Threatened Species Assessment

Persoonia subvelutina
Velvety Geebung

Taxonomy

Persoonia subvelutina L.A.S. Johnson

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 A2ce+3ce+4ce; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The taxon is a spreading shrub or small tree to 5 m high; young branches moderately to densely hairy. Leaves alternate to subopposite, narrowly elliptic to elliptic, oblanceolate to obovate or narrowly spathulate to spathulate, 3-8 cm long, 6-18 mm wide, discolorous, flat, moderately to densely hairy when young, sparsely to moderately hairy when mature, minutely scabrous; margins recurved to revolute, sometimes slightly incurved. Flowers solitary in axils of leaves; pedicels 1-4 mm long, erect, moderately to densely hairy. Tepals 11-15 mm long, apiculate to caudate, moderately to densely hairy, terminal spine to c. 1 mm long; anthers white; ovary glabrous. Drupe ovoid, to c. 14 mm long, c. 12 mm wide, green. Flowers summer (VicFlora 2017).

Vital Attributes for congenerics include a long-lived seedbank of 20 to >50 years; complete germination after fire; may resprout after fire, and 5-10 years to reproductive maturity (DELWP 2015).

Persoonia species have a persistent soil seedbank, capable of withstanding low-medium intensity fires, but there is some uncertainty about the degree of endocarp degradation through wet and dry cycles and fire (Emery and Offord 2018)

Generation Length

The generation length of *Persoonia subvelutina* is estimated to be 35 to 90 (midpoint 50) years. The taxon is inferred (from relevant congenerics of similar habit and habitat) to be a long-lived shrub or small tree which recruits episodically from a long-persistent soil-stored seedbank following intense fire events at pre-settlement intervals of 35-90 years or more. The taxon may resprout following low-intensity fire, although most fire events in the mountain forest habitat of the taxon are typically high-intensity fires which would kill most individuals. Episodic recruitment may be supplemented by some opportunistic recruitment in response to localised site disturbance events or exceptional seasons although these individuals are at greater risk of herbivory.

Distribution

The taxon is restricted to the north-east, for example between Bright and Mt Hotham and from Bogong Village to Falls Creek. It also occurs in NSW and ACT (VicFlora 2017).

Habitat

The taxon is apparently confined to shaded slopes in montane and subalpine forests (VicFlora 2017).

The taxon is frequently associated with tall open-forests dominated by *Eucalyptus delegatensis* (Alpine Ash), less frequently with *E. dalrympleana* (Mountain Gum) or *E. viminalis* (Manna Gum), sometimes extending into small stands of Cool Temperate Rainforest dominated by *Atherosperma moschatum* (Southern Sassafras) and *Leptospermum grandifolium* (Mountain Tea-tree). The taxon is sometimes associated with another local endemic *Acacia dallachiana* (Catkin Wattle). There is one record of the taxon in Snow Gum Woodland.

Threats

Velvety Geebung is threatened by increased fire intensity, frequency and landscape extent combined with climatic warming and drying, which increase the risk of recruitment failure due to repeat fire events at intervals approaching the tolerable fire interval (TFI) for the taxon and extreme and prolonged drought stress. Occurrences within Cool Temperate Rainforest are at particular risk due to the likely contraction of this habitat under climate change driven fire regimes.

Velvety Geebung is also likely to be affected by forestry operations in parts of its range, including through mechanical disturbance and regeneration burning.

Small and isolated stands may also be threatened by browsing by Sambar Deer (*Rusa unicolor*), particularly during the early stages of post-fire recruitment.

Spatial analysis of likely habitat for Velvety Geebung on all land tenures indicates that it occurs substantially within the Comprehensive, Adequate and Representative (CAR) reserve system, including parks, reserves and special protection zones in State forest. Likely habitat also occurs in areas available for timber harvesting, noting that further areas are excluded from harvesting by prescription under the Victorian Code of Practice for Timber Production 2014 (the Code) and that species-specific protections for Forest Geebung are included in Code. In recent years, modified harvesting and forest regeneration practices have been implemented in native forest that are designed to further mitigate the potential threat from forestry operations to threatened species and their habitats.

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 105 to 270 years is estimated to be 30 to 50%, based on (c) and (e) above. This is based on the historic impact of forestry operations, particularly in the valley of the Kiewa River West Branch, exacerbated in recent decades by the early impact of climate change and the recent increase in abundance of the exotic herbivore Sambar Deer throughout the North East region.

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

Eligible under Criterion A3 as Endangered

The population reduction over the next 100 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, all of which apart from forestry are projected to increase in intensity in coming decades.

Eligible under Criterion A4 as Endangered

The population reduction over any 105 to 270 year period, including both past and future (up to 100 years in the future), is estimated to be 30 to 90% (midpoint 60%), based on (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

This is based on the causes of past and future declines.

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 203 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas.

The taxon is estimated to be severely fragmented naturally at the landscape scale since forest birds which are likely to disperse seed are likely to be isolated within forested catchments separated by elevated ridgelines supporting Snow Gum woodland or alpine heathland or grassland.

Two locations can be identified: one for occurrences protected within the Alpine National Park and one for occurrences in state forest.

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

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 36 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, the taxon is severely fragmented, has 2 locations and 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 no available estimate of total population size for the taxon in Victoria, although it may be less than 1000 since scant quadrat data indicates that the taxon is typically of low density with projective foliage cover of only 1% at the quadrat scale and rarely exceeding 5%.

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

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

DELWP (2015) 'Victorian Flora Vital Attributes dataset'. Department of Environment, Land, Water and Planning, Victoria.

Emery NJ and Offord CA (2018) Managing *Persoonia* (Proteaceae) species in the landscape through a better understanding of their seed biology and ecology. *Cunninghamia* 18: 89-107.

VicFlora (2017) Flora of Victoria, Royal Botanic Gardens Victoria: *Persoonia subvelutina*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/7ae91394-1fe3-47b7-856a-01733a729cf2