular or elliptic, flat or saddle-shaped; limb erect, to c. 1 mm long; spines 3(-4), divergent, the 2 lateral c. 3-6 mm long, the adaxial 1(-2) conspicuously shorter to c. 1 mm long, all sparsely pubescent for most of their length. The taxon fruits in September (1 record) (VicFlora 2018).

Generation Length

The generation length of *Maireana sedifolia* is suspected to be 50 to 100 years. The taxon has been observed to flower in the wild from 1-7 years of age. Seed biology research by Corrine Duncan at Federation University found that the taxon's seed longevity is quite short even under optimal conditions. Therefore, the soil seed bank is short-lived, the taxon's seed losing its viability on wetting by rain. Sluiter (pers. comm.) has observed that seed recruitment in the field is sporadic, spontaneous, localised and quite dense. He suspects that the pre-settlement recruitment cue for seed production is winter rainfall as seed is collectable in late summer. The taxon is long-lived, its deep taproots and system of shallow, deciduous, feeding roots support a longevity of up to 200 years.

Distribution

In Victoria, the taxon occurs in the far north-west (Lake Tyrell, Red Cliffs, Merbein, South Australian border region) and is sometimes locally common (VicFlora 2018). Sluiter (pers. comm.) speculates that the taxon may have occupied the cooler Bassian Plain that was connected to Tasmania during the last Glacial Maximum 18,000 - 20,000 years ago.

Habitat

In Victoria, the taxon is confined to a few sites with loamy, often limestone-rich soils (VicFlora 2018). According to Cunningham *et al* (1981) it occurs on red-brown soils with a sandy or loamy texture, always with limestone nodules at a depth of 60 cm or less beneath the surface. Plants may occur in pure stands, mixed with Black Bluebush (*M. pyramidata*) or Bladder Saltbush (*Atriplex vesicaria*), or as an understorey in Belah (*Casuarina pauper*) communities. Suiter (pers. comm.) considers it to be a heavy, clay-loam, soil specialist that is rarely associated

with sandy loam or light sandy clay loam soils and that there is an obligate association with soil supracalcic 'Calcarasol' (soils with at least one, but up to three, calcareous layers).

Threats

The taxon appears to be stable in most locations and has been observed recruiting successfully at many sites. Herbivory by sheep, particularly Dorper Sheep (*Ovis aries*), a South African breed of meat sheep, and also by feral goats, is a threat under drought conditions. Whilst resilient to light livestock browsing (with the ability to recover from what look like leafless skeletons), sustained herbivory under extended drought can kill plants. In agricultural regions the taxon exists in what is now a fragmented landscape where there are a range of threats such as habitat loss, habitat degradation, edge effects, road maintenance and fire management activities. Climate change also poses a threat to germination. According to Corrine Duncan (pers. comm.), experiments with seed shows the taxon germinates within 1-3 days at base temperatures of two degrees Celsius, although the optimum temperature is 18 ºC and a maximum temperature of 26 ºC. According to Sluiter (pers. comm.) these temperatures make the taxon quite anomalous to most arid zone taxa which germinate optimally at 25 to 26 ºC or at least in the 20 to 25 ºC range. Sluiter (pers. comm.) speculates that this lower temperature may reflect its origin and evolution under cooler climatic conditions. If so, the taxon is therefore at risk of recruitment failure under projected climatic warming and drying.

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 150 to 300 years is estimated to be 30 to 50%, based on (a), (b), (c) and (e) above.

The taxon has suffered post-settlement habitat loss to cereal cropping and horticulture with the greatest losses in Merbein, Pirlta to Merrilee and Morkalla districts. There have also been plausible but uncertain density reductions across surviving populations resulting from prolonged exposure to exotic herbivores, particularly sheep, that may have accounted for a reduction of 20-30%.

The causes of the reduction may not have ceased, be understood or be reversible.

Eligible under Criterion A4 as Endangered

The population reduction over any 150 to 300 year period, including both past and future (up to 100 years in the future), is suspected to be 50 to 70%, based on (a), (b), (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

Past decline is based on post-settlement habitat loss. The low future decline is based on drought resistance and observations of successful recruitment in NSW sites, where seed sown in June germinated the following summer with no evidence of seedling or juvenile mortality. The taxon appears stable in most sites, including some small remnants.

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 B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 252 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas.

The taxon is estimated to be severely fragmented naturally at a subregional scale due to discontinuity in its habitat and as a result of past clearing in rural landscapes.

It is estimated to have two locations. It has a continuing decline in (i) and (iv) above, since all outlying occurrences are the taxon's south east edge of range e.g. a highly disjunct rail reserve site between Lake Charm and Cranes Lake BR, as well as sites near Sea Lake, Lake Tyrrell, Kooloonong and Nyah.

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 insufficient evidence to determine the number of mature individuals.

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:

Ineligible under Criterion D as Data Deficient

There is insufficient evidence to determine the number of mature individuals.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

Cunningham, G.M., Mulham, W.E., Milthorpe, P.L. and Leigh, J.H. (1981). *Plants of Western New South Wales,* Soil Conservation Service of N.S.W.

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

VicFlora (2018). Flora of Victoria, Royal Botanic Gardens Victoria: *Maireana sedifolia*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/3907759d-b299-4094-86fe-c6ec282102aa