

NSW Threatened Species Scientific Committee

Notice of Preliminary Determination

The NSW Threatened Species Scientific Committee, established under the *Biodiversity Conservation Act 2016* (the Act), has made a Preliminary Determination to support a proposal to list the orchid *Caladenia callitrophila* D.L.Jones as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1 of the Act. Listing of Critically Endangered species is provided for by Part 4 of the Act.

How to make a submission

The NSW TSSC welcomes public involvement in the assessment process and places preliminary determinations on public exhibition on the NSW TSSC pages on the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) website. This public exhibition provides an opportunity for the public to comment on this preliminary determination as well as provide any additional information that is relevant to the assessment.

Postal submissions regarding this Preliminary Determination may be sent to:

Secretariat
NSW Threatened Species Scientific Committee
Locked Bag 5022
Parramatta NSW 2124.

Email submissions in Microsoft Word or PDF formats to:
scientific.committee@environment.nsw.gov.au

Submissions close 28 February 2025

What happens next?

After considering any submissions received during the public exhibition period the NSW TSSC will make a Final Determination and a notice will be placed on the NSW DCCEEW website to announce the outcome of the assessment. If the Final Determination is to support a listing, then it will be added to the Schedules of the Act when the Final Determination is published on the legislation website. www.legislation.nsw.gov.au.

Privacy information

The information you provide in your submission may be used by the NSW TSSC in the assessment to determine the conservation status and listing or delisting of threatened or extinct species, threatened populations and threatened or collapsed ecological communities or to assess key threatening processes.

The NSW TSSC may be asked to share information on assessments with NSW Government agencies, the Commonwealth Government and other State and Territory governments to collaborate on national threatened species assessments using a common assessment method and to assist in the management of species and ecological communities.

If your submission contains information relevant to the assessment it may be provided to state and territory government agencies and scientific committees as part of this collaboration.

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If you wish your identity and personal information in your submission to be treated as confidential you must:

- *request your name be treated as confidential, and*
- *not include any of your personal information in the main text of the submission or attachments so that it can be easily removed.*

Professor Caroline Gross
Deputy Chairperson
NSW Threatened Species Scientific Committee

NSW Threatened Species Scientific Committee

Public Exhibition period: 29/11/2024 - 28/02/2025

Preliminary Determination

The NSW Threatened Species Scientific Committee, established under the *Biodiversity Conservation Act 2016* (the Act), has made a Preliminary Determination to support a proposal to list the orchid *Caladenia callitrophila* D.L.Jones as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1 of the Act. Listing of Critically Endangered species is provided for by Part 4 of the Act.

Summary of Conservation Assessment

Caladenia callitrophila D.L.Jones was found to be Critically Endangered in accordance with the following provisions in the *Biodiversity Conservation Regulation 2017*: Clause 4.4(a)(e i,ii B). The main reasons for this species being eligible are: (i) it has a very low population size (<250); (ii) most mature individuals occur within one population; (iii) there is a continuing decline in the number of mature individuals due to threats from herbivory (grazing and browsing), forestry activities, habitat loss and destruction and climate change.

The NSW Threatened Species Scientific Committee has found that:

