



## *Caladenia xanthochila* Yellow-lip Spider-orchid

### Taxonomy

*Caladenia xanthochila* D. Beards. & C. Beards.

*C. xanthochila* is similar to *C. stellata* from southern NSW and eastern SA. It differs from that taxon in that the labellum mid-lobe is not usually dark red and has almost entire margins, and the sepal clubs have contiguous glands (VicFlora 2018).

### 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 1996).

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

### Proposed conservation status

Endangered in Victoria

Criteria A2ace+3ce+4ce; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v); C1+2a(ii)

### Species Information

#### Description and Life History

The taxon is a flowering plant 25-32 cm tall. Leaf 8-17 cm long, 6-10 mm wide. Flowers solitary (rarely 2); perianth segments 2-5 cm long, creamy yellow to greenish yellow; lateral sepals and petals divergent, drooping; sepals flattened at base, 2.5-4 mm wide, tapered to a filiform, clubbed tail, clubs 3-10 mm long, with reddish or purplish, contiguous, sessile glands; petals shorter than sepals, flattened at base, tapered to long acuminate apex, rarely shortly clubbed. Labellum more or less flat, curved forward with apex recurved, lamina ovate, very obscurely 3-lobed, 9-11 mm long and 7-9 mm wide (when flattened), pale yellow (very rarely reddish towards apex); marginal calli on lateral lobes club-shaped, to 1.3 mm long (very rarely absent), diminishing in size to a crenulate or entire mid-lobe; lamina calli in 4 or 6 rows, extending over half of lamina, narrow, foot-shaped, to 1 mm long at base of lamina, decreasing in size towards apex. The taxon flowers in September (VicFlora 2018).

Spider-orchids, in general, use either food deception or sexual deception for pollination, the usual pollinator is male wasps from the family Thynnidae. A scent that mimics female thynnid wasp pheromone is produced by the glandular tips of the sepals and acts as a sexual attractant for the pollinators. Once the pollinator reaches the flower, it attempts to copulate with the labellum of the flower, mistaking it for the female wasp, and effects pollination (DSE 2000).

Spider-orchids generally reproduce from seed. The fruits normally take 5-8 weeks to reach maturity following pollination and each mature capsule may contain tens of thousands of microscopic seeds that are dispersed by the wind when the capsule dries out. Most spider-orchids grow in a complex relationship with mycorrhizal fungi which is critical for growth and development. The fungus assimilates some nutrients for the orchid, but the degree of nutritional dependence upon the fungus by spider-orchids is not clearly understood. Some spider-orchids have survived for at least 17 years in the wild, however longevity of most taxa is not known (DSE 2000).

Most terrestrial orchids have evolved under conditions of hot summer fires, generally when the plants have been dormant. Some *Caladenia* taxa flower vigorously following hot summer fires, but this may be as much the result of



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the removal of surrounding vegetation and reduced competition as any chemical effect of the fire. The timing of fire is important, with the best time during late summer or early autumn, after seed dispersal but prior to new plant emergence. Rainfall and temperature also influence flowering. Flowering is often aborted when periods of sustained hot, dry weather follow flower opening (DSE 2000).

## Generation Length

The generation length of *Caladenia xanthochila* 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, 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.

Using the example of reintroductions for *C. cruciformis* which occurs in the same vegetation types and locations, it is noted that, assuming conditions are suitable after approximately five years, natural recruitment takes place and parent plants will gradually die off. This may be a different outcome for other taxa of the same genus occurring within different habitat types, undergoing different land management, and dealing with different acting threats.

## Distribution

The taxon is recorded in four locations in Victoria between Bendigo and Dimboola (VicFlora 2018). The Kooyoora State Park and the Murtoa region has three separate subpopulations.

## Habitat

The taxon grows on sandy soil in *Eucalyptus leucoxylon* woodland (VicFlora 2018). Specifically, the taxon occurs on Shallow Sands Woodland and Alluvial Terraces Herb-rich Woodland, and occupies Quaternary alluvial or aeolian deposits derived from a variety of different geologies.

## Threats

Subpopulations and habitat are considered at risk from human visitation and trampling, habitat fragmentation, low genetic diversity, site degradation due to macropod browsing pressure, inappropriate fire regimes, increasingly dry conditions from declining rainfall, and the consequent increase in severity and intensity of bushfires. Very small subpopulations are highly susceptible to stochastic events causing major decline or local extinction within a very short time frame.

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### 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>(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> <p><i>based on any of the following:</i></p>			

### Evidence:

#### Eligible under Criterion A2 as Endangered

The population reduction over the past 60 to 120 years is estimated to be 50 to 75%, based on (a), (c) and (e) above.

Past population decline is based on the past land clearing practices of the regions in which the taxon currently occurs, resulting in habitat clearing and site degradation. Additionally, agricultural developments have destroyed vast areas of what would have been potential habitat and only very small patches of habitat remain.

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 projected to be 10 to 50%, based on (c) and (e) above.

Although conservation activities are operating, there is uncertainty regarding the taxon's ability to cope with climate change, which will likely lead to gradual reductions in populations.

#### 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 30 to 70%, based on (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 B1 as Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 1,145 km<sup>2</sup>, based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented considering its limited dispersal ability, the barriers to dispersal, and the lack of habitat separating individuals. Each of these locations have been separated for at least 50 to 100 years and there is no connection between sites.

It is estimated to have 4 locations, and has a continuing decline in (i), (ii), (iii), (iv) and (v) above as a result of climate change.

#### Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 24 km<sup>2</sup>, based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA.

As above, the taxon is severely fragmented, has 4 locations, and has a continuing decline in (i), (ii), (iii), (iv) and (v) above.

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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 Endangered

It is estimated that there are 500 to 600 mature individuals. This is based on known sites and regular monitoring. A continuing decline of 10 to 30% is estimated to occur within 2 generations.

### Eligible under Criterion C2 as Endangered

It is estimated that there are 500 to 600 mature individuals. The number of mature individuals is estimated to continue to decline due to climate change, and the percentage of mature individuals in one subpopulation is 95-100%.

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: AoO < 20 km <sup>2</sup> or number of locations ≤ 5

## Evidence:

### Eligible under criterion D as Vulnerable

It is estimated that there are 500 to 600 individuals, and 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

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