

Prasophyllum spicatum Dense Leek-orchid

Taxonomy

Prasophyllum spicatum R.J. Bates & D.L. Jones

P. spicatum is most similar to the complex of taxa currently known as *P. odoratum*.

Current conservation status

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

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

Proposed conservation status

Critically Endangered in Australia

Criteria A2ace+3ce+4ace; C1+C2a(i)

Species Information

Description and Life History

The taxon is a deciduous, perennial, terrestrial orchid that emerges annually from an underground tuber. It has a single, terete, erect, slender, dark green leaf to 60 cm long with a reddish-purple base. A slender greenish stem to 80 cm tall, has up to 50 small (to 10 mm across), fragrant flowers in a densely crowded, narrowly cylindrical spike (up to 20 cm long).

The dorsal sepal is linear-ovate, subacute, held horizontally or incurved, and thick textured. The lateral sepals are linear-oblong, sub-erect, free, divergent, and the margins incurved. The lateral petals are white, spathulate, with crisped margins. The labellum is ovate to broadly elliptical (with intensely folded and crisped margins), crystalline white, recurved at less than right angles near the centre, and the tip is erect but not protruding beyond the lateral sepals. The callus is thin-textured, channelled, with a pyramidal basal swelling, and extends just beyond the bend in the labellum. The single leaf emerges in autumn after the onset of seasonal rains. Flowering commences in early October and is usually completed by early November in populations around Melbourne and South Gippsland. Flowering commences in early November and is completed by early December in populations in southwest Victoria and southeast South Australia. About four weeks after flowering finishes, the leaf has shrivelled, and if pollination has occurred, the seed capsule is ripening. Seed dispersal occurs soon after. *P. spicatum* survives the dry summer and early autumn as a dormant tuber.

Reproduction is from seed and/or vegetative reproduction (tuber multiplication). The tuber is replaced annually. All subpopulations have very low numbers of flowering plants each year, with some subpopulations not flowering in some years. The taxon grows in a complex relationship with a mycorrhizal fungus that initiates seed germination and supplies some nutrients for the orchid. Type and degree of dependence upon the fungus is unknown. The pollinator of the orchid is unknown. However, many *Prasophyllum* taxa are pollinated by small native bees and wasps, and many other types of insects visit and may contribute to pollination. Some *Prasophyllum* taxa are primarily self-pollinating. The rate of pollination is unknown. *P. spicatum* usually flowers well in the absence of fire, but occasional hot summer fires promote flowering of dormant plants. The fires may also promote seed germination and seedling establishment in the resulting ash-bed, likely by reducing surrounding vegetation competition, and changes in mineral and nutrient levels. The effect may be directly on the orchid or indirectly through the fungal symbiont (Duncan, 2010).

Generation Length

The generation length of *Prasophyllum spicatum* 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 reliant on seed-based recruitment for population maintenance.

Distribution

The current range extends from Wonthaggi in southern Victoria to near Penola in South Australia, although there is apparently a wide disjunction between south Gippsland and south-west Victorian populations. It appears to be absent from the Otway coast (Duncan 2010).

Records previously attributed to *P. spicatum* from the Anglesea, Lara and East Gippsland regions are now considered to be three separate, unnamed taxa (Duncan, 2010).

Habitat

The taxon commonly occurs in low, windswept coastal and near-coastal heathland and heathy woodland. It is found in grasslands, heathlands and heathy woodlands on well-drained sand and clay loams (Backhouse et al., 2016). Specifically, the soils are commonly sandy and generally damp but well drained, although some sites are seasonally waterlogged.

Threats

The taxon has suffered a substantial decline due to extensive habitat loss and degradation by land clearing for agricultural and urban development across its range. The taxon now survives in small, highly fragmented subpopulations mostly occurring in small habitat remnants. The taxon is continuing to decline, especially in the Crib Point, Stony Point and Cape Paterson subpopulations, which survive in tiny habitat fragments, and run a very high risk of becoming extinct.

