Threatened Species Assessment

Pterostylis valida
Robust Greenhood

Taxonomy

Pterostylis valida (Nicholls) D.L. Jones

The taxon has a confused taxonomic history. In 1941, it was originally described as *P. squamata* var. *valida,* then in 1968 it was included with *P. boormannii*, although it does not resemble either taxa. In 1994 the variety name *valida* was raised to species level (Backhouse et al. 2016).

Current conservation status

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

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1998).

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

Proposed conservation status

Endangered in Australia

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

Species Information

Description and Life History

The taxon is a flowering plant to 20 cm tall, stem leaves 2-4, closely sheathing. Rosette leaves 8-14, ovate-lanceolate, 2-3 cm long, 6-12 mm wide, margins shortly ciliate. Flowers 2-6, porrect, 3-4 cm long, mostly green, sometimes with pale brownish suffusions, some transparent areas in the petals and galea; dorsal sepal with an upcurved filiform point 10-15 mm long; lateral sepals deflexed, conjoined part ovate in outline when flattened, shallowly concave, margins slightly incurved, densely ciliate, free points filamentous, 15-25 mm long, curved forwards, divergent, 1-2 cm apart at the tips; petals with a well developed proximal flange. Labellum ovate-oblong, 6-7 mm long, c. 2.5 mm wide, green, thick; marginal hairs in 8-12 pairs, 3-8 mm long, white, deflexed; basal lobe erect, with short sparse hairs. The taxon flowers from late October to early December (Backhouse et al. 2016; VicFlora 2015).

It is one of the tallest and largest flowered of the rustyhoods in Victoria. It is known to have flowered poorly, if at all, during the years of drought in the mid-1990s (Backhouse et al. 2016). It is a terrestrial deciduous herb, with a winter growing season, flowering in late spring (by which time the basal rosette has withered), and with a summer-autumn dormancy. Vegetative reproduction is rare in the 'rufa group' *Pterostylis*, and presumably only one replacement tuber is produced each season, with reproduction being almost entirely by seed. The pollinator is not known (SAC 1998).

Generation Length

The generation length of *Pterostylis valida* is estimated to be 20 to 30 years. Despite the potential for plants to flower annually, with a recorded rate of approximately 30% flowering, the plants may only have a pollination event every 10 years or so. 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 reliant on seed-based recruitment for population maintenance.

Distribution

The taxon is endemic to north central Victoria, where it occurs between Maldon and Charlton. The altitude range is from 200-400 metres above sea level (Backhouse et al. 2016). It was thought to be extinct until its rediscovery near Charlton in 2009, and it is now known from several sites and hundreds of plants (VicFlora 2015).

Habitat

The taxon grows on low, rocky hills in sparse, grassy woodland, including on hot dry exposed north and west slopes. It occurs on well-drained, shallow, gravelly loam soils, among emergent granite or sedimentary rocks (Backhouse et al. 2016; VicFlora 2015).

Threats

Subpopulations and habitat of the taxon are considered at risk from browsing pressure and increasingly dry conditions from declining rainfall, and the consequent increase in severity and intensity of bushfires. Very small subpopulations are highly susceptible to stochastic events causing major decline or local extinction within a very short time frame.

Other threats to the taxon include the effects of climate change, inappropriate management, and the lack of pollination. Additionally, the impacts of habitat fragmentation are still operating, and decline is likely to continue.

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 90 years is suspected to be 30 to 65%, based on (c), and (e) above.

The largest of the sites is currently a mining operation, where 50% habitat loss has been observed. Additionally, populations all occur in areas which have suffered due to climate change issues.

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

Eligible under Criterion A4 as Endangered

The population reduction over any 60 to 90-year period, including both past and future, is suspected to be 30 to 65%, based on (c) and (e) above. The causes of the reduction may not have ceased, be understood or be reversible.

Current active management is ensuring that populations are monitored, fenced for browsing pressure, and that the populations are augmented. Assuming these current management activities continue future decline in population size is unlikely, although climate change may have an undetermined impact.

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 616 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented considering its dispersal ability, the barriers to dispersal, and the lack of habitat separating individuals. There is a reduced probability of recolonisation should subpopulations become extinct.

It has a continuing decline in (i), (ii), (iii), (iv) and (v) above, based on habitat degradation due to climate change impacts and other identified threats.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 16 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

As above, the taxon is severely fragmented, 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:

Eligible under Criterion C2 as Vulnerable

It is estimated that there are 500 to 1,500 mature individuals. The taxon was originally known from Pigeon Hill near Maldon and was long thought to be extinct as it had not been seen for several decades. However, in 2009 it was rediscovered near Charlton, then found at two more sites near Wedderburn in 2010. Its rediscovery in 2009 and discovery at new sites in 2010 followed two years of exceptionally good rainfall in the region. At the three locations there are many hundreds of plants, perhaps over 1,000 in total (Backhouse et al. 2016).

The number of mature individuals is projected to continue to decline, and the number of mature individuals in one population is fewer than 1,000.

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 D as Vulnerable

It is estimated that there are 500 to 1,500 individuals, and 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

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

DEPI (2014). *Advisory list of rare or threatened plants in Victoria - 2014*. Department of Environment and Primary Industries, Melbourne.

SAC (1998). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 458 *Pterostylis valida.*

VicFlora (2015). Flora of Victoria, Royal Botanic Gardens Victoria: *Pterostylis valida*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/28eaf427-d81c-435d-a51b-9520e79f86c7