1. *Caladenia callitrophila* D.L.Jones (family Orchidaceae) was described by (Jones 2021) as “Leaf linear-lanceolate, 70–130 x 4–12mm. Flower stem 200–350mm tall, 1–2-flowered. Flowers 50–60mm across, pale greenish-yellow with reddish markings; sepals with blackish to reddish clubs 6–13mm long; petals lacking clubs. Dorsal sepal erect, 25–40 x 1.5–2mm. Lateral sepals stiffly but obliquely decurved, 24–40 x 3.5–4 mm, divergent. Petals similarly arranged, 20–30 x 2–2.5mm. Labellum stiffly hinged, 12–15 x 7–9mm, yellowish base with red lines and maroon apex; margins with 6–9 pairs of red teeth to 1.3mm long; tip recurved. Calli to 1mm long, maroon, in 4 or 6 rows onto base of midlobe. Column 9.5–11.5 x 4–4.5mm, translucent reddish; basal glands c.1.3mm long, yellow with red basal stalk. Flowers: September to October.”
2. *Caladenia callitrophila* is endemic to the southern Riverina region of New South Wales (NSW). It is currently known to exist in three small, isolated subpopulations located within state forests between the towns of Berrigan and Balldale at altitude range of 120-170 m ASL (Copeland and Backhouse 2022). The subpopulations are separated by 16-50 km of cultivated farmland. This species occurs in woodland of *Callitris glaucophylla* (white cypress pine), *Eucalyptus melliodora* (yellow box) and *Eucalyptus microcarpa* (western grey box), with a grassy and sparsely shrubby understorey, on red-brown sandy or sandy-loam soils. Most of the plants have been found in 3-4 m tall white cypress pine regrowth (G. Robertson *in litt.* Feb 2021).
3. The habitat of this species may occur within ‘White Box-Yellow Box-Blakely’s Red Gum Grassy Woodland and Derived Native Grassland’ Critically Endangered Ecological Community and ‘Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions’, Endangered Ecological Community under the NSW BC Act (NSW SC 2011a; NSW SC 2011b). These Threatened Ecological Communities most likely correspond with ‘Yellow Box -

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White Cypress Pine grassy woodland on deep sandy-loam alluvial soils of the eastern Riverina Bioregion and western NSW South Western Slopes Bioregion' Plant Community Type (PCT 75), but may not be restricted to this PCT (NSW DPE 2023).

4. The geographic distribution of *Caladenia callitrophila* is highly restricted. The area of occupancy (AOO) is estimated to be 12 km², based on three 2 x 2 km grid cells, the scale recommended for assessing area of occupancy by IUCN (2024). The extent of occurrence (EOO) is estimated to be 310 km². The EOO is based on a minimum convex polygon enclosing all mapped occurrences of the species, the method of assessment recommended by IUCN (2024).
5. There is a very low number of mature individuals of *Caladenia callitrophila*. The total number of *C. callitrophila* flowering plants recorded during the 2020 season, after good winter rain, was around 183 flowering plants, with the majority of those (>90%) occurring at one site (G. Robertson *in litt.* Feb 2021; DCCEEW unpubl. data). Following the much drier winter of 2023 only 14 flowering plants were recorded (DCCEEW unpubl data; L. Carrigan unpubl data; G. French unpubl data). It is difficult to estimate the current total population size of *C. callitrophila* as plants observed flowering in one season that did not reemerge in the following season are not necessarily dead. Some may remain dormant underground, a common ecological strategy observed in orchids with a similar life history (Dixon and Tremblay 2009). Emergent numbers fluctuate primarily due to rain and soil moisture, and the underground population is probably capable of persisting for some years without emergence (Dixon and Tremblay 2009). However, given the season in 2020 was considered a year with good conditions for flowering, the population size is likely no more than 250.
6. Little is known of the specific details of the biology of *Caladenia callitrophila* however it is believed to be very similar to other spider orchids. *Caladenia* species are deciduous and die back to a dormant, fleshy tuber over summer (NSW DEC 2004; Dixon and Tremblay 2009). In *Caladenia*, tubers are generally replaced annually by a single daughter tuber on a vertical dropper, but few species appear to reproduce vegetatively by this means (Jones 2021). The tuber sprouts following sufficient late autumn/winter rains, with a single leaf developing above ground. Once the leaf is fully extended, a single flower may be produced. *C. callitrophila* flowers in September to October if conditions are suitable and flowers persist for about a month depending on the seasonal conditions (NSW DEC 2004; Copeland and Backhouse 2022). The prominent calli on the labellum of *C. callitrophila* suggest that is likely pollinated by nectar-foraging thynnid wasps (*Zaspilothynnus* sp.) (Reiter *et al.* 2019).
7. Plants produce tiny dust-like seeds that disperse on wind currents (Dixon and Tremblay 2009), however as the plants usually grow under a dense woodland canopy, most seeds likely fall within just a few metres of the plant, indicating significant barriers to widespread dispersal, especially in fragmented populations (Machon *et al.* 2002; Brzosko *et al.* 2017). Seeds are short-lived in the soil seedbank as per other Orchidaceae, often lasting only one or two seasons (NSW DEC 2004;