Subpopulations and habitat are considered at risk from disturbance, weed invasion and increasingly dry conditions from declining rainfall and consequent increase in severity and intensity of bushfires. There is a threat of weed invasion at the sites near Melbourne. Soil disturbance is a threat, and at some sites this is a consequence of: vehicle, horse or motorbike activity, accidental damage associated with track maintenance activities, illegal rubbish dumping, and the potential for trampling of plants by recreational users. It is likely that the conditions for maintenance of the pollinator and fungal activity have been adversely affected at most sites. (Duncan 2010).

There is evidence that this taxon responds positively to frequent biomass reduction. The flowering of *P. spicatum* is likely to be adversely affected if slashing, burning etc. is removed. Grazing by native and/or introduced herbivores is a threat at all sites (Duncan 2010).

There is risk of extinction due to small population size and the highly fragmented distribution of the known populations. Very small subpopulations are highly susceptible to stochastic events causing major decline or local extinction within a very short time frame.

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> <ul style="list-style-type: none"> (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 75 to 99%, based on (a), (c) and (e) above.

Past decline is based on the loss of subpopulations and extensive habitat degradation across the Victorian range of the taxon. The taxon was once more widely distributed and abundant, but has suffered a substantial decline due to extensive habitat loss and degradation across its range. There are records of this taxon occurring at Lower Glenelg River, Blacknose Point (Portland), Cashmore, Dartmoor, Gorae West, Kentbruck, and southwest of Dergholm in south-western Victoria, and at Coronet Bay and Leongatha in Western Port-South Gippsland. It is now extinct at all these sites. The taxon is continuing to decline, especially in the Crib Point, Stony Point and Cape Paterson subpopulations, which survive in tiny habitat fragments, and run a very high risk of becoming extinct.

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 40 to 80%, based on (c) and (e) above.

Future decline is based on the impact of the identified threats, including disturbance, weed invasion and increasingly dry conditions from declining rainfall and a consequent increase in the severity and intensity of bushfires.

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 70 to 99%, based on (a), (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

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Past decline is based on the loss of subpopulations and extensive habitat degradation across the Victorian range of the taxon.

Future decline is based on the impact of the identified threats, including disturbance, weed invasion and increasingly dry conditions from declining rainfall and a consequent increase in the severity and intensity of bushfires.

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 B as Endangered

The Area of Occupancy (AoO) is estimated to be 32 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

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.

wide geographic separation of subpopulation groups and habitat and threat differences. The Lake Mundi, Drajurk, Lindsay and Kentbruck subpopulations all occur in south-western Victoria, which is considered one location. The second location is Western Port-South Gippsland, which comprises the Crib Point, Stony Point, Wonthaggi and Cape Paterson subpopulations.

It has a continuing decline in (i), (ii), (iii), (iv) and (v) above, based on the current and projected impact of the 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:

Eligible under Criterion C2 as Critically Endangered

It is estimated that there are 120 to 230 mature individuals. There is an estimated continuing decline of 15 to 30% within one generation.

Eligible under Criterion C2 as Critically Endangered

It is estimated that there are 120 to 230 mature individuals.

The number of mature individuals is inferred to continue to decline, and the number of mature individuals in each subpopulation is 50 or fewer.

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: AaO < 20 km ² or number of locations ≤ 5

Evidence:

Eligible under Criterion D as Endangered

It is estimated that there are 120 to 230 mature individuals.

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.
- Bishop, A. (1996). *Field Guide to the Orchids of New South Wales and Victoria*. Sydney, New South Wales: University of New South Wales Press.
- 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 Dense Leek Orchid *Prasophyllum spicatum*. Melbourne: Department of Sustainability and Environment. Retrieved from: <http://www.environment.gov.au/system/files/resources/e495c257-a2d4-470c-882e-f3f8276c7d76/files/prasophyllum-spicatum.pdf>
- Jeanes, J. A., and Backhouse, G. N. (2004). *Pictorial Guide to Wild Orchids of Victoria Australia*. Seaford, Victoria: Zoonectics.
- Jones, D. L. (1991). *Australian Orchid Research Volume 2. New Taxa of Australian Orchidaceae*. Melbourne: Australian Orchid Foundation.
- VicFlora (2015). Flora of Victoria, Royal Botanic Gardens Victoria: *Prasophyllum spicatum*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/85788803-5305-482d-8092-0c8da8f9f89b>