

Bossiaea heterophylla Variable Bossiaea

Taxonomy

Bossiaea heterophylla Vent.

Current conservation status

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

Proposed conservation status

Endangered in Victoria

Criterion B2ab(iii)

Species Information

Description and Life History

The taxon is a shrub to c. 1 m high; stems flattened, 1-3 mm wide, often glaucous, glabrous or sparingly pubescent. Leaves alternate, distichous, unifoliolate, narrowly to broadly ovate or linear-oblong, 10-30 mm long, 1.5-12 mm wide, larger leaves usually confined to juvenile growth; margins flat, incurved or involute; stipules triangular, to 1 mm long. Flowers solitary, 7-15 mm long; pedicels to 5 mm long; bracts few, to 1.5 mm long; bracteoles similar to bracts, inserted on lower half of pedicel, persistent; calyx 4-6 mm long, lobes equal to or shorter than the tube; standard slightly shorter or longer than keel, orange-yellow suffused with red outside; wings shorter than keel; ovary stipitate, glabrous, c. 8-ovuled. Pod narrow-oblong, 2-4 cm long, 0.7-0.9 mm wide, valves slightly thickened; stipe exceeding calyx. The taxon flowers from April to June (VicFlora 2017).

Generation Length

The generation length of *Bossiaea heterophylla* is estimated to be 20 to 30 years. The taxon is observed to be a facultative resprouter which recruits predominantly post-fire, with very limited recruitment between fire events. The longevity is observed to exceed 27 years, since mature individuals persist in vegetation unburnt for 27 years. Average fire intervals in the Gippsland Lakes Coastal Park is 10-20 years, although pre-settlement fire intervals are likely to have been greater, both in the Gippsland Lakes region and elsewhere within the Victorian range of the taxon.

Distribution

The taxon is uncommon in Victoria and is now confined to Gippsland, east of Rosedale. Site records in the Victorian Biodiversity Atlas (VBA) indicate that the taxon reaches its south-western limit at Wilsons Promontory, extending discontinuously in near-coastal districts to the NSW border, mostly south of the Princes Highway except at Providence Ponds and at Maramingo Creek near Genoa. The Victorian stronghold for the taxon is the Sand Heathland Ecological Vegetation Class (EVC) within the Gippsland Lakes Coastal Park. The taxon is also found in Qld and NSW (VicFlora 2017).

Habitat

The taxon favours sandy soils in a variety of habitats, including heath and open woodland (VicFlora 2017).

Threats

Historically, the taxon has suffered significant decline in response to habitat loss to agriculture in some districts, notably inland of the Gippsland Lakes.

Current and future threats include inappropriate fire regimes and the invasion of heathland habitat by *Leptospermum laevigatum* (Coast Tea-tree). The threat of invasion by *L. laevigatum*, however, is context dependent. The Victorian stronghold within the Gippsland Lakes Coastal Park between Seaspray and Loch Sport is isolated from foreshore stands of *L. laevigatum* by Lake Reeve. Stands in Sperm Whale Head and along the East Gippsland coast, however, are at far greater risk of encroachment by *L. laevigatum*.

Inappropriate fire regimes are identified as a threat to the taxon, which may decline in vegetation unburnt for over 30 years. Long unburnt heathland or heathy woodland is very rarely observed and is likely to become rarer, in response to planned burning, climatic warming and drying, and by the increasing incidence of lightning and anthropogenic ignition sources across the range of the taxon. However soil-stored seedbanks are expected to persist indefinitely and outlive the last cohort of mature individuals.

Some sites, particularly those near habitation, may be threatened by exotic weed invasion, but this is considered a highly localised threat at present.

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>based on any of the following:</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>
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Evidence:

Eligible under Criterion A3 as Vulnerable

The population reduction over the next 60 to 90 years is suspected to be 15 to 35 (midpoint 25)%, based on (c) and (e) above.

Bossiaea heterophylla

Variable Bossiaea

The magnitude of future decline cannot be estimated with any confidence since the identified threats operate incrementally and with unpredictable intensity across the Victorian range of the taxon.

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 7,958 km², based on accepted, post-1970 records in the VBA.

The taxon is estimated to be severely fragmented naturally at the regional and landscape scales, and anthropogenically at the landscape scale in some districts. Geographically isolated stands occur at spacings greatly exceeding the dispersal range of the taxon, which is dispersed at the metre scale by ants (the phenomenon known as myrmecochory). This precludes the possibility of recolonisation in the event of local extinction.

Three locations can be identified based on exposure to invasion by *L. laevigatum*. Occurrences in proximity to foreshore stands of *L. laevigatum* are at greatest risk of invasion by this indigenous taxon, which is classed as a transformer environmental weed. Inland occurrences such as those at Wilsons Promontory, Providence Ponds and Maramingo Creek near Genoa, are at lower risk of invasion. Finally, stands within the Victorian stronghold within the Gippsland Lakes Coastal Park between Seaspray and Loch Sport, are isolated from foreshore stands of *L. laevigatum* by Lake Reeve, and are therefore shielded from invasion.

. It has a continuing decline in (iii) above, based on the current and projected impact of the identified threats. Key threats include agriculture, inappropriate fire regimes, climatic drying and warming, increasing incidence of lightning and anthropogenic ignition sources, and exotic weed invasion.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 251 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it is severely fragmented, has 3 locations and has a continuing decline in (iii) above.

Bossiaea heterophylla

Variable Bossiaea

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 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:

Ineligible under Criterion D

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

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. 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 (2017). Flora of Victoria, Royal Botanic Gardens Victoria: *Bossiaea heterophylla*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/3ed48f14-876e-4c88-9d14-667e7df3abe8>