Threatened Species Assessment

Prostanthera galbraithiae
Wellington Mint-bush

Taxonomy

Prostanthera galbraithiae B.J. Conn

Current conservation status

Listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*.

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2004).

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

Proposed conservation status

Endangered in Australia

Criteria A3ce+4ace; B1ab(ii,iii,iv,v)c(iv)+2ab(ii,iii,iv,v)c(iv); C1+2b

Species Information

Description and Life History

Erect or spreading subshrub or shrub, 0.3-2 m high. Branches densely hairy between ridges and at nodes, otherwise glabrous; hairs antrorse, appressed; glands scattered and usually very sparse. Leaves sessile, very narrowly ovate or oblong, appearing c. linear because margin strongly revolute, (5-)8-15(-25) mm long, to 2 mm wide, mid-green, somewhat aromatic (when crushed), sessile, glabrous, rarely with an occasional minute hair, sparsely glandular, base subobtuse, margin entire, often strongly revolute, apex c. obtuse. Inflorescence leafy and panicle-like, part-inflorescences racemose, 8-24-flowered, often branched, leafy at base; bracteoles persistent, narrowly elliptic, 2-2.5 mm long, 0.4-0.6 mm wide. Calyx 4-5.5 mm long, tube 2-2.5 mm long, abaxial lobe 2-3 mm long; corolla deep mauve to purple with maroon dots, 7-10 mm long; anthers lacking basal appendage. Flowers spring.

Generation Length

The generation length of *Prostanthera galbraithiae* is estimated to be 10 to 30 (likely 20) years. DSE (2008) found that the taxon starts to decline in vigour after 10 years, starts to senesce at about 15 years and dies after 18 years. Another field worker estimated longevity in the 15-20 (-25) year range. The taxon is a fire-sensitive obligate seed regenerator (OSR) which relies on fire at a pre-settlement interval of around 15-30 years to promote germination from a soil-stored seedbank. No seedling recruitment has been observed between fires. Recruitment is therefore episodic with no evidence of continuous recruitment.

Distribution

The taxon is endemic to Victoria**,** where it is restricted to the Holey Plains State Park south-east of Rosedale and Dutson Downs south-east of Sale in the Wellington Shire in South Gippsland (VicFlora 2018).

Habitat

The taxon occurs in heathy open forest, heathland and heathy woodland, usually on gravelly sand (VicFlora 2018).

Threats

The taxon has suffered at least some historic decline through habitat loss to agriculture and silviculture (*Pinus radiata* softwood plantation establishment), since records extend to the northern boundary of the Holey Plains State Park and would have extended onto what is now cleared freehold. The taxon also extends to the boundary of an inholding within the park which has supported a softwood plantation and also supported additional stands of the taxon at the time of European settlement. Other threats contributing to past decline include bracken intensification (the taxon has not been able to be relocated at a site now strongly bracken-dominated), modified fire regimes, excessive browsing by wallabies, possibly stock grazing, rabbit browsing of juveniles and drought stress during the immediate post-fire recruitment phase resulting in reduced seed production.

The greatest current and future threat is targeted browsing by native and exotic herbivores, most notably *Wallabia bicolor* (Black-tailed Wallaby or Swamp Wallaby) and feral deer including Fallow Deer, Hogg Deer and Sambar. Browsing by native herbivores, particularly wallabies, has become more problematic, with the increase in wallaby numbers in the last decade promoted by surrounding pine plantations which provide a haven for wallabies.

Another long-standing and increasing threat is inappropriate fire regimes, either over-frequent or infrequent. The optimal fire regime is around every 15 years after plants have hit their flowering peak and before they begin to senesce and die.

The taxon is at increasing risk of adult mortality and recruitment failure in response to climatic drying resulting in prolonged and extreme drought stress. Drought conditions reduce plant vigour, reduce seedset and expose the taxon to increasing grazing pressure due to the palatability of the taxon to native herbivores. The taxon is exceptional in the genus *Prostanthera* in being only sparsely glandular and only mildly aromatic when crushed (VicFlora 2018). The resulting lack of oil content minimises any likely chemical defence against herbivory.