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Dixon and Tremblay 2009). Successful germination requires sufficient moisture, adequate temperatures (usually 15-20°C) and the presence of a suitable mycorrhizal fungal symbiont at the soil surface (Batty *et al.* 2001; Ramsay and Dixon 2003; Dixon and Tremblay 2009).

8. The generation length of this species is not known but is likely to be similar to other species of *Caladenia*. While the time from seed germination to flowering for *Caladenia* species is largely unknown under natural habitat conditions, ex-situ plants have been observed to flower 2-3 years after germination (Swarts 2007). Based on data for closely related *Caladenia* species, these ex-situ plants likely live for at least 10-20 years (Swarts 2007, NSW DEC 2004).
9. The current main threats to *Caladenia callitrophila* are from habitat clearing and fragmentation, herbivory pressure, weeds, and reduced reproductive success due to the effects of a changing climate. Clearing of woodlands dominated by *Callitris glaucophylla* (white cypress pine) has been extensive in the southern Riverina region, with an estimated loss of over 80% (Moore 1953; NSW DEC 2004; Thompson and Eldridge 2005; NSW DPE 2023). Most of the remaining vegetation has been, and continues to be, heavily modified due to a combination of grazing by domestic livestock, browsing by non-native and native animals, forestry activities, weed incursion and altered fire regimes. Currently in the Riverina, *C. glaucophylla* woodlands occur in highly fragmented remnants, with many managed as formal forestry reserves and such woodlands are very poorly represented in protected areas (Thompson and Eldridge 2005; NSW DPE 2023). The removal and degradation of this vegetation type has very likely had a significant impact on the distribution of *C. callitrophila*. 'Clearing of native vegetation' is listed as a key threatening process (KTP) under the *Biodiversity Conservation Act 2016* (BC Act).
10. Forestry operations can threaten *Caladenia callitrophila* by destroying its habitat and disrupting its lifecycle, especially if conducted at inappropriate times or disturbing soil in areas where the plants occur. Logging practices, in particular, may pose a direct threat through physical damage from treefall, soil compaction, log dumps, and harvesting machinery. They can also indirectly threaten the species by facilitating the incursion of weeds following soil disturbance or opening of the canopy (NSW DEC 2004). Most *C. callitrophila* populations in state forests are found growing among regrowth white cypress pine. Thinning of these stands, done to reduce competition and encourage faster growth, is likely to be detrimental to populations of *C. callitrophila*, either by direct physical damage or by promoting herbaceous competitors (NSW DEC 2004).
11. The impacts of herbivores, which includes both the consumption of vegetation, as well as the trampling and habitat destruction by domestic, feral and native herbivores, has the capacity to eliminate mature plants and/or disrupt reproductive processes resulting in a decrease in population numbers (NSW DEC 2004). The leaves and flower stems of *Caladenia* spp. are palatable and evidence of grazing by native and introduced vertebrate herbivores (including macropods, goats (*Capra hircus*) and sheep (*Ovis aries*)) is frequently observed in areas accessible to these animals. Additionally, the tubers may be preyed upon by animals such as, rabbits (*Oryctolagus cuniculus*), white-winged choughs (*Corcorax melanorhamphos*) or pigs (*Sus scrofa*) (NSW DEC 2004; G. Robertson *in litt.* June 2024). Domestic

