Threatened Species Assessment

Prasophyllum frenchii
Maroon Leek-orchid

Taxonomy

Prasophyllum frenchii F. Muell.

The taxon is very variable. It is closely related to *Prasophyllum diversiflorum*, which has narrower flowers with a laterally compressed labellum, a larger callus plate and hatchet-shaped column appendages and to *P. litorale*, which has short, dense flowering spikes (hardly exserted from the leaf) and a more crenate labellum margin (VicFlora, 2018).

P. frenchii was described by von Mueller in 1889, based on plants collected east of Melbourne (between the Yarra River and the Dandenong Ranges). However, the identity of *P. frenchii* was only relatively recently determined in relation to the closely related *P. hartii*, under which name many Victorian *P. frenchii* populations were commonly referred to for many years (Backhouse & Jeanes, 1995; Duncan, 2010).

P. frenchii differs from following below taxa (below text inserted from Backhouse et al., 2016): "*Prasophyllum litorale*, which occurs in south-western Victoria, grows in drier habitats, flowers later and is shorter with larger flowers with a narrower labellum with a much smaller callus plate longer and less widely spreading lateral sepals. *Prasophyllum niphopedium*, which occurs in the mountains of eastern Victoria, flowers later, is usually shorter and has a longer, narrower labellum and longer but only narrowly spreading lateral sepals."

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* (SAC 1997).

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

Proposed conservation status

Endangered in Victoria

Criteria A2ac+3c+4ac; B2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The taxon has a flowering stem, usually robust, 15-60(-100) cm tall. Leaf-blade to 20 cm long, 5-10 mm diam. at base, green, apex lax, often withered at flowering. Flowers 20-65, fragrant, green to reddish brown or red, subsessile in a loose to quite dense spike which is well exserted from the leaf; ovary ovoid, 3-5 mm long, green, standing out from the rachis; sepals 5-8 mm long, dorsal sepal ovate, lateral sepals free, lanceolate, nearly parallel, erect to recurved; petals 6-7 mm long, oblong-elliptic, blunt. Labellum trullate, 5-6 mm long, green or red-tinted, recurved at right angles past the middle; base pouched, swollen, thick-textured with incurved margins, margins slightly crinkled; apex triangular, subacute, entire; callus plate much-raised, horseshoe-shaped just beyond bend, verrucose. Column appendages oblong, to 2.2 mm long, obtuse. The taxon flowers from October to November (VicFlora, 2018).

Very little is known of the biology and ecology of this taxon. The single leaf emerges in late autumn, following the onset of seasonal rains. Flowering commences in late October and is usually completed by late November in populations around Melbourne and Gippsland. In populations in southwest Victoria and South Australia, flowering

commences in late November and is completed by late December. About four weeks after flowering finishes, the leaf has shrivelled, and if pollination has occurred, the seed capsule is ripening. The taxon survives the dry summer and early autumn as a dormant tuber that is replaced yearly. The pollinator is unknown, but many *Prasophyllum* species are visited by a range of insects such as bees, wasps, beetles and ants, attracted to the flowers by strong perfumes and/or rewards of nectar (Backhouse & Jeanes, 1995), so the taxon may not have a specific insect pollinator. A few *Prasophyllum* species appear to be primarily self-pollinating (Backhouse & Jeanes, 1995). The taxon usually flowers well in the absence of fire, but at some grassland sites, occasional hot summer fires promote flowering of dormant plants. These fires are probably necessary to prevent thick swards of grass (e.g., Kangaroo Grass) from developing, which can inhibit orchid flowering (Duncan, 2010).

Generation Length

The generation length of *Prasophyllum frenchii* is suspected to be 20 to 40 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) that are reliant on seed-based recruitment for population maintenance.

Distribution

The taxon is widely but sporadically distributed right across southern Victoria, mostly in the lowlands but with rare occurrences in the foothills. The altitude ranges from 0-680 metres above sea level. It also occurs in South Australia and New South Wales (Backhouse & Jeanes, 1995; VicFlora, 2018).

The taxon was formerly more widespread in south-eastern Australia, but it has suffered a substantial decline in range and abundance. The taxon has disappeared from many locations including Kentbruck, Gorae West, Poolagielo and Surrey River in southwest Victoria, Beaconsfield, Boronia, Brighton, Dandenong Creek, North Croydon and Officer in eastern Melbourne, Bairnsdale, Woodside and Mallacoota in Gippsland. The taxon has not been seen at the Wilsons Promontory or Mt. Clay sites for about 20 years, and it is probably extinct at these sites (Duncan, 2010).

Habitat

The taxon occurs in grassland, heathland and open forest on well-drained or water-retentive sandy to black clay loams that are generally damp but well drained, although some sites are seasonally waterlogged (Backhouse et al., 2016; Duncan, 2010; VicFlora, 2018). Specifically, the sites include the seasonally damp transition zone on the margins of shallow freshwater marshlands. Little is known of specific habitat requirements, and some sites have been disturbed by periodic fire or stock grazing (Duncan, 2010).

Threats

The taxon is widely distributed across southern Victoria, but it now occurs as small, isolated, highly disjunct populations. Most of these occur in small patches of remnant habitat, such as along road and rail reserves, where they are at great risk from weed invasion and habitat disturbance. Much of the taxon's former habitat has been cleared, and the few remaining populations are generally declining (Backhouse et al., 2016).

