Threatened Species Assessment

Pterostylis tunstallii
Granite Greenhood

Taxonomy

Pterostylis tunstallii D.L. Jones & M.A. Clem.

Other Scientific Names: *Bunochilus tunstallii* (Backhouse et al., 2016).

Current conservation status

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

Proposed conservation status

Endangered in Victoria

Criteria A2ace+3ce+4ace; B2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The taxon is a flowering plant 25-50 cm tall, stem leaves 5-7, spreading, linear-lanceolate, 2.5-8.5 cm long, 3-5 mm wide. Rosette leaves 3-5, ovate to elliptic, 1-4 cm long, 4-9 mm wide. Flowers 3-10, 0.7-1 cm long, shiny, pale translucent green with darker green stripes, sepal tips brown; galea decurved in the distal third; dorsal sepal with an acuminate apex; lateral sepals deflexed, conjoined part elliptic, 7-10 mm long, 5-7 mm wide, free points 3.5-4.5 mm long, slightly divergent; petals slightly falcate, basal flanges small, apex obtuse. Labellum oblong, 4-5 mm long, 2-2.5 mm wide, dark brown with a blackish basal mound and an inconspicuous broad blackish central stripe, covered with transparent, beaded or elongate cells and some acicular cells at base, apex attenuate, notched (VicFlora, 2018).

The taxon flowers from July to September. Flowering plants lack a basal rosette and have several long, pointed stem leaves, while non-flowering plants have a rosette of leaves often held several centimetres above the ground on a short stem. Species multiply largely or entirely by seed and vegetative reproduction seems to be rare (Backhouse et al., 2016).

Generation Length

The generation length of *Pterostylis tunstallii* is estimated to be 20 to 40 (midpoint 30) years. Generation time for non-colonial terrestrial orchids is estimated to be a nominal 30 years based on the annual replacement of the mother tuber by daughter tubers. Whilst somatically immortal, each individual is susceptible to endogenous exhaustion or environmental causes of mortality at rates likely to result in replacement at intervals of several decades only. Such orchids are classed as obligate seed regenerators (OSRs) reliant on seed-based recruitment for population maintenance.

Distribution

The taxon is scattered across southern Victoria east from Wilsons Promontory and with an isolated inland occurrence near Tallangatta. The taxon is patchily distributed from central and South Gippsland east to the NSW border. The taxon also occurs in NSW and Tasmania. The altitude ranges from 0-350 metres ASL (Backhouse et al., 2016; VicFlora, 2018).

The taxon was thought to be a rare orchid that was largely confined to granite hills. However, as orchid enthusiasts have become more familiar with the taxon, it is proving to be locally common in some areas of East Gippsland, where it occurs in both rocky areas and in forest lacking granite rock outcrops. The taxon is generally uncommon and sporadic in the west of its range, although the recent discovery of populations in central Gippsland north of Briagolong indicate it probably occurs elsewhere in Gippsland. Much of its likely habitat is poorly accessible, and it may also be overlooked or mistaken for the more common *Pterostylis melagramma* with which it grows at several sites (Backhouse et al., 2016).

Habitat

The taxon grows in moist areas of shrubby open-forest in coastal and near-coastal districts, often near granite rock outcrops, on sand or clay loams (VicFlora, 2018). In the west of its range, the taxon usually occurs amongst granite rocks and boulders, whilst in East Gippsland it occurs most commonly on slopes on well-drained, coarse sandy loam soils lacking rock outcrops (Backhouse et al., 2016).

Threats

Pterostylis spp. tend to be autumn flowering and flowering may be triggered by fire. In conditions following fire, the plants may be weakened, and the tubers stressed. The bushfires of 2019/2020 are believed to have impacted around 60% of the taxon's modelled habitat, as of early January 2020. The overall impacts of the fire are yet to be determined. The taxon is likely to be threatened by feral herbivores, notably Sambar Deer and soil and vegetation disturbance as a result of fire recovery activities. Drought, hot weather and repeat fires have the potential to damage or destroy recovering plants and/or seedlings.

The taxon is also threatened by climatic drying and warming, which are likely to reduce the success of flowering and seed set and increase the risk of recruitment failure in response to drought stress and herbivory by exotic herbivores, including slugs, snails, Red-legged Earth Mites, rabbits, and, potentially, feral deer.

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 60 to 120 years is suspected to be 30 to 50%, based on (a), (c) and (e) above.

Little is known of past distribution but the taxon's occurrence in damp areas in coastal and near coastal districts suggests that it would have suffered a historic decline due to land alienation. New colonies are still being discovered as the taxon becomes better known (Backhouse et al., 2016).

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 60 to 100 years is suspected to be 30 to 50%, 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 60 to 120 year period, including both past and future (up to 100 years in the future), is estimated to be 30 to 50%, based on (a), (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 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 Victorian Biodiversity Atlas.

The taxon is inferred to be severely fragmented naturally at both regional scale and landscape scales, with geographically isolated occurrences situated at separations typically exceeding the dispersal range of the taxon which is wind-dispersed at the kilometre scale.

It is estimated to have 4 locations. It 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:

Eligible under Criterion C as Vulnerable

It is estimated that there are 3,000 to 6,000 mature individuals. from DEWLP records and observations.

There is estimated to be a continuing decline of 30 to 50% within three generations.

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

It is estimated that there are 3,000 to 6,000 mature individuals.

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

References

Backhouse, G., Kosky, B., Rouse, D., and Turner, J. (2016). *Bush Gems: A Guide to the Wild Orchids of Victoria, Australia.* Melbourne, Victoria: EBook.

Clements, M. A. in Jones, D.L. (ed.) (1989), Catalogue of Australian Orchidaceae. Australian Orchid Research, 1, 128.

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: *Pterostylis tunstallii.* Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/7eede226-2c8f-43b8-bbaa-755d758124fc