

## Notice and reasons for the Final Determination

The NSW Threatened Species Scientific Committee, established under the *Biodiversity Conservation Act 2016* (the Act), has made a Final Determination to remove the shrub *Dracophyllum macranthum* E.A.Br. & N.Streiber from the Schedules of the Act by omitting reference to this species from Part 3 of Schedule 1 (Vulnerable species). The omission of species from the Schedules is provided for by Part 4 of the Act.

## Summary of Conservation Assessment

*Dracophyllum macranthum* was found to no longer be eligible for listing as a threatened species following the outcomes of targeted surveys conducted since the taxon was initially listed, and from a re-assessment of threats. None of the Listing Criteria are now met.

The NSW Threatened Species Scientific Committee has found that:

1. *Dracophyllum macranthum* was described by Brown and Streiber (1999) as a "Shrub 0.6–2(–3) m tall, glabrous, initially erect to spreading but longer branches frequently pendent, open and often sparsely branching from c. 10 cm above base; bark somewhat fibrous, deeply and regularly fissured, grey with reddish tinge towards base of fissures, frequently with dark blotches and lichens; branches distally reddish brown, smooth between leaf scars. Leaves usually not persisting more than 20 cm below apex, erect to spreading, sheathing at base; sheath pale brown, c. 8 mm long and 12 mm wide, gradually narrowed into lamina, margin somewhat membranous; lamina coriaceous, dark to mid green, abaxially slightly paler, linear-triangular, (85–)140–200 mm long, 6–9 mm wide, flat to slightly concave (becoming more so when dried); margin serrulate, up to 8 teeth/cm basally (usually 2 or 3), teeth more numerous distally, antrorse; tip acute and often brownish. Inflorescence (a variously modified superconflorescence, Streiber et al. 1999) terminal, flowers maturing basipetally; primary axis reddish brown; each node with a caducous leaf-like bract, usually with 2 or 3 flowers per node basally and 1, or occasionally 2, flowers per node distally; flowers large for genus, deflexed to spreading, becoming erect after corolla has dropped (probably  $\pm$  erect in bud), sometimes secund. Bracts brown, triangular, c. 50 mm long, 11 mm wide, with sheath, margin and apex as for leaves (only basal bracts observed). Bracteoles similar to bracts but smaller, c. 8 mm long, 0.5 mm wide. Pedicel reddish brown, 1.5–3 mm long. Calyx rose-coloured (becoming scarious and reddish brown with margin paler in fruit), lobes triangular, (8–)9–10(–11) mm long, 2–2.5 mm wide, c. 1/2 corolla length; margin membranous, ciliolate especially in distal half; apex acute. Corolla dark pink becoming red with age, lobes white; tube cylindrical, (16–)18–22(–25) mm long, 3–3.5(–4) mm diam.; lobes spreading, ovate, 2.5–4 mm long, 1.5–3 mm wide, base obtuse to subcordate, apex obtuse, surface rugose-verrucate. Stamens with filaments inserted at base of corolla tube, 18–20 mm long; anthers attached above midpoint, 2–3 mm long, barely included in corolla throat. Pistil slightly longer than corolla tube; nectary scales separate,  $\pm$  half height of

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ovary, upper margin  $\pm$  irregularly toothed and truncate; ovary  $\pm$  cylindrical, 2–3 mm long, 1–2 mm diam., smooth, locule septum showing as paler vertical line; style filiform, (14–)17–19 mm long, minutely papillose distally; stigma indistinctly 5-lobed. Fruit brown, shorter than calyx, style often persisting, seeds not observed.”