The main reason for the decline of the taxon is the loss and degradation of its grassland and grassy woodland habitat across its range, principally for agriculture. Remaining populations are mostly small and occur in highly fragmented and often degraded habitats. In addition, populations along roads or rail lines are at risk from maintenance or development works. Some sites have been subjected to frequent fires while others have been grazed at a low intensity/frequency and the impact of this disturbance is not known. Given the extensive habitat destruction and disturbance that has occurred across the taxon's range, and that remaining populations are small and isolated, it is likely that the conditions for maintenance of the pollinator and fungal activity have been adversely affected at most sites. The small size and highly fragmented distribution of remaining populations renders them at a very high risk of extinction due to stochastic events. Individual threatening processes vary in size, severity and relative importance at the known sites (Duncan, 2010).

Specific threats to the taxon include grazing by native herbivores such as kangaroos and/or introduced herbivores such as rabbits, hares, feral goats and domestic stock is an existing or potential threat at most sites. Grazing by

kangaroos, wallabies and deer are a serious problem at the Wilsons Promontory site. Grazing by invertebrates (caterpillars) is a serious problem at the Discovery Bay and Piccaninnie Ponds sites, while flowers and seed capsules are frequently removed at many sites, possibly by invertebrate grazers such as caterpillars or grasshoppers. The Greenhills NCR is subject to an annual grazing lease, with up to 50 cattle periodically grazing the site over summer. This action has possibly favoured the taxon by reducing the biomass on the site, however, the impact of the cattle on the population (and those of other threatened flora species) needs to be assessed.

The taxon is threatened by a variety of weed species, particularly perennial grasses. This causes a serious problem at most sites and will require active and ongoing management for control. *Watsonia meriana* and *Rubus fruticosus* are a problem at Clyde and *Gladiolus* sp. is a problem at Pakenham.

Disturbance to, and destruction of, plants and habitats is a major ongoing threat. Part of the Pakenham site was destroyed by works and machinery activity related to the Fast Rail Project, while plants and habitat were destroyed during development of the Parkside airfield. Soil disturbance caused by vehicle and machinery movement is a threat at some sites where plants grow close to roads and tracks, such as at Piccaninnie Ponds and Gippsland Lakes, where there is also the potential for accidental trampling by people. Soil disturbance and trampling by stock are a threat at the private land sites. There is the potential for herbicide spraying along roadsides and railway lines to adversely affect plants at some sites.

Periodic fire (outside the growing/flowering/seed production time) is probably beneficial to some populations by reducing the amount of competing vegetation biomass and promoting growth and flowering. There is anecdotal evidence that this taxon responds positively to frequent (3-4 years cycle) biomass reduction. In the absence of fire (or mowing), thick grass swards can develop which inhibit growth and flowering. The absence of biomass reduction is potentially a serious problem at many sites including Discovery Bay CP, Gippsland Lakes CP, Greenhills NCR, Mt. Clay SF, Yarram (Parkside), Clyde and Pakenham sites.

The taxon may be threatened by changes to hydrological regimes. Specifically, some populations appear to occupy the narrow margins of marshy sites, but they are absent from adjacent higher drier ground, and seasonal inundation of these shallow wetlands is probably important for maintenance of populations. Alteration of wetting/drying cycles, such as through draining of shallow freshwater marshes or extended flooding such as through dam construction could adversely affect populations.

Climate change poses a substantial long-term threat to the taxon. The taxon lives in seasonally damp to wet microhabitats, which are likely to increasingly dry out with the predicted increase in temperatures, decrease in rainfall and increase in evaporation rates for south-eastern Australia. All sites, but particularly the Piccaninnie Ponds, Discovery Bay and Wilsons Promontory sites are at risk of drying out and permanently changing due to the ongoing dry weather in southern Australia and/or altered groundwater levels (Duncan, 2010).

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 estimated to be 75%, based on (a) and (c) above.

The taxon was formerly more widespread in south-eastern Australia, but it has suffered a substantial decline in range and abundance. The main reason for past decline is the loss and degradation of its grassland and grassy woodland habitat across its range, principally for agriculture. The bushfires of 2019/2020 are believed to have potentially impacted between 20 to 50% of the taxon's habitat.

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

Eligible under Criterion A3 as Endangered

The population reduction over the next 100 years is projected to be 55%, based on (c) above.

Future decline is based on the current and projected impact of the identified threats. In addition, remaining populations are mostly small and occur in highly fragmented and often degraded habitat.

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 65%, 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 B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 216 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas.

The taxon is estimated to be severely fragmented. Remaining populations are mostly small and occur in highly fragmented and often degraded habitat. In addition, gene flow is probably highly compromised as many intervening populations have been lost.

It is estimated to have one location. It has a continuing decline in (i), (ii), (iii), (iv) and (v) above since much of its former habitat has been cleared, and the few remaining populations are generally declining.

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 700 to 5000 mature individuals, based on numbers from Duncan (2010). However, the numbers fluctuate and there are thousands of plants at Yarram and Greenhills in wet years.

There is estimated to be a continuing decline of 55% 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:

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. N., and Jeanes, J. A. (1995). *The Orchids of Victoria*. Melbourne: The Meigunyah Press.

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

Duncan, M. (2010). National Recovery Plan for the Maroon Leek Orchid *Prasophyllum frenchii*. Department of Sustainability and Environment, Melbourne.

Mueller, F. J. H. (1889). Description of an orchid, new for Victoria. *The Victorian Naturalist 6*(8), 126.

SAC (1997). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 409 *Prasophyllum frenchii*.

VicFlora (2018). Flora of Victoria, Royal Botanic Gardens Victoria: *Prasophyllum frenchii.* Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/9cf51b39-f012-43be-a28c-98ce7e5e0fd1