Plants of an undescribed member of the *Kunzea ericoides* complex, *Kunzea* sp. (Upright form) (Forest Burgan) are also a threat in the Holey Plains State Park as they have the potential to outcompete the taxon, due to their weedy spread and intensification throughout the park and dense growth form. The density of another indigenous plant, *Pteridium esculentum* (Austral Bracken), increases dramatically in response to over-frequent fire. Bracken intensification is implicated in the local extinction of at least one stand of the taxon. There is no evidence that exotic weeds are a significant threat to the taxon.

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 Vulnerable

The population reduction over the past 45 to 90 years is estimated to be 30 to 50% (likely 35%), based on (a), (c) and (e) above.

In 2008 DSE (2008) reported around 1150 plants from 8 sites and the taxon has been recorded from another site since. Previous to these surveys, the taxon was present at a further four sites but have not been seen at these sites since, and the seed at these sites is possibly no longer viable. If these stands are considered extinct it is possible that there may have been around 1.4 x the number of individuals (because there were 13 occurrences rather than 9) in the past 45 years compared to what there is currently.

The bushfires of 2019/2020 are believed to have potentially impacted up to 20% of the taxon's habitat. The taxon is sensitive to fire and is likely to have been significantly impacted, although the degree of damage is yet to be determined.

Eligible under Criterion A3 as Endangered

The population reduction over the next 30 to 45 years is projected to be 30 to 80% (midpoint 50%), based on (c) and (e) above

This is based on the projected impact of the identified threats.

Eligible under Criterion A4 as Endangered

The population reduction over any 45 to 90 year period, including both past and future, is estimated to be 30 to 80% (midpoint 50%), based on (a), (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 Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 284 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The taxon is severely fragmented naturally and anthropogenically at the landscape scale. The only plausible vectors are ants (myrmecochory) which operate at the metre scale.

A single location is identified since all occurrences are subject to wallaby browsing pressure at some stage in recruitment or post-fire secondary succession. Most other identified threats are also expected to operate with similar intensities across the very restricted ecological and geographic range of the taxon.

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

The taxon is likely to be subject to in mature population size at the subpopulation level in response to severe Wallaby browsing which can result in recruitment failure or highly compromised adult vigour and hence seedset, requiring optimal conditions following a subsequent recruitment event before optimal population density can be re-established.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 96 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it is severely fragmented, has one location, has a continuing decline in (i), (ii), (iii), (iv) and (v) above and has extreme fluctuations in (iv).

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:

Eligible under Criterion C1 as Endangered

It is estimated that there are 1,000 to 6,000 mature individuals, or more likely 1,200 to 2,000.

Immediately prior to the fire at the start of 2019, there was most likely between 1000 and 1200 mature individuals based on numbers reported by DSE (2008). However, as of late 2020 there may be as few as 300 mature individuals, which is the number counted in the Dutson Downs subpopulations which did not get burnt in the fire that affected subpopulations in the Holey Plains State Park. Adult plants are expected to have been killed by these recent fires in the Holey Plains State Park, but the fire is expected to promote germination of the next cohort and this should restore the number of mature individuals to near the numbers prior to the fire. Another estimate of population size in 2008 suggests as many as 2000-6000 mature individuals may be plausible, based on an estimated 20-30 subpopulations each comprising a plausible 100-200 mature plants in a mean stand area of 0.1 ha or less.

There is estimated to be a continuing decline of 20 to 60% (midpoint 40%) within two generations.

Eligible under Criterion C2 as Endangered

it is estimated that there are 1,000 to 6,000 mature individuals, there is an estimated continuing decline, and the taxon has extreme fluctuations in 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:

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

Carter, O. & Walsh N. (2006). *National Recovery Plan for the Wellington Mint-bush Prostanthera galbraithiae*. 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.

DSE (2008). Action statement Flora and Fauna Guarantee Act 1998 No. 231 Wellington Mint-bush *Prostanthera galbraithiae*. Department of Sustainability and Environment, Melbourne.

SAC (2004). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Flora and Fauna Guarantee, Nomination No. 711 *Prostanthera galbraithiae.*

VicFlora (2018). Flora of Victoria, Royal Botanic Gardens Victoria: *Prostanthera galbraithiae*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/39b395b2-35c5-4a8e-920c-ba0c1cc40e19)