- Dracophyllum macranthum* is endemic to the lower North Coast of NSW, known only from Coorabakh NP, Comboyne SF, Lansdowne SF, and potentially within adjacent private land holdings. NSW Scientific Committee (2008) suggested that the total range was likely to cover less than 20 km<sup>2</sup>, with a north-south extent of less than 9 km. However, recent surveys have expanded this range to 36 km<sup>2</sup> (Bell and Sims 2018a). Following targeted surveys across part of the known range (searching 8 km of gorge habitat in two catchments, c. 10% of the likely habitat in Coorabakh NP), Bell and Sims (2018a) estimated a total population size within this search area of between 10,000 and 75,000 individuals. Considering the extent of unsearched habitat within Coorabakh NP and the adjacent Comboyne SF, they estimated a total population size of well over 100,000 individuals.
- Brown and Streiber (1999) noted habitat as being ‘rock outcrops in sheltered stream gullies and damp roadsides, usually in slightly more open areas in the forest’. The more descriptive notes in NSW Scientific Committee (2008) add that *Dracophyllum macranthum* occurs at elevations of 300 to 500m ASL, on loamy soils over conglomerate bedrock and associated sandstones of the Triassic Camden Haven beds. They continue that the species occurs in localised colonies often distributed along linear landscape features such as roadsides, steep rock drop-offs, and on large sub-canopy conglomerate knolls. All observed populations of *D. macranthum* occur beneath a canopy of eucalypts (most commonly *Eucalyptus pilularis*) and *Syncarpia glomulifera* with *Allocasuarina torulosa*, but are confined to rocky substrates (Bell 2017). Secondary and perhaps opportunistic populations also occur on rocky road cuttings where sufficient water seepage is evident for plants to be maintained, and where such water is abundant aspect does not appear to be a limiting factor. *D. macranthum* is consequently almost certainly exclusively lithophytic, and tall cliff lines within remote gorges and at sheltered southerly-to-easterly aspects is clearly the most important habitat for this species (Bell and Sims 2018b).
- Previous documentation of habitat (NSW Scientific Committee 2008) also included reference to dry slopes beneath *Eucalyptus pilularis* open forest, but it is considered that these occurrences actually refer to rocky outcrops or boulders that may be covered in a shallow layer of leaf litter. Likewise, fern banks dominated by *Gleichenia* sp. and *Sticherus* sp., previously considered as the most common habitat for *Dracophyllum macranthum*, does not accurately reflect field observations; the vast majority of plants occur on conglomerate boulders and cliffs in the complete absence of fern banks of these species (Bell and Sims 2018b).
- On its initial listing, NSW Scientific Committee (2008) documented a number of threats potentially impacting on *Dracophyllum macranthum*. These included adverse road maintenance activities, and forestry operations with the associated potential changes to hydrology, introduction of invasive weed species, changes in exposure and fire regimes, and possible introduction of soil- or water-borne

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pathogens. Most of these threats are associated with the existing trail network within known habitat, however extensive stands of the species are now known from more remote gorges well distant from these influences (Bell and Sims 2018a). Additionally, forestry operations and related disturbances in this region have been dramatically reduced with the gazettal of Coorabakh NP across former timber production forests.

