Threatened Species Assessment

Prasophyllum diversiflorum
Gorae Leek-orchid

Taxonomy

Prasophyllum diversiflorum Nicholls

Current conservation status

Listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999*.

Listed as threatened under the *Flora and Fauna Guarantee Act 1988*.

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

Proposed conservation status

Critically Endangered in Victoria

Criteria A2ace+3ce+4ace; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The taxon has a flowering stem 30-60 cm tall. Leaf-blade to 15 cm long and 4-10 mm diam. at base, mostly green, apex lax. Flowers 10-40, greenish with brownish markings, fragrant, in a moderately crowded spike 8-15 cm long; ovary obovoid, to 4 mm long; sepals 6-9 mm long, dorsal sepal ovate-lanceolate, acuminate, striated, lateral sepals free, divergent, lanceolate, erect, margins strongly incurved, tips bidentate; petals linear, 6-9 mm long, incurved or spreading, apex pale, acute to obtuse. Labellum on a short broad claw, white to pinkish, ovate, 6-9 mm long, concave throughout, margins crisped or undulate, compressed near bend; callus tongue-shaped, greenish, channelled, thickest at the bend, but extending well beyond, often verrucose. Column appendages pale, hatchet-shaped, to 3 mm long. The taxon flowers from December to January (VicFlora 2015).

The taxon is a deciduous terrestrial orchid that emerges annually from a subterranean, spherical tuber after sufficient late autumn rains. A leaf emerges during the winter months and if sufficient moisture is present a flower is initiated in spring. Peak flowering is generally during early to late December dependant on season. When the plant is flowering the opening of the individual flowers is from the centre of the flower spike to the outside. The plant produces seeds after pollination by native bees or wasps. After pollination the flowers quickly form seedpods, mature and then dehisce over the next 3-4 weeks. The seed is dispersed by wind and lies on the ground until favourable conditions the following Autumn. Seed production can be prolific but there is possibly a high mortality rate of the seed dispersed. It is possible that the species can be propagated but, like many orchids, this is complicated by the interrelationship with soil fungi, insects and other organisms. Even if propagation is successful it may be extremely difficult to reintroduce the species into the wild to form self-sustaining populations. The taxon appears to require seasonal inundation, which may also be the stimulus for flowering and germination. The seasonal inundation also influences the growth phases of the species. It appears that the taxon may be compatible with light grazing.

Generation Length

The generation length of *Prasophyllum diversiflorum* is estimated to be 40 to 50 years. The generation time for non-colonial terrestrial orchids is estimated 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 that are likely to result in replacement at intervals of several decades only. Such orchids are classed as obligate seed regenerators (OSRs), meaning they are reliant on seed-based recruitment for population maintenance.

Distribution

The taxon is endemic to south-western Victoria, occurring in the south-west between Glenthompson and Hotspur. The altitude ranges from 80-300 metres above sea level. The taxon is known from just three small populations, all occurring on roadsides with two extending onto adjoining private land.

The taxon was first collected at Gorae West near Portland in 1941. This population was lost to agricultural development in 1948. It was rediscovered during the summer of 1983-84 on a narrow road reserve and on the adjoining private land near Hotspur. A new population has since been discovered, on private land near Glenthompson. The known range extends from Glenthompson in the east to Hotspur in the west, a distance of 90 kilometres apart. A further population in Cobboboonee State Forest and one at Lake Condah are still to be located and confirmed.

Habitat

At the type locality, the taxon grew along watercourses and around swamps on heavy black loams in open forest. The new populations grow in heavy clay soils, and in wet areas in Western Basalt Plains Grassland. The habitat and associated species present vary, but both sites are seasonally inundated. The population on the road reserve and adjoining private land near Hotspur is on river floodplain consisting of heavy basalt clay soils. Associated species present on the road reserve site include *Themeda triandra, Poa labillardierei* tussocks and a scattering of *Leptospermum lanigerum. Poa* tussocks dominate the private land adjoining this site. The Glenthompson site on private land is the largest site, with the orchid scattered over an area of 5 hectares. Higher numbers occur in the wetter areas. The site is a native grassland remnant containing over 61 indigenous species and occurs on brown basalt loam.

Threats

Subpopulations and habitat are considered at risk from disturbance, weed invasion and increasingly dry conditions from declining rainfall. In addition, very small subpopulations are highly susceptible to stochastic events causing major decline or local extinction within a very short time frame.

Extensive Eucalyptus plantations have been established around the Hotspur site and there are fears that water tables and run-off may be reduced, drying the site of the largest remaining population. One site is grazed by domestic stock, one roadside has had illegal stock movement and grazing on it, and all sites are at constant threat from weed invasion.

Priority weeds include Phalaris (*Phalaris aquatica*), oxtongue thistle (*Helminthotheca echioides*), Paspalum (*Paspalum dilatatum*), Spiny Rush (*Juncus acutus*), sweet vernal grass (*Anthoxanthum odoratum*), harlequin flower (*Sparaxis bulbifera*), wild carrot *(Ammi majus)*, and radiata pine (*Pinus radiata*). Other threats include smothering by native *Themeda triandra* and *Poa* spp.; fertiliser and herbicide application from adjacent farmland; grazing and trampling (by stock within the paddock or being driven along the roadside); vehicle movement; road works; altered management regimes and altered hydrological regimes. A new threat is the emergence of Blue Gum plantations being established in the area of the orchid's habitat. These have the potential to alter hydrology and land use in the Condah Rd. site.

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 120 to 150 years is inferred to be 95 to 99%, based on (a), (c) and (e) above.

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

The taxon was once much more widespread and abundant but has suffered an extensive decline through almost total loss and degradation of its habitat.

Eligible under Criterion A3 as Critically Endangered

The population reduction over the next 100 years is projected to be 75 to 95%, based on (c) and (e) above.

Both subpopulations occur on roadsides and private land, and the habitat is not secure. The numbers of plants in both subpopulations are declining and the taxon is at high risk of extinction in the near future.

Eligible under Criterion A4 as Critically Endangered

The population reduction over any 120 to 150 years period, including both past and future (up to 100 years in the future), is inferred to be 75 to 99 %, based on (a), (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

The taxon was once much more widespread and abundant but has suffered an extensive decline through almost total loss and degradation of habitat. The numbers of plants in both subpopulations are declining and the taxon is at high risk of extinction in the near future.

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 8 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented and is estimated to have 1 location. It has a continuing decline in (i), (ii), (iii), (iv) and (v) above, based on the current and projected impact of the identified threats.

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.

Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 8 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

As above, the taxon is estimated to be severely fragmented, 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 Endangered

It is estimated that there are 250 to 350 mature individuals. The taxon is known from just 2 subpopulations, with fewer than 350 plants remaining.

The number of mature individuals is inferred to continue to decline, and there is a projected decline of 75 to 95% within two 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:

Eligible under Criterion D as Vulnerable

It is estimated that there are 250 to 350 mature individuals.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

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