Threatened Species Assessment

Caladenia calcicola
Limestone Spider-orchid

Taxonomy

Caladenia calcicola G.W. Carr

Current conservation status

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

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1991).

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,v)+2ab(i,ii,v); C2a(ii); D

Species Information

Description and Life History

The taxon is a flowering plant 11-22 (rarely to 28) cm tall. Leaf 5-13 cm long, 4-15 mm wide. Flowers solitary (rarely 2); perianth segments 1.5-4 cm long, pale yellow with red median stripe; lateral sepals divergent, deflexed, flattened at base, 2-4 mm wide, tapered to a filiform, clubbed tail, club linear, 2-9 mm long, with yellowish to reddish-purple, contiguous, sessile glands; petals spreading to deflexed, shorter than sepals, flattened at base, tapered to a long acuminate apex. Labellum curved forward with apex recurved and lateral lobes erect, lamina ovate to obtrullate, more or less 3-lobed, 8-15 mm long and 7-11 mm wide (when flattened), glossy and waxen, red at least distally, proximal half paler red or yellowish-cream, with red veins; marginal calli on lateral lobes irregularly triangular to linear, to 1 mm long, diminishing in size towards the (usually) entire or slightly irregular mid-lobe; lamina calli in 4 (rarely 6) rows, more or less crowded, not reaching bend, stout and flat-topped, to 2.5 mm long at base of lamina, decreasing in size towards apex (VicFlora 2015). The taxon produces leaves from a tuber and flowers from mid-September to early November (Backhouse et al. 2016).

Pollination is thought to be carried out by a thynnid wasp (Thynninae), however the ecological requirements of the pollinator are unknown. Observations suggest that between 5% and 10% of plants are pollinated annually. The importance of fire in promoting flowering and providing a suitable medium for seedling establishment is unclear. The removal of canopy cover through fire may not contribute to seedling establishment, as the habitat of the taxon is naturally open, due to the poor skeletal soils and outcropping limestone. Flowering in many *Caladenia* taxa is stimulated by summer fire, however fire is not essential for flowering to occur (DSE 2003).

Generation Length

The generation length of *Caladenia calcicola* is estimated to be 20 to 40 years (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, individuals are 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 rare and only currently known from one location, the Bats Ridge Wildlife Reserve. It is possibly endemic to Victoria, as populations of clubbed spider-orchids from the lower south-east of South Australia ascribed to *C. calcicola* are probably *C. rampla* or other taxa in the *C. reticulata* complex (Backhouse et al. 2016). A subpopulation on private land near Dunkeld that has been ascribed to *C. calcicola* is most likely *C. ampla*, which occurs in the Grampians just to the north.

Habitat

The taxon grows in open forests and coastal low heathy and shrubby woodland on shallow well-drained sandy soils over limestone ridges (Backhouse et al. 2016; DSE 2003; VicFlora 2015). The altitude range is from 25-90 metres above sea level.

Threats

Much of the taxon's habitat has been cleared for agriculture, and a large population near Portland was destroyed when the site was excavated for a limestone quarry (Backhouse et al. 2016).

The taxon is currently threatened by habitat changes through long-term reduction in rainfall due to climate change attendant increased fire frequency risk, and by weed invasion, especially Coast Wattle (*Acacia longifolia* subsp. *sophorae*). This environmental weed, while indigenous to a narrow coastal strip, has dominated areas of heath and open forest inland from the coast to the apparent detriment of the ground flora (DSE 2003).

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 60 to 120 years is inferred to be 50 to 85%, based on (a), (c) and (e) above.

Past reduction is based on observations from up to 40 years ago, the known loss of subpopulations and habitat, as well as the apparent recent decline of the remaining subpopulations. A subpopulation at the Princess Margaret Rose Caves near Nelson has recently become extinct, and prior to 1950 the taxon was recorded from private property at Cashmore, but has not been seen there since and that subpopulation has been lost. A large subpopulation near Bats Ridge containing several hundred plants was mostly destroyed in the early 1980s when the site was quarried for limestone, and no plants have been seen there since 1990.

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 120 years is suspected to be 35 to 70 %, based on (c) and (e) above.

Future reduction is based on observed declines in plant numbers in the remaining subpopulation due to habitat changes, because of increased drying from reduced rainfall, changed fire regimes, and weed invasion, specifically by Coast Wattle.

Eligible under Criterion A4 as Critically Endangered

The population reduction over any 60 to 120 period, including both past and future (up to 100 years in the future), is suspected to be 50 to 80 %, based on (a), (c) and (e) 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 B1 as Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 4 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

It is estimated to have one location, as there is just a single subpopulation, in the Bats Ridge Wildlife Reserve and on adjoining private property.

It has a continuing decline in (i), (ii) and (v) above based on the threats of weed invasion, the long-term reduction in rainfall due to climate change, and attendant increased fire frequency risk.

Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 4 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

As above, the taxon has 1 location, and has a continuing decline in (i), (ii) 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 C1 as Critically Endangered.

It is estimated that there are 20 to 80 mature individuals, based on VBA records, sporadic survey, monitoring, and the surveying of several subpopulations in 2017.

There is estimated to be a continuing decline of 15 to 30% within one generation.

Eligible under Criterion C2 as Critically Endangered

It is estimated that there are 20 to 80 mature individuals, the number of mature individuals is inferred to continue to decline in response to the identified threats, and the percentage of mature individuals in one subpopulation is 90-100%.

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 Critically Endangered

The taxon is estimated to have 20 to 80 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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