Threatened Species Assessment

Pterostylis smaragdyna
Emerald-lip Greenhood

Taxonomy

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

Other Scientific Names; *Bunochilus smaragdynus* (Backhouse *et al*. 2016).

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 A2ace+4ace

Species Information

Description and Life History

The taxon is a flowering plant to 40 cm tall, stem leaves 5-7, spreading, linear-lanceolate, 2-10 cm long, 3-6 mm wide, dark green. Rosette leaves on a separate plant, 3-5, narrowly ovate to lanceolate, 10-35 mm long, 4-8 mm wide. Flowers 1-10, 1.7-2.2 cm long, shiny, translucent green with dark green stripes and suffusions; dorsal sepal with a short apical point; lateral sepals deflexed, conjoined part narrow elliptic, 16-19 mm long, 7-8 mm wide, free points 3-4 mm long, parallel; petals slightly falcate, with a well-developed basal flange. Labellum oblong, 7-8 mm long, 3.5-4 mm wide, emerald green with a darker green basal mound and central stripe, occasionally brownish green, covered with numerous, short, transparent, bead-like cells, longer and hair-like at base and along margins, apex attenuate, notched (VicFlora, 2018).

The taxon flowers from May 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 smaragdyna* 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 as they are reliant on seed-based recruitment for population maintenance.

Distribution

The taxon is patchily distributed from north-eastern to western Victoria, between Wangaratta and Stawell, and south to near Melbourne and Anakie. The taxon also occurs in SA and NSW (Backhouse *et al*., 2016). While the taxon is apparently localised in Victoria (e.g., outer north-eastern suburbs of Melbourne, Brisbane Ranges, Ararat), its exact range is uncertain due to confusion with allied species (VicFlora 2018).

Habitat

The taxon grows in drier open forests and woodlands on well-drained, shallow clay loam, sometimes gravelly soils across an altitudinal range of 95-450 metres above sea level (Backhouse *et al*. 2016; VicFlora 2018).

Threats

The taxon was locally common in the outer north-eastern suburbs of Melbourne, but many populations have been lost to urban development, and those remaining are at great risk (Backhouse *et al*., 2016).

Subpopulations in north-east Melbourne region are highly threatened by urban development and recreational pressures, though it is conserved and less threatened in other areas of its range. The decline is likely to be gradual from ongoing habitat decline and loss. Additional future decline is likely to be driven by climate change.

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 inferred to be 25 to 50%, based on (a), (c) and (e) above.

The taxon was locally common in the outer north-eastern suburbs of Melbourne, but many subpopulations have been lost to urban development (Backhouse *et al.* 2016). Subpopulations outside of Melbourne would have suffered a historic decline due to land alienation.

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

Eligible under Criterion A2 as Vulnerable

The population reduction over the next 60 to 100 years is inferred to be 10 to 50% (midpoint 30%), based on (a), (c) and (e) above.

Development and recreational pressures threaten Melbourne suburban subpopulations, whilst climate change threatens these and those subpopulations outside Melbourne.

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.

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:

Ineligible under Criterion B

The Extent of Occurrence (EoO) across the taxon's range, based on accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA), is estimated to be 48,131 km² which exceeds the threshold for criterion B.

The Area of Occupancy (AoO) across the taxon's range, based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA, is estimated to be 200 km² but other thresholds under this criterion have not been met.

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 4,500 to 9,000 mature individuals, based on DELWP records and observations.

There is estimated to be a continuing decline of 10 to 50% (midpoint 30%) 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 4,500 to 9,000 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.

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

Jones, D.L. and Clements, M.A. (1993), New species of *Pterostylis* R.Br. (Orchidaceae) from Victoria and New South Wales. Muelleria 8(1): 82.

VicFlora (2018). Flora of Victoria, Royal Botanic Gardens Victoria: *Pterostylis smaragdyna.* Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/1a2564c2-e107-49e8-8402-403d26392190