

# Threatened Species Assessment

## *Prasophyllum subbisectum* Pomonal Leek-orchid

### Taxonomy

*Prasophyllum subbisectum* 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* (SAC 1993).

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; C1

### Species Information

#### Description and Life History

The taxon is a herbaceous terrestrial orchid that dies back annually to spherical or ovoid underground tubers. It produces a single, sub-erect, hollow and tapering leaf which is bright green in colour and reddish at the base. The leaf grows to 30 cm long and is usually withered by flowering time. The erect flower stem emerges through a slit in the leaf and grows to 30 cm high, with up to 15 tiny, upward facing, brownish, non-scented flowers. The central petal (labellum) on each flower has a channelled greenish callus. The upper sepal is about 6 mm in length, downward-pointing and angled forward. The lateral sepals are about 7 mm in length and are erect, free, parallel or divergent, while the petals are slightly spreading (Backhouse and Jeanes, 1995; TSSC, 2016).

The taxon flowers in October and November. Detection in the field can be difficult due to its small size and pale colouration. The species is considered intrinsically rare and does not flower every year. Fluctuation in the number of flowering plants appears to be dependent upon the amount of winter rainfall. Leek-orchids have a dry season dormancy period during the hotter summer and early autumn months, commencing towards the end of spring or early summer. Leek-orchids begin to shoot in response to autumn rains. Leaves are produced first during winter and flower spikes may develop in spring (Backhouse and Jeanes; TSSC, 2016).

Sexual reproduction is the principle means of reproduction in many leek-orchid species. Pollination mainly occurs by native bees and wasps that are attracted to the flowers' strong perfumes and rewards of nectar. Many other types of insects visit and may contribute to pollination. Syrphiid flies, in particular, are frequent visitors to leek-orchids. Little is known of the habitat requirements of pollinators of leek-orchids. Leek-orchids propagate mainly from seed, although several have been observed to develop into small clumps, presumably by vegetative means. The Leek-orchid species are obligate mycotrophic plants that rely on mycorrhizal fungi to initiate seed germination, and supply some nutrients for the orchid. Type and degree of dependence upon the fungus is unknown (Backhouse and Jeanes, 1995; Bishop, 2006; TSSC, 2016).

Most terrestrial orchids have evolved under conditions of hot summer fires, generally when the plants are dormant. The best time for fire is during late summer or early autumn, after seed dispersal but prior to new shoot growth. Rainfall and temperature also influences flowering. The variation in seasonal climatic conditions, most notably



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rainfall and temperature also influences flowering. Flowering is often restricted following periods of sustained hot, dry weather follow flower opening (TSSC, 2016).

## Generation Length

The generation length of *Prasophyllum subbisectum* 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 taxon is endemic to western Victoria, where it is restricted to a small area in the Victorian goldfields region around Stawell, in the Grampians National Park, Deep Lead Nature Conservation Reserve and the Three Jacks Flora and Fauna Reserve (TSSC, 2016).

## Habitat

The taxon is found in open forest and heathy woodland on well-drained, sandy loam. Soils are gravely clay loams. The locality near Stawell is on damp clayey soil which is also somewhat stony or gravelly. The woodland community is dominated by *Eucalyptus leucoxylon* (yellow gum) and *E. goniocalyx* (long-leaved box) open forest (TSSC, 2016).

The taxon also occurs in habitat dominated by *Eucalyptus tricarpa* (Red Ironbark), *E. macrorhyncha* (Red Stringybark) and *E. microcarpa* (Grey Box), with a heathy understorey typically consisting of *Ozothamnus obcordatus* (Grey Everlasting), *Brachyloma ciliatum* (Fringed Brachyloma) and *Calytrix tetragona* (Fringe Myrtle) (TSSC, 2016).

The understorey consists of open areas of low herbs and grasses along with areas of low dense heathland containing a mixture of woody sub-shrubs from genera including *Grevilea*, *Prostanthera*, *Hibbertia*, *Leucopogon*, *Calytrix* and *Leptospermum*.