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livestock, particularly sheep and cattle, can also damage the habitat through pugging in wet conditions. The orchid's vulnerability to soil disturbance is increased by the positioning of the collar, its primary nutrient transfer organ, at the soil surface via the mycorrhizal associations (Dixon and Tremblay 2009). Additionally, grazing may negatively impact the plants that pollinators rely on, or the soils where female wasps build their nests (NSW DEC 2004). 'Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus*', 'Predation, habitat degradation, competition and disease transmission by Feral Pigs, *Sus scrofa*' and 'Competition and habitat degradation by Feral Goats, *Capra hircus*' are listed as a KTPs under the BC Act.

12. There are a number of introduced weed species that occur near *Caladenia callitrophila* populations and in the surrounding state forest. These weeds can result in overshadowing and soil moisture depletion, reducing resources available for flower emergence and fruit development in the orchid. The invasive perennial exotic grass *Ehrharta calycina* has been identified as a direct threat to one of the populations of this species (NSW DEC 2004). Additionally, pasture weeds like *Brassica* spp. and *Trifolium* spp. have high coverage in some areas where the orchid is found. Annual grasses such as *Avena* spp., *Lolium* spp., *Bromus* spp., and *Vulpia* spp. are present in all the forests where this species has been recorded and where dense, appear to competitively exclude the terrestrial orchids (G. Robertson *in litt.* Feb 2021). 'Invasion of native plant communities by exotic perennial grasses' is listed as a KTP under the BC Act.
13. *Caladenia callitrophila* rely on late autumn and winter rains to trigger their emergence and flowering. Decreases in this seasonal rainfall as a consequence of climate change are likely to make the habitat less suitable, reducing reproductive output for the species. In addition, the projected hotter temperatures and increase in drought frequency, severity and duration may result in a reduced flowering period for *Caladenia* species (NSW DEC 2004) and may also disrupt the critical overlap between orchid flowering times and pollinator activity, further compromising reproductive success (Brown *et al.* 2008). The highly specialized biotic relationships (with pollinators and mycorrhizal fungi) and limited reproductive resilience of *Caladenia* orchids, as evidenced by their low annual seedling recruitment, severely constrain the species' ability to migrate to new, climatically suitable sites, especially in highly fragmented landscapes. Consequently, climate change poses a significant threat to the long-term survival of the species (Dixon and Tremblay 2009). "Anthropogenic Climate Change" is listed as a KTP under the BC Act.
14. *Caladenia callitrophila* D.L.Jones is eligible to be listed as a Critically Endangered species as, in the opinion of the NSW Threatened Species Scientific Committee, it is facing an extremely high risk of extinction in Australia in the immediate future as determined in accordance with the following criteria as prescribed by the *Biodiversity Conservation Regulation 2017*:

Assessment against *Biodiversity Conservation Regulation 2017* criteria

The Clauses used for assessment are listed below for reference.

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Overall Assessment Outcome:

Caladenia callitrophila was found to be Critically Endangered under Clause 4.4(a)(e i,ii B).

Clause 4.2 – Reduction in population size of species

(Equivalent to IUCN criterion A)

Assessment Outcome: Data Deficient

(1) - The species has undergone or is likely to undergo within a time frame appropriate to the life cycle and habitat characteristics of the taxon:			
	(a)	for critically endangered species	a very large reduction in population size, or
	(b)	for endangered species	a large reduction in population size, or
	(c)	for vulnerable species	a moderate reduction in population size.
(2) - The determination of that criteria is to be based on any of the following:			
	(a)	direct observation,	
	(b)	an index of abundance appropriate to the taxon,	
	(c)	a decline in the geographic distribution or habitat quality,	
	(d)	the actual or potential levels of exploitation of the species,	
	(e)	the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.	

