Threatened Species Assessment

Caladenia douglasiorum
Douglas' Spider-orchid

Taxonomy

Caladenia douglasiorum (D.L. Jones) G.N. Backh.

The taxon is also referred to as *Arachnorchis douglasiorum* (Backhouse et al. 2016). It was previously included in *Caladenia reticulata* (Jones 2006).

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2007).

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

Proposed conservation status

Critically Endangered in Australia

Criteria A2ace; B1ab(i,ii,iii,v); C2a(ii)

Species Information

Description and Life History

The taxon is a flowering plant 10-25 cm tall. Leaf 6-11 cm long, 5-8 mm wide. Flower solitary; perianth segments 2.8-4.5 cm long, greenish cream to yellowish with red striae; dorsal sepal erect, lateral sepals and petals divergent, tips drooping; dorsal sepal flattened at base, 2-3 mm wide, tapered to a filiform, clubbed tail, club 6-10 mm long, with dark red to blackish, globose, sessile glands; lateral sepals flattened at base, 4-5 mm wide, tapered to filiform clubbed tails, clubs 6-10 mm long, similar to those of dorsal sepal; petals shorter than sepals, flattened at base, 2-3 mm wide, tapered to an acuminate apex, sometimes with a narrow club 2-4 mm long. Labellum curved forward with apex recurved, lamina ovate to ovate-lanceolate, unlobed or obscurely 3-lobed, 13-15 mm long and 8-9 mm wide (when flattened), cream with red veins and a deep reddish apex; marginal calli on lateral lobes, red, linear, 1-3 mm long, diminishing in size and merging towards the apex; lamina calli in 4 rows, often yellowish, moderately crowded, extending onto base of mid-lobe, foot-shaped, c. 1.5 mm long at base of lamina, decreasing in size towards apex (VicFlora 2018).

The taxon flowers in September and October. The taxon tends to flower a couple of weeks after *C. cruciformis* and *C. reticulata* but there is considerable overlap in flowering period between the three taxa. All three clubbed spider-orchids in this region apparently have the same species of thynnine wasp pollinator, so gene flow would almost certainly be occurring amongst the three putative taxa, raising further doubts about the distinctiveness of *C. douglasiorum.* There is a bewildering array of intermediate forms in some populations. It is uncertain if these are hybrid swarms involving the three taxa or if there is just a single but highly variable clubbed spider-orchid taxa involved (Backhouse et al. 2016).

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 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 douglasiorum* is estimated to be 20 to 40 (midpoint 30) years. Long-term observation and monitoring of populations of terrestrial orchids in general suggests that there is very low recruitment over decades, and individual plants may be very long-lived, possibly several decades.

Distribution

The taxon is known from 3 subpopulations occurring in 1 location, with fewer than 250 plants. All subpopulations occur on private land at Dalyenong, which is deemed as a single location. Surveys of the 3 bushland reserves that occur at the location have failed to find any subpopulations on protected public land.

The taxon is endemic to Victoria, where it is confined to a small area around Dalyenong-Emu area of the western goldfields. It is a poorly known, apparently highly restricted, clubbed spider-orchid (Backhouse et al. 2016; VicFlora 2015). The taxon occurs in a single locality on private property.

Habitat

The taxon grows in heathy open woodland with a low, sparse shrubby understorey, on fertile well-drained grey-brown sandy loam soils. The altitude range is from 210-270 metres above sea level (ASL). It grows with both *Caladenia cruciformis* and *C. reticulata*, and there is a wide array of intermediate forms in some populations (Backhouse et al. 2016; Jones 2006; VicFlora 2015).

Threats

There has most likely been an extensive decline in distribution and abundance due to widespread historical clearing of habitat. At least one current subpopulation is in decline from domestic stock grazing and trampling and weed invasion. All subpopulations and habitat are considered at risk from disturbance, weed invasion and 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.

Grazing by rabbits (and possibly by kangaroos) is a major problem, with flowering plants regularly grazed off. Plants growing in low shrubs and thereby avoiding predation are often the only ones that flower. The state forest population is potentially at risk from vehicle movement off road. Extended drought in the district is likely to cause mortality of mature plants and greatly reduce recruitment (Jones 2006).

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 95% (midpoint 70%), based on (a), (c) and (e) above.

Past decline is based on widespread and extensive historical habitat loss across the range of the taxon.

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 30 to 70% (midpoint 50%), based on (c) and (e) above.

Future decline is based on ongoing decline in at least one subpopulation, in response to domestic stock grazing and trampling and weed invasion. Additionally, all subpopulations and habitat are considered at risk from disturbance, weed invasion and increasingly dry conditions from declining rainfall.

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 estimated to be 40 to 95% (midpoint 70%), 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 12 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas. The EoO has been made equal to the AoO to ensure consistency with the definition of AoO as an area within EoO.

The taxon is estimated to be severely fragmented because of its limited dispersal ability and the lack of habitat between subpopulations (which are separated by cleared farmland). This will result in a reduced probability of recolonisation should subpopulations become extinct, resulting in an increased extinction risk to the taxon.

It is estimated to have 1 location. It has a continuing decline in (i), (ii), (iii) and (v) above, based on ongoing decline in at least one subpopulation, in response to domestic stock grazing and trampling and weed invasion. Additionally, all subpopulations and habitat are considered at risk from disturbance, weed invasion and increasingly dry conditions from declining rainfall..

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 36 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it is severely fragmented, has 4 locations and has a continuing decline in (i), (ii), (iii) 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 C2 as Endangered

It is estimated that there are 120 to 250 mature individuals. Currently three small populations are known, two on private land and a third in nearby Dalyenong State Forest, with fewer than 250 mature individuals.

The number of mature individuals is inferred to continue to decline, and the number of mature individuals in one subpopulation is fewer than 250.

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 Endangered

It is estimated that there are 120 to 250 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.

DEPI (2014) *Advisory list of rare or threatened plants in Victoria - 2014*. Department of Environment and Primary Industries, Melbourne.

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SAC (2007). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 774 *Caladenia douglasiorum.*

VicFlora (2015). Flora of Victoria, Royal Botanic Gardens Victoria: *Caladenia douglasiorum*. Retrieved from: https://vicflora.rbg.vic.gov.au/flora/taxon/fc9f64f0-7e8a-46fe-9f59-5b134e32649f