# Threatened Species Assessment

## *Pultenaea fasciculata*
## Alpine Bush-pea

### Taxonomy

*Pultenaea fasciculata* Benth.

Specimens from Lake Mountain have smaller flowers than those from more north-easterly alpine areas (VicFlora, 2017).

### 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 A4bce; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)

### Species Information

#### Description and Life History

The taxon is a small, prostrate or decumbent shrub; stems terete with white, silky, appressed hairs, eventually almost glabrous. Leaves alternate, terete, 3-10 mm long; apex acute with long, fragile mucro; lower surface scabrous with a few, pale hairs on young growth; upper surface obscured; margin tightly inrolled; stipules lanceolate, slender, 1-2 mm long, with recurved tips. Flowers solitary, axillary, towards tips of branches; bracts absent, but flower subtended by a reduced leaf with enlarged stipules; calyx 4-5 mm long, silky-pubescent, lobes acute, lower lobes with long, slender tips; bracteoles attached at base of calyx tube, linear 1.5-3.5 mm long, silky-hairy; standard 7-9 mm wide; ovary and base of style hairy. Pod ovate, at least lower half enclosed by calyx. The taxon flowers from December to February (VicFlora 2017).

#### Generation Length

The generation length of *Pultenaea fasciculata* is estimated to be 50 to 100 years. By analogy with other alpine *Pultenaea* taxa such as *P. tenella*, generation time is based on a plausible longevity of 50-100 years and an inferred reliance on episodic recruitment following very rare fire events at pre-settlement intervals of 50-100 years or more. The taxon is inferred to be a vigorous resprouter post-fire, with limited reliance on post-fire seed germination. Recruitment between fire events is likely to be very limited given the intense competition from the dense sward of herbs, graminoids and other subshrubs. Fire-induced mortality is likely to be low with most established individuals resprouting successfully following all but the most intense fire events.

#### Distribution

The taxon is restricted in Victoria to the Alpine region, with an old record from lower altitude near Bidwell at the southern limit of the Monaro Tableland. The taxon also occurs in New South Wales and Tasmania (VicFlora 2017).

It is arguably extinct at Bidwell where it was last collected in 1940. It is possibly also extinct at Lake Mountain where it was last collected in 1985, and very plausibly extinct also at Mt Buffalo, where it was listed by Beauglehole in 1987 but not recorded in any subsequent post-fire monitoring.

### Habitat

The taxon occurs in alpine herbfields, margins of bogs and subalpine woodlands, with an old record from a lower altitude near Bidwell (VicFlora 2017).

### Threats

Historic decline through habitat loss to infrastructure development is likely to have been relatively minor. Although most Victorian occurrences are currently protected within the Alpine National Park, the taxon may have suffered significant historic decline through targeted or casual browsing and habitat degradation in response to alpine grazing and the activity of feral horses. The taxon may have at least partially recovered following cancellation of grazing licences throughout the Alpine National Park, although occurrences outside the park on the Nunniong Plateau continue to be threatened by cattle grazing.

Current and future threats include targeted browsing by native and exotic herbivores, habitat degradation by feral horses and Sambar Deer (*Rusa unicolor*). Outside the Alpine National Park, it may be threatened by cattle grazing, contraction in alpine bogs due to climatic drying, the increasing frequency, intensity and landscape scale of fire events, the increasing risk of drought-induced recruitment failure, potentially exacerbated by targeted browsing, and the potential impact of repeat fire events at intervals approaching the tolerable fire interval for the taxon. In the medium-term, the taxon may be advantaged by the contraction in wetland habitats resulting, initially, in broader ecotones, since the taxon tends to occupy ecotonal habitats fringing alpine bogs. In the longer term, however, these ecotonal habitats and the bogs themselves are likely to be invaded by shrubs and trees. Most sites rely on cold air drainage to preclude tree encroachment. The projected rise in temperature associated with climatic warming is projected to result in woody invasion of the habitat range of the taxon, constituting a major long-term threat to the taxon.

An ongoing legacy of alpine grazing is weed invasion by taxa such as *Cytisus scoparius* (English Broom) and *Acetosella vulgaris* (Sheep Sorrel), exacerbated by the increasing density of both feral horses and Sambar throughout the range of 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 A3 as Vulnerable**

The population reduction over the next 100 years is projected to be 30 to 50% (midpoint 40%), based on (c) and (e) above.

Future decline is based on the projected impact of the identified threats.

**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 estimated to be 20 to 65% (midpoint 40%), based on (b), (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

| 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 3,276 to 11,566 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The lower bound estimate excludes Echo Flat at Lake Mountain where the taxon was last collected in 1985, and the Mt Buffalo where it was listed by Beauglehole in 1987, based on an earlier record. It is potentially extinct at both these disjunct sites.

The taxon is estimated to be severely fragmented naturally at the subregional and landscape scales with all geographically isolated occurrences isolated from each other at spacings exceeding the dispersal range of the taxon, which has no specialised mechanism for long-distance dispersal.

It is estimated to have 2 locations, and has a continuing decline in (i), (ii), (iii), (iv) and (v) above as a result of the current and projected impact of the identified threats, such as targeted browsing by herbivores, habitat degradation, climatic drying, increased fire, and contraction of wetland habitat.

**Eligible under Criterion B2 as Endangered**

The Area of Occupancy (AoO) across the taxon's range is estimated to be 141 to 149 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, the lower bound estimate excludes Lake Mountain and Mt Buffalo records.

The taxon is estimated to be severely fragmented, to have 2 locations and has a continuing decline in (i), (ii), (iii), (iv) and (v) 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 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<br>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:<br>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

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: *Pultenaea fasciculata*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/b9bbfe67-d248-44aa-92f7-02b854ee60c6