## Threats

The taxon was once more widespread and abundant in the region, but has suffered a decline through extensive loss and degradation of habitat. There was a historical record of the orchid from Pomonal on a site long since cleared. Considerable areas of woodland habitat between Stawell and the Grampians were cleared for agriculture and rural residential development. It is possible other populations of the taxon were destroyed during this land clearing (Backhouse and Jeanes, 1995; TSSC, 2016).

Rabbits were common at all sites in 2010, and grazing by red deer was a known threat at the Grampians National Park site in 2010. Grazing by native herbivores can be threatening in highly fragmented habitats, where they exert a significantly increased grazing pressure on the remnant vegetation. Eastern Grey Kangaroos and Swamp Wallabies were common at all sites in 2002 (Coates et al., 2002; TSSC, 2016).

Some plants in the Deep Lead Nature Conservation Reserve are close to a road, and vulnerable to accidental destruction from road maintenance activities. Two of the reserves where the taxon is found attract large numbers of orchid enthusiasts in spring, and activities such as gold prospecting and firewood collection also occur. Consequently, accidental trampling of plants and seedlings is a serious threat at both sites. Illegal rubbish dumping has caused accidental destruction of plants and seedlings.

The specific role of fire for this taxon is unknown, however fires that occur in autumn, winter and spring, after the taxon shoots but before seed is set, may pose a significant threat. Too-frequent fire may pose a threat by altering the habitat, removing organic surface materials and negatively impacting pollinators and mycorrhizal agents. In 2002, all sites were long unburnt and the fire risk was considered low (Coates et al., 2002; TSSC, 2016). Being close to human habituation, the risk of weed invasions and predation by introduced herbivores is substantial (SAC, 1993).

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Subpopulations and habitat are considered at risk from 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

### 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>based on any of the following:</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>
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### Evidence:

#### Eligible under Criterion A2 as Critically Endangered

The population reduction over the past 60 to 120 years is inferred to be 75 to 95%, based on (a), (c) and (e) above.

Past decline is based on a known loss of subpopulations and an extensive loss and degradation of habitat. Numbers of plants in at least one subpopulation have declined precipitously to the point of probably local extinction, and another has declined substantially in the last 25 years.

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 50 to 85%, based on (c) and (e) above.

Future decline is based on a continuing decline in plant numbers and habitat conditions, in response to the identified threats.

#### 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 50 to 95%, based on (a), (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

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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 <sup>2</sup>	< 5,000 km <sup>2</sup>	< 20,000 km <sup>2</sup>
B2. Area of occupancy (AOO)	< 10 km <sup>2</sup>	< 500 km <sup>2</sup>	< 2,000 km <sup>2</sup>
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 Extent of Occurrence (EoO) is estimated to be 605 km<sup>2</sup>, based on accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

The Area of Occupancy (AoO) is estimated to be 12 km<sup>2</sup>, 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.

The Grampians-Ararat-Stawell region where all subpopulations occur is deemed as a single location based on the uniform impact of the identified threats.

It has a continuing decline in (i), (ii), (iii), (iv) and (v) above, through impacts of disturbance, weed invasion and increasingly dry conditions from declining rainfall, and plant numbers in all subpopulations are declining.

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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 C1 as Critically Endangered

It is estimated that there are 130 to 250 mature individuals, based on sporadic surveys and VBA records.. In the early 2000s, the taxon was known to occur at three localities with a total population size of fewer than 100 plants. In 2010, it was recorded at four populations containing an estimated 130 plants. It is likely that numbers may have recovered slightly since the cessation of the Millennium Drought.

There is an estimated continuing decline of 10 to 305 in one generation.

#### Eligible under Criterion C2 as Endangered

It is estimated that there are 130 to 250 mature individuals, the number of mature individuals is inferred to continue to decline, and the number of mature individuals in each subpopulation is fewer than 250.

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 <sup>2</sup> or number of locations ≤ 5

### Evidence:

#### Eligible under Criterion D as Endangered

It is estimated that there are 130 to 250 mature individuals.

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



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