

Pterostylis cucullata subsp. *cucullata* Leafy Greenhood

Taxonomy

Pterostylis cucullata subsp. *cucullata* R. Br.

Two subspecies of *P. cucullata* have been described: subsp. *cucullata* and subsp. *sylvicola* (Jones 2006). Subspecies *sylvicola* differs from nominate subsp. *cucullata* by its generally taller habit (to 25 cm tall), leaves usually extending up the scape, and slightly smaller flower on a longer pedicel, with the upper bract well separated from the flower (Duncan 2010).

The habitat of *P. cucullata* subspecies is generally distinct, with subsp. *cucullata* occurring in coastal and nearcoastal habitats (except for the population at Mt Eccles in western Victoria), whereas subsp. *sylvicola* occurs in foothill and montane habitats well away from the coast (Duncan 2010).

Current conservation status

Listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* as *Pterostylis cucullata*.

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* as *Pterostylis cucullata* (SAC 1991).

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

Proposed conservation status

Endangered in Victoria

Criterion B2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

Pterostylis cucullata is a perennial, terrestrial orchid emerging annually from an underground tuber. It has a stem-encircling basal rosette of 5-7 leaves. A greenish flower stem to 25 cm tall bears several large leafy bracts and a single, large white, green, and reddish-brown flower. The dorsal sepal and petals are combined to form a galea which is erect for three quarters of its length and then curved forward in a semi-circle, ending in a blunt point. The lateral sepals are erect and joined at the base, the free points embracing the galea. The labellum is brown and just visible above the sinus (Duncan 2010).

P. cucullata subsp. *cucullata* has a flower stem 5-12 cm tall; leaves in a basal rosette; uppermost bract closely subtending flower; coastal and near coastal habitats, often on dunes. The taxon flowers from August to October (VicFlora 2019).

Little is known of the ecology of *Pterostylis cucullata*. It is dormant during the drier summer months, then dormancy is broken in response to autumn/winter rains, with leaves emerging and growing throughout the winter and early spring. Flowering occurs from August to December, depending upon altitude, with coastal plants flowering first and plants in montane populations flowering later. Plants reproduce mainly from seed, with limited vegetative propagation occurring. Pollination is probably by small flying insects such as gnats, flies, or mosquitoes. Fruits usually take 5-8 weeks to mature following pollination. Each mature capsule may contain tens of thousands of microscopic seeds that are dispersed by the wind when the capsule dries out and splits (Duncan 2010).

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Generation Length

The generation length of *Pterostylis cucullata* subsp. *cucullata* 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

Pterostylis cucullata is widely distributed but disjunct, mostly occurring in small groups in coastal areas, sometimes near inland watercourses (VicFlora 2018).

In Victoria, subsp. *cucullata* occurs in the coastal strip between Nelson in the west and Bairnsdale in the east (with one population inland at Mt Eccles in the south-west), in the Southeast Coastal Plain, Naracoorte Coastal Plain and Victorian Volcanic Plain IBRA bioregions. The taxon also occurs in Tasmania and South Australia (Duncan 2010). The altitude ranges from 5 to 100 metres above sea level (Backhouse et al., 2016). Habitat

The lowland subsp. *cucullata* occurs in Coast Tea-tree (*Leptospermum laevigatum*) or Moonah (*Melaleuca lanceolata*) coastal scrubs on stabilised sand dunes, with an open understorey and grassy and herbaceous groundcover on seasonally damp but deep, well-drained humus rich sandy loam soils. The Mt Eccles population of subsp. *cucullata* occurs in Brown Stringybark (*Eucalyptus baxteri*) and Manna Gum (*E. viminalis*) forest with a grassy groundcover (Backhouse et al. 2016; Duncan 2010).

Threats

Subsp. *cucullata* was once abundant along the coast but is now much rarer, with many populations lost to development, especially around Port Phillip Bay, where few populations remain. Several remaining large populations occur private land (Backhouse et al. 2016).