Clause 4.3 - Restricted geographic distribution of species and other conditions
(Equivalent to IUCN criterion B)

Assessment Outcome: Endangered under Clause 4.3(b)(d)(e i,iii)

The geographic distribution of the species is:			
	(a)	for critically endangered species	very highly restricted, or
	(b)	for endangered species	highly restricted, or
	(c)	for vulnerable species	moderately restricted,
and at least 2 of the following 3 conditions apply:			
	(d)	the population or habitat of the species is severely fragmented or nearly all the mature individuals of the species occur within a small number of locations,	
	(e)	there is a projected or continuing decline in any of the following:	
		(i)	an index of abundance appropriate to the taxon,
		(ii)	the geographic distribution of the species,
		(iii)	habitat area, extent or quality,
		(iv)	the number of locations in which the species occurs or of populations of the species,
	(f)	extreme fluctuations occur in any of the following:	
		(i)	an index of abundance appropriate to the taxon,
		(ii)	the geographic distribution of the species,

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		(iii)	the number of locations in which the species occur or of populations of the species.
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Clause 4.4 - Low numbers of mature individuals of species and other conditions

(Equivalent to IUCN criterion C)

Assessment Outcome: Critically Endangered under Clause 4.4(a)(e i,ii B)

The estimated total number of mature individuals of the species is:			
	(a)	for critically endangered species	very low, or
	(b)	for endangered species	low, or
	(c)	for vulnerable species	moderately low,
and either of the following 2 conditions apply:			
	(d)	a continuing decline in the number of mature individuals that is (according to an index of abundance appropriate to the species):	
		(i)	for critically endangered species very large, or
		(ii)	for endangered species large, or
		(iii)	for vulnerable species moderate,
	(e)	both of the following apply:	
		(i)	a continuing decline in the number of mature individuals (according to an index of abundance appropriate to the species), and
		(ii)	at least one of the following applies:
		(A)	the number of individuals in each population of the species is:
			(I) for critically endangered species extremely low, or
			(II) for endangered species very low, or
			(III) for vulnerable species low,
		(B)	all or nearly all mature individuals of the species occur within one population,
		(C)	extreme fluctuations occur in an index of abundance appropriate to the species.

Clause 4.5 - Low total numbers of mature individuals of species

(Equivalent to IUCN criterion D)

Assessment Outcome: Endangered

The total number of mature individuals of the species is:			
	(a)	for critically endangered species	extremely low, or
	(b)	for endangered species	very low, or
	(c)	for vulnerable species	low.

Clause 4.6 - Quantitative analysis of extinction probability

(Equivalent to IUCN criterion E)

Assessment Outcome: Data Deficient

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The probability of extinction of the species is estimated to be:			
	(a)	for critically endangered species	extremely high, or
	(b)	for endangered species	very high, or
	(c)	for vulnerable species	high.

Clause 4.7 - Very highly restricted geographic distribution of species–vulnerable species

(Equivalent to IUCN criterion D2)

Assessment Outcome: Vulnerable

For vulnerable species,	the geographic distribution of the species or the number of locations of the species is very highly restricted such that the species is prone to the effects of human activities or stochastic events within a very short time period.
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Professor Caroline Gross
Deputy Chairperson
NSW Threatened Species Scientific Committee

Supporting Documentation:

Bray C (2024) Conservation Assessment of *Caladenia callitrophila* D.L.Jones (Orchidaceae). NSW Threatened Species Scientific Committee.

References

ADAPT (2024) Murray, Murrumbidgee projections 2060-2079. Available at <https://www.climatechange.environment.nsw.gov.au/projections-map> (accessed 1 August 2024).

Batty AL, Dixon KW, Brundrett MC, Sivasithamparam K (2001) Constraints to symbiotic germination of terrestrial orchid seed in a mediterranean bushland. *New Phytologist* **152**, 511–52.

