

## *Pterostylis maxima* Large Rustyhood

### Taxonomy

*Pterostylis maxima* M.A. Clem. & D.L. Jones

### Current conservation status

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

### Proposed conservation status

Critically Endangered in Victoria

Criteria A2ace+3ce+4ace

### Species Information

#### Description and Life History

The taxon is a flowering plant to 35 cm tall, stem leaves 4-6, closely sheathing. Rosette leaves 6-12, ovate to obovate, 2.5-4 cm long, 8-18 mm wide, margins minutely ciliate. Flowers 2-8, porrect or semi-erect, c. 1.5 cm long, mostly dark red-brown with some transparent areas on the galea; dorsal sepal with a decurved filiform point 6-12 mm long; lateral sepals deflexed, conjoined part ovate to elliptic in outline when flattened, concave, margins slightly incurved, densely ciliate, free points filamentous, 25-35 mm long, curved forward, more or less parallel, c. 10 mm apart at the tips; petals with a poorly developed proximal flange. Labellum obovate, 6-7.5 mm long, 3.5-4.5 mm wide, reddish-brown, thin-textured; marginal hairs 12-15 pairs, c. 0.5 mm long, white; basal lobe sloped backwards, with 2 prominent forward-pointing hairs c. 2.5 mm long. The taxon flowers from October to December (VicFlora 2015).

The taxon relies on good early winter rain to flower well, flowering sporadically or not at all in dry years.

#### Generation Length

The generation length of *Pterostylis maxima* 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, every 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 as they are reliant on seed-based recruitment for population maintenance.

#### Distribution

The taxon is confined to a small area in the goldfields region of north-central Victoria between Rushworth and Charlton. It is an uncommon taxon that whilst it seems to be confined to north central Victoria its precise distribution is uncertain due to confusion in identification with other similar rustyhood orchids. There are records of *P. maxima* from western, north-western and north-eastern Victoria, and even from just to the north and west of Melbourne (Plenty, Bacchus Marsh) (Backhouse *et al.* 2016). It also occurs in NSW and SA.

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### Habitat

The taxon grows in sparse open box ironbark forest, dry woodland, and mallee, on sandy loam to hard, gravelly, clay loam soils within an altitudinal range of 150-350 metres above sea level. (Backhouse *et al.* 2016; VicFlora 2015).

### Threats

There has almost certainly been a widespread decline in distribution and abundance of the taxon, given the extensive loss and degradation of habitat across its range, and the recent and historical loss of subpopulations.

The decline in habitat extent and condition is continuing, with ongoing declines in several remaining subpopulations and extensive disturbance of habitat at several subpopulation localities, especially from vehicle use, compounded by some rubbish dumping and weed invasion. There is also likely to be ongoing decline in habitat condition due to increasingly dry conditions from declining rainfall. Several very small subpopulations in the Bendigo urban area are likely to disappear. Very small subpopulations are highly susceptible to stochastic events causing major decline or local extinction within a very short time frame.

### 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%
<p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>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.</p> <p>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]</p> <p>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.</p> <p style="text-align: center;"><i>based on any of the following:</i></p> <p>(a) direct observation [except A3]</p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</p>			

### Evidence:

#### Eligible under Criterion A2 as Critically Endangered

The population reduction over the past 60 to 120 years is inferred to be 50 to 95%, based on (a), (c) and (e) above. Past decline is based on the loss of subpopulations and habitat.

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

#### Eligible under Criterion A3 as Critically Endangered

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The population reduction over the next 60 to 100 years is projected to be 35 to 80%, based on (c) and (e) above. Future decline is based on ongoing habitat degradation and declining plant numbers.

## Eligible under Criterion A4 as Critically Endangered

The population reduction over any 60 to 120 year period, including both past and future (up to 100 years in the future), is inferred to be 35 to 95%, 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 km <sup>2</sup>	< 5,000 km <sup>2</sup>	< 20,000 km <sup>2</sup>
B2. Area of occupancy (AOO)	< 10 km <sup>2</sup>	< 500 km <sup>2</sup>	< 2,000 km <sup>2</sup>
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 B as Endangered

The Area of Occupancy (AoO) is estimated to be 36 km<sup>2</sup>, based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

Any two of (a), (b) or (c) above are also satisfied.

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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 300 to 500 mature individuals based on sporadic surveys and VBA records.

There is estimated to be a continuing decline of 35 to 80% within two generations.

Criterion D. Very small or restricted populations		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 km <sup>2</sup> or number of locations ≤ 5

### Evidence:

#### Eligible under criterion D1 as Vulnerable

It is estimated that there are 300 to 500 individuals.

#### 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

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



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VicFlora (2015). Flora of Victoria, Royal Botanic Gardens Victoria: *Pterostylis maxima*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/e443eb68-338f-4c09-8a49-abfb42c5f586>