Threatened Species Assessment

Pterostylis woollsii
Long-tail Greenhood

Taxonomy

Pterostylis woollsii Fitzg.

Current conservation status

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

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

Proposed conservation status

Critically Endangered in Victoria

Criteria A2ac+3c+4ac; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v); C1+2a(i,ii); D

Species Information

Description and Life History

The taxon is a flowering plant to 45 cm tall, stem leaves 2-5, closely sheathing. Rosette leaves 6-10, 1.5-4 cm long, 8-20 mm wide, broadly ovate-lanceolate, margins entire. Flowers 1-6, porrect to semi-erect, c. 3.5 cm long, transparent with green and reddish tonings; dorsal sepal with an upcurved filiform point 1.5-2 cm long; lateral sepals deflexed, conjoined part broadly ovate in outline when flattened, shallowly to deeply concave, margins strongly incurved, ciliate, free points long-filiform, 10-13 cm long, deflexed, parallel to divergent, 15-30 mm apart at the tips; petals with a poorly developed proximal flange. Labellum elliptic to obovate, 12-15 mm long, 3-4 mm wide, reddish brown, thin-textured, apex beaked; marginal hairs 8-10 pairs, c. 3 mm long; basal lobe extended backwards, c. 3 mm long, with a single erect pair of hairs c. 6 mm long at the base and another pair c. 2 mm long at the apex. The taxon lowers from October to December (VicFlora, 2015).

Flowering is dependent upon good winter and spring rains, with plants flowering sporadically or not at all in dry years. The taxon does not form colonies, unlike other species of *Pterostylis*, so that continuing and repeated demands are made on wild populations by orchid collectors.

Generation Length

The generation length of *Pterostylis woollsii* 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 (OSRs) reliant on seed-based recruitment for population maintenance.

Distribution

The taxon is known from a single site near Rushworth in north-central Victoria, at 150 metres above sea level. (Backhouse et al., 2016).

Habitat

The taxon is found growing on southerly aspects in low-lying, exposed stony or gravelly well-drained clay loam soils with ironstone components. The soil dries almost rock hard by flowering time. The open-scrub habitat is dominated by mature *Eucalyptus behriana* (Bull Mallee), *Eucalyptus macrocarpa* (Grey Box) and *Eucalyptus sideroxylon* (Red Ironbark). The shrub layer consists of scattered *Cassinia uncata* (Sticky Cassinia), *Acacia montana* (Mallee Wattle) and *Pultenaea* spp. (Bush-peas). *Danthonia* spp. (Wallaby Grasses) and other herbs make up a sparse field layer (Backhouse et al., 2016); SAC, 1989).

Threats

Although the habitat is now protected, plant numbers have declined through disturbance, alien grasses and increasingly dry conditions from declining rainfall. Very small subpopulations are highly susceptible to stochastic events causing major decline or local extinction within a very short time frame.

The site of *P. woollsii* south of Rushworth is State Forest and zoned for Eucalyptus oil production. Though this site lacks the key oil species *(Eucalyptus polybractea)*, considerable threats still arise from nearby operations. Oil production operations have caused increased runoff, leading to soil deposition and gully erosion near the population. Soil disturbance caused by associated activities has enabled the invasion and establishment of the alien grasses Briza and Aira. The taxon has become a target for illegal orchid collectors, who have removed many plants in recent years. The taxon is threatened as a result of its rarity and, in the opinion of the SAC, one small known population could have easily been wiped out by collecting (SAC, 1989).

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 Critically Endangered

The population reduction over the past 60 to 120 years is inferred to be 80 to 99%, based on (a) and (c) above.

Past decline is based on recent subpopulation declines and habitat loss. The taxon was only ever known from a single subpopulation. There has been a recent decline in plant numbers, from about 100 plants 25 years ago, to fewer than 20 now.

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

Eligible under Criterion A3 as Critically Endangered

The population reduction over the next 60 to 100 years is projected to be 80 to 100%, based on (c) above.

A population of just 2 plants is highly unlikely to survive without management intervention. The remaining plants are highly susceptible to stochastic events causing major decline or local extinction.

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 80 to 100%, based on (a) and (c) 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 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 Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 4 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas. The EoO has been made equal to the AoO to ensure consistency with the definition of AoO as an area within EoO.

It is estimated to have 1 location. It has a continuing decline in (i), (ii), (iii), (iv) and (v) above.

Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 4 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it has 1 location 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 C as Critically Endangered

It is estimated that there are 10 to 20 mature individuals, based on sporadic surveys and VBA records.

There is an estimated continuing decline of 80 to 100% within one generation.

The number of mature individuals is inferred to continue to decline, the number of mature individuals in each subpopulation is 50 or fewer and the percentage of mature individuals in one subpopulation is 90-100 %.

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 Critically Endangered

The taxon is estimated to have 10 to 20 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.

SAC (1991). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Flora and Fauna Guarantee, Nomination No. 103 *Pterostylis woollsii.*

VicFlora (2015). Flora of Victoria, Royal Botanic Gardens Victoria: *Pterostylis woollsii.* Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/c570de71-fed8-4645-b409-c1e9483289ca