Brown AP, Dundas P, Dixon KW, Hopper SD (2008) 'An illustrated guide to the orchids of Western Australia.' (University of Western Australia Press: Perth)

Brzosko E, Ostrowiecka B, Katowicz J, Bolesta M, Gromotowicz A, Gromotowicz M, Orzechowska A, Orzolek J, Wojdalska M (2017) Seed dispersal in six species of terrestrial orchids in Biebrza National Park (NE Poland). *Acta Societatis Botanicorum Poloniae*, **86**(3).

Copeland LM, Backhouse GN (2022) 'Guide to native orchids of NSW and ACT.' (CSIRO Publishing: Clayton South, Victoria)

Dixon K and Tremblay RL (2009) Biology and natural history of *Caladenia*. *Australian Journal of Botany* **57**, 247–258.

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- IUCN (2012) IUCN Red List Categories and Criteria: Version 3.1. Second edition. Gland, Switzerland and Cambridge, UK. <https://portals.iucn.org/library/sites/library/files/documents/RL-2001-001-2nd.pdf>
- IUCN Standards and Petitions Subcommittee (2024) Guidelines for Using the IUCN Red List Categories and Criteria. Version 16. https://nc.iucnredlist.org/redlist/content/attachment_files/RedListGuidelines.pdf
- Jones D (2021) 'A complete guide to native orchids of Australia: Third Edition.' (New Holland Publishers: Australia).
- Machon N, Bardin P, Mazer SJ, Moret J, Godelle B, Austerlitz F (2002) Relationship in genetic structure and seed and pollen dispersal in the endangered orchid *Spiranthes spiralis*. *New Phytologist* **157**, 677–687.
- Moore CWE (1953) The vegetation of the south-eastern Riverina, New South Wales 1: the climax communities. *Australian Journal of Botany* **1**, 485-547.
- NSW DEC (Department of Environment and Conservation) (2004) *Caladenia arenaria* Fitzg. Recovery Plan. NSW Department of Environment and Conservation. Hurstville.
- NSW DPE (Department of Planning and Environment) (2023) Updating BioNet plant community types: PCT master list C2.0 (2023), NSW Department of Planning and Environment, Parramatta. Available at <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/BioNet/Updating-bionet-PCTs-PCT-masterlistC2-0-230379.pdf> (accessed 1 August 2024)
- NSW NPWS (National Parks and Wildlife Service) (2003) Bioregions of New South Wales – their biodiversity conservation and history. NSW National Parks and Wildlife Service Hurstville.
- NSW SC (Scientific Committee) (2011a) White Box Yellow Box Blakely's Red Gum Woodland - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act. NSW Scientific Committee for the NSW Biodiversity Conservation Act. Available at: <https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2011-2012/white-box-yellow-box-blakelys-red-gum-woodland-minor-amendment-determination>
- NSW SC (Scientific Committee) (2011b) Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes Bioregions - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act. NSW Scientific Committee for the NSW Biodiversity Conservation Act. Available at: <https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2011-2012/sandhill-pine-woodland-in-the-riverina-minor-amendment-determination>
- Ramsay M, Dixon KW (2003) Propagation science, recovery and translocation of terrestrial orchids. In 'Orchid conservation'. (Eds KW Dixon, SP Kell, RL Barrett,

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PJ Cribb) pp. 25–42. (Natural History Publications: Kota Kinabalu, Sabah, Malaysia)

Reiter N, Bohman B, Freestone M, Brown G, Phillips R (2019) Pollination by nectar-foraging thynnine wasps in the endangered *Caladenia arenaria* and *Caladenia concolor* (Orchidaceae). *Australian Journal of Botany* **67**, 490–500.

Swarts ND (2007) 'Integrated conservation of the rare and endangered terrestrial orchid *Caladenia huegelii* H.G.Reichb.' PhD Thesis, The University of Western Australia, Perth.

Thompson WA, Eldridge DJ (2005) White cypress pine (*Callitris glaucophylla*): a review of its role in landscape and ecological processes in eastern Australia. *Australian Journal of Botany* **53**, 555-570.