

## *Pterostylis alveata* Coastal Greenhood

### Taxonomy

*Pterostylis alveata* Garnet

Synonym: *Pterostylis crypta*, considered a petaloid form of *Pterostylis alveata* (Backhouse et al. 2016).

The taxon differs from *P. atrans* in the shorter filiform point on the dorsal sepal, slight v-notch in the sinus of the lateral sepals and green petals (brown in *P. atrans*) (VicFlora 2015).

In Backhouse et al. (2016), the inland plants of *Pterostylis alveata* are treated as a separate taxon (description below) though most authorities place them together (VicFlora 2015).

*Pterostylis* 'foothill forest' Hill Greenhood (Backhouse et al. 2016): The Hill Greenhood is a poorly known taxon of uncertain taxonomic status. It is very similar to *Pterostylis alveata*, from which it is distinguished by the more deeply v-notched but less protruding sinus. It also has different habitat preferences, being found almost entirely in moist foothill forest rather than coastal scrubs. It also begins to flower earlier than *P. alveata*, even though it generally occurs at a higher altitude, and has pretty much finished flowering by the time *P. alveata* is in peak flower, although there is a considerable overlap in flowering time (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

Vulnerable in Victoria

Criterion A2ace+4ace; D2

### Species Information

#### Description and Life History

The taxon has a flowering stem to 20 cm tall, stem leaves 3-5, spreading. Rosette leaves 2-5, ovate, 1-2.5 cm long, 5-15 mm wide, petiolate, margins flat or crisped. Flower 12-15 mm long, erect, green and white, shiny; dorsal sepal with a filiform point c. 5 mm long; lateral sepals erect, tightly embracing the galea, sinus flat, with a small central notch, protruding prominently when viewed from the side, free points 12-15 mm long, filiform, erect; petals green, margins not flared. Labellum oblong to oblong-elliptic, 8-10 mm long, 2-3 mm wide, red-brown towards the apex, the tip slightly protruding above the sinus in the set position (VicFlora 2015).

The coastal form flowers from April to July, and the foothill forest form flowers from February to May. Like many cauline greenhoods, generally only a small proportion of a population will flower. The main flowering period is in late autumn and early winter but in years of good late summer rains the taxon can commence flowering in early March. In group 2, cauline greenhoods, only non-flowering plants have a rosette of leaves, while flowering plants lack a basal rosette (Backhouse et al. 2016).

#### Generation Length

The generation length of *Pterostylis alveata* 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 found mostly in near-coastal areas east of Melbourne (VicFlora 2015). The taxon occurs in a range of biological reserves including Wilsons Promontory National Park (NP), Lakes NP, Snowy River NP, and Croajingalong NP.

The coastal form occurs in eastern Victoria east from Wonthaggi to the New South Wales (NSW) border, on or near the coast. The altitude ranges from 5-50 metres above sea level. This form also occurs in NSW and New Zealand. The foothill forest form is apparently confined to the coast and hinterland of East Gippsland, east from Bruthen. The altitude ranges from 15-350 metres above sea level.

## Habitat

*P. alveata* occurs in coastal woodland and scrub on stabilized dunes (VicFlora 2015). The coastal form grows in shady areas in dense coastal scrubs, heath, and heathy woodland, on well drained, sandy to sandy loam soils. The foothill forest form grows in grassy areas in moist foothill forest, on sandy to clay loam soils (Backhouse *et al.* 2016).

## Threats

At some sites along the coast, the Coastal Greenhood is threatened by recreational activities and coastal development. Some sites are stressed by coastal recreation activity, such as beach tracks or coastal camp sites intruding onto populations. However, overall, the taxon is well-conserved in reserves.

A large population in Wilsons Promontory National Park was recently destroyed during fire protection works there (Backhouse *et al.*, 2016). The bushfires of 2019/2020 are believed to have impacted around 6% of the taxon's modelled habitat as of early January 2020, however the overall impacts of the fire are yet to be determined. The taxon is potentially threatened by climate change-driven increases in fire frequency and intensity. Drought, hot weather, and repeat fires have the potential to damage or destroy recovering plants and/or seedlings.

The taxon is likely to be threatened by feral herbivores, notably Sambar Deer (*Rusa unicolor*) and soil and vegetation disturbance from fire recovery activities (e.g., machinery impacts, removal of hazardous trees).

## 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>based on any of the following:</p> <ul style="list-style-type: none"> <li>(a) direct observation [except A3]</li> <li>(b) an index of abundance appropriate to the taxon</li> <li>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</li> <li>(d) actual or potential levels of exploitation</li> <li>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</li> </ul>			

## Evidence:

### Eligible under Criterion A2 as Vulnerable

The population reduction over the past 60 to 120 years is estimated to be 25 to 45%, based on (a), (c) and (e) above.

This is based on degradation and loss of habitat due to coastal recreation usage, and the impacts of feral herbivores.

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

### Eligible under Criterion A4 as Vulnerable

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 20 to 40%, based on (a), (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

Past decline is based on loss of habitat and the impacts of feral herbivores. Overall, most populations are well-conserved, however, the taxon is likely to be threatened by habitat loss due to bushfire, the impacts of feral herbivores, fire recovery activities, and potentially drought affecting recruiting and recovering plants.

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:**

**Ineligible under Criterion B**

The Area of Occupancy (AoO) across the taxon's range is estimated to be 111 km<sup>2</sup>, 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 <u>C1</u> or <u>C2</u>				
<u>C1</u>	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)	
<u>C2</u>	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**

It is estimated that there are 70,000 to 140,000 mature individuals, which exceeds the thresholds for criterion C.

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 km <sup>2</sup> or number of locations ≤ 5

## Evidence:

### Eligible under criterion D 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.

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](https://www.environment.vic.gov.au/__data/assets/pdf_file/0021/50448/Advisory-List-of-Rare-or-Threatened-Plants-in-Victoria-2014.pdf)

Garnet, J. R. (1939). A new species of the genus *Pterostylis*. *The Victorian Naturalist*, 56, 91.

VicFlora (2015). Flora of Victoria, Royal Botanic Gardens Victoria: *Pterostylis alveata*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/dca8d7de-8799-433a-9865-86bf9eb2a70>