

Thelymitra gregaria Basalt Sun-orchid

Taxonomy

Thelymitra gregaria D.L. Jones & M.A. Clem.

Apparent hybrids with *T. exigua* and with *T. antennifera* have been observed where the species are sympatric (VicFlora, 2014).

Current conservation status

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 Australia

Criterion A2bce

Species Information

Description and Life History

The taxon has a flowering stem erect, straight, 9-20 cm tall, 1-2.5 mm diam., purplish, often pruinose. Leaf linear to linear-lanceolate, attenuate, 5-12(-18) cm long, 5-12 mm wide, fleshy, canaliculate, ribbed abaxially, sheathing at base, dark green to yellowish with a purplish base. Inflorescence 1-6-flowered, loose. Sterile bracts usually 2, rarely 1 or 3. Perianth segments elliptic, lanceolate or ovate, 10-20 mm long, dark violet-blue to purple with darker longitudinal veins. Column slender, 5-7 mm long, pink, blue or purplish; mid-lobe hooding the anther, tubular, inflated, gently curved through c. 90 deg., dark brown to blackish, apex shallowly bilobed, yellow; lateral lobes converging 0.8-1.5 mm long, digitiform, obliquely erect, each with a toothbrush-like arrangement of white hairs almost along their entire length, terminating in front of mid-lobe. Anther inserted towards apex of column, shortly beaked. The taxon flowers from September to November. Flowers expand readily on warm to hot days and are strongly scented (VicFlora, 2014).

Pollination occurs through simple food deception (Duncan and Coates, 2010). Flowers are fairly long-lasting and will open repeatedly in a run of consecutive warm sunny days, with some groups of plants being in flower for a month or so. The taxon probably relies mostly on insect pollination and does not appear to readily self-pollinate (Backhouse et al., 2016). Leaves appear in winter and plants flower in October and November setting seed and going dormant in early summer.

The number of emergent plants is affected by rainfall and by grassland density. Opening up events, such as fires and slashing, often increase plant emergence levels.

Generation Length

The generation length of *Thelymitra gregaria* 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. Visible ramets essentially represent distinct genets, since a single leaf emerges each



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year from an annually replaced tuberoid (although very occasionally), usually in response to minor subterranean injury. Two daughter tuberoids are produced instead of the normal one tuberoid, resulting in two ramets in very close proximity. However, it is to monitor numbers since seedlings may also occur in very close proximity.

Distribution

The taxon is endemic to Victoria, where it is confined to the south-west between Melbourne and Hamilton. The altitude ranges from 150-220 metres ASL (Backhouse et al., 2016).

Habitat

The taxon occurs in open species-rich native grassland dominated by *Themeda triandra* with perennial herbs and lilies on poorly drained red-brown basalt soils, often at sites with embedded basalt boulders. The sites form part of the 'Natural Temperate Grassland of the Victorian Volcanic Plain', which is a critically endangered ecological community under the EPBC Act, and the 'Western (Basalt) Plains Grasslands Community' which is listed as a threatened ecological community under the FFG Act (Duncan and Coates, 2010; VicFlora, 2014).

Threats

The original distribution and abundance of *T. gregaria* is not known, but it is highly likely to have been restricted to the native grasslands and grassy woodlands of the western basalt plains (Duncan and Coates, 2010). This habitat has been reduced to less than 1% of its original occurrence (DSE 2003), mostly for agriculture, and many populations of *T. gregaria* have undoubtedly been lost. There has been extensive loss of grasslands and grassy woodlands in south-eastern Australia, such that these are now some of Australia's most threatened ecosystems (Kirkpatrick et al., 1995). Remaining populations are mostly small and all are restricted to tiny remnant patches of habitat, often in highly tenuous locations such as roadsides. There is a high risk of extinction due to the small population size at most sites and the highly disjunct distribution of the taxon. It is possible that some ecological functions such as conditions for the maintenance of pollinator and fungal activity have been adversely affected at these remnant sites (Duncan and Coates, 2010).

Remaining populations of *T. gregaria* are at risk from a variety of current and potential threats. Accidental disturbance to or destruction of plants and habitat from vehicle and stock movement and road/utilities installation and maintenance activities is a serious ever-present risk at all sites, despite some populations being sign-posted. Soil disturbance facilitates weed invasion and establishment, with weeds readily colonizing disturbed sites. Weed invasion, especially by pasture grasses and other weeds such as *Phalaris aquatica*, *Romulea rosea* and *Cuscuta dubia* is a major recurring problem at all sites, especially sites suffering soil disturbance or with the prolonged absence of fire. The taxon probably requires periodic fire to reduce accumulation of grasses, especially Kangaroo Grass, which otherwise may suppress growth if grass swards become too dense. Grazing by introduced herbivores (rabbits/hares) is a minor threat at several locations, while invertebrate predation on seed capsules also occurs. Grazing and trampling by stock is a potential threat if stock are moved along roadsides containing the taxon (Duncan and Coates, 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%
<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 estimated to be 75 to 85%, based on (b), (c) and (e) above.

Past decline is based on estimates of the amount of suitable habitat lost in the last 60 to 120 years and an overall decline of the Western Basalt Plains Grasslands. Notably, habitat has been reduced to less than 1% of its original occurrence (DSE 2003).

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 60 to 100 years is suspected to be 50 to 75% based on (c) and (e) above.

Future decline is largely due to the small size of remnant sites. Some of the best localities are situated on roadsides. Most future losses will be due to ongoing habitat degradation.

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 75%, based on (b), (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 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 128 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

Any two of (a), (b) or (c) above are also satisfied.

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 <u>C1</u> or <u>C2</u>				
<u>C1</u>	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)
<u>C2</u>	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 Endangered

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It is estimated that there are 2,000 to 4,000 mature individuals, based on observation and numbers published in Duncan and Coates (2010).

There is estimated to be a continuing decline of 30 to 50% 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 km ² or number of locations ≤ 5 [Ⓜ]

Evidence:

Ineligible under Criterion D

It is estimated that there are 2,000 to 4,000 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.
- DSE (2003). Flora and Fauna Guarantee Action Statement no 182. Central Gippsland Plains Grassland Forest Red Gum Grassy Woodland Northern Plains Grassland South Gippsland Plains Grassland Western (Basalt) Plains Grassland. Department of Sustainability and Environment, East Melbourne.
- Duncan, M., and Coates, F. (2010). *National Recovery Plan for Twenty-two Threatened Orchids in South-eastern Australia*. Department of Sustainability and Environment, Melbourne.
- Jones, D. L. and Clements, M. A. (1998). Two new species, characterisation of two poorly known species and a new name in *Thelymitra* J.R. and G.Forst. (Orchidaceae) from Australia. *The Orchadian* 12(7), 327, 330.
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- VicFlora (2014). Flora of Victoria, Royal Botanic Gardens Victoria: *Thelymitra gregaria*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/2f941699-c520-42b0-9bc1-58877b1835d5>