Habitat loss for agriculture and urban development has been the primary cause of the decline of *P. cucullata*, especially in coastal areas. There are historical records of this taxon from localities where it no longer occurs (Frankston, Seaford, Nelson, Queenscliff, Rosebud, Rye and Sorrento). In particular, the taxon must have once been abundant along the eastern side of Port Phillip Bay, between Melbourne and Portsea, with many records from this region, but this area has suffered extensive loss of habitat from urban development.

Flowers and fruits of *P. cucullata* are likely to be highly palatable and are frequently lost to predation. The taxon is subject to grazing by native (kangaroos, wallabies, wombats) and/or introduced herbivores (cattle, rabbits, hares) or invertebrates (snails) is a serious threat at many sites. In Victoria, the introduced Mediterranean Snail (*Microxeromagna vestita*), rabbits and possibly macropods threaten many populations.

Weed invasion is a major threat to many populations of *P. cucullata*, a reflection of extensive clearing and large edge effects, urban development, garden escapes and invasion from pastures (Duncan, 2010). Weeds include introduced grasses *Briza maxima*, *Ehrharta erecta* and *Stenotaphrum secundatum*, Myrtle-leaf Milkwort (*Polygala myrtifolia*), Boneseed (*Chrysanthemoides monilifera*), Bridal Creeper (*Asparagus asparagoides*), Freesia (*Freesia alba* X *F. leichtlinii*), Ivy (*Hedera helix*), Sweet Pittosporum (*Pittosporum undulatum*) and Periwinkle (*Vinca major*).

Flowering rates may be reduced by increased drought. Although this may not cause mortality, it does reduce opportunities for pollination, seed development and subsequent recruitment (Duncan 2010). Whilst there are some important populations reserved in national parks, many groups of the taxon occur on private property, where their future is not secure.

Disturbance to, or destruction of, plants and habitats remains a major risk throughout the range of *P. cucullata*, from impacts such as land development, damage from recreational users, stock trampling and road maintenance works. Accidental trampling by walkers and/or disturbance caused by track maintenance activities is a threat at Mornington Peninsula National Park. Rubbish dumping is an existing problem at the Cape Schanck roadside and Tootgarook reserve and private property sites. Accidental disturbance caused by road/track maintenance and/or weed spraying activities is a threat at the Wilsons Promontory National Park.

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There is a risk of extinction due to the small group sizes at many sites, and the highly fragmented distribution of the known populations, leading to low genetic diversity. Inappropriate fire regimes, especially frequent or poorly timed fires, are thought to be detrimental to the taxon (Quarmby, 2009).

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 Vulnerable

The population reduction over the past 60 to 120 years is estimated to be 40%, based on (a) and (c) above.

Many populations have been lost to development, especially around Port Phillip Bay, where few populations remain (Backhouse et al., 2016).

Eligible under Criterion A3 as Vulnerable

The population reduction over the next 60 to 100 years is projected to be 30%, based on (c) above.

Future decline is based on a range of ongoing threats outlined by Duncan (2010), specifically those associated with ongoing coastal development and use.

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 35%, based on (a) and (c) above.

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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 ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
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 144 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas.

Considering the limited dispersal ability of the taxon, the barriers to dispersal, or lack of habitat separating them, the subpopulations can be considered to be severely fragmented. This limits the probability of recolonisation if subpopulations were to go extinct.

It is estimated to have five locations, each of which is impacted by similar threats but these may operate at different timescales and intensities.

It has a continuing decline in (i), (ii), (iii), (iv) and (v) above, based on the current and projected identified threats.

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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:

Ineligible under Criterion C

It is suspected that there are 8,000 to 16,000 mature individuals, based on population counts from Duncan (2010) and observations, but this qualifier is too weak to satisfy the criterion

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 ² or number of locations ≤ 5

Evidence:

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

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