6. Bell and Sims (2018a) found few or no threats to be operating on the bulk of the *Dracophyllum macranthum* population, and areas where potential threats do operate occupy a very small proportion of the total extent of this species. They considered the threats from weed species to be negligible, particularly since few weeds are capable of colonising rocky substrates within intact and remote habitats without major ground disturbances. A small number of weed species were observed (e.g. *Andropogon virginicus*, *Erechtites valerianifolius*, *Paspalum urvillei*) along some forestry trails, but these were confined to road edges and the deeper soils accumulating there through trail erosion, and did not penetrate far into the adjoining bushland. Although a small number of instances were also observed by Bell and Sims (2018b) where *Lantana camara* or *Ageratina adenophora* were present along roadsides, none of these were in close proximity to the larger *D. macranthum* populations in remote gorges.
7. No *Dracophyllum* species are currently known to be at risk from *Phytophthora*, although some studies have shown other epacrids to be highly susceptible, such as *Epacris microphylla*, *E. paludosa*, and *Leucopogon ericoides* (Newby 2014). Surrounding habitat dominated by *Eucalyptus pilularis* may be susceptible to *Phytophthora*, thereby altering the micro-habitat necessary for *Dracophyllum macranthum* survival and growth. However, available evidence suggests only a minimal threat of *Phytophthora* to stands of *Eucalyptus pilularis* given its low susceptibility (O’Gara et al. 2005; Keith et al. 2012).
8. Considering the rocky habitat in which *Dracophyllum macranthum* occurs, fire is not envisaged to pose a major threat to the survival and longevity of populations, although there is at present little scientific knowledge of the fire response of this species. As with its close relative *Dracophyllum secundum* (see Benson and McDougall 1995), individual *D. macranthum* are expected to be killed by high intensity fire events, with persistence of the population reliant on post-fire seedling emergence and growth. Thomas *et al.* (2003) found that *D. secundum* and other species inhabiting rarely-burnt sites showed very little response to fire-related germination cues (heat shock, smoke), suggesting a poorly defined fire response in that species, while populations of *D. subulatum* in New Zealand are resilient to fire, reaching pre-fire density after 15 years (Smale *et al.* 2011).
9. In view of the above, the NSW Threatened Species Scientific Committee is of the opinion that *Dracophyllum macranthum* E.A.Br. & N.Streiber is no longer eligible to be listed as a Vulnerable species in Part 3 of Schedule 1 of the Act.

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## Assessment against *Biodiversity Conservation Regulation 2017* criteria

The Clauses used for assessment are listed below for reference.

### Overall Assessment Outcome

Least Concern

### Clause 4.2 – Reduction in population size of species

(Equivalent to IUCN criterion A)

Assessment Outcome: Data Deficient

<b>(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:</b>			
	(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.
<b>(2) - The determination of that criteria is to be based on any of the following:</b>			
	(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: Not met

<b>The geographic distribution of the species is:</b>			
	(a)	for critically endangered species	very highly restricted, or
	(b)	for endangered species	highly restricted, or
	(c)	for vulnerable species	moderately restricted,
<b>and at least 2 of the following 3 conditions apply:</b>			
	(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:	

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	(i)	an index of abundance appropriate to the taxon,
	(ii)	the geographic distribution of the species,
	(iii)	the number of locations in which the species occur or of populations of the species.

### Clause 4.4 - Low numbers of mature individuals of species and other conditions

(Equivalent to IUCN criterion C)

**Assessment Outcome: Not met**

<b>The estimated total number of mature individuals of the species is:</b>				
	(a)	for critically endangered species	very low, or	
	(b)	for endangered species	low, or	
	(c)	for vulnerable species	moderately low,	
<b>and either of the following 2 conditions apply:</b>				
	(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: Not met**

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

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## Clause 4.6 - Quantitative analysis of extinction probability

(Equivalent to IUCN criterion E)

Assessment Outcome: Data Deficient

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: Not met

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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Dr Anne Kerle  
Chairperson  
NSW Threatened Species Scientific Committee

### Supporting Documentation:

Bell S and Gallagher R (2021) Conservation Assessment of *Dracophyllum macranthum* E.A.Br. & N.Streiber (family Ericaceae: Epacridoideae). NSW Threatened Species Scientific Committee.

### References:

Bell SAJ (2017) *Monitoring of the Vulnerable Dracophyllum macranthum (Ericaceae) in Coorabakh National Park and environs, New South Wales North Coast bioregion: Baseline data*. Unpublished Report to NSW Office of Environment & Heritage. 28 April 2017. Eastcoast Flora Survey.

Bell S, Sims R (2018a) Extensive populations of *Dracophyllum macranthum* (Ericaceae) in Coorabakh National Park suggest a review of threat status. *Australasian Plant Conservation* **27**, 11–14.

Bell SAJ, Sims R (2018b) *Targeted Surveys for the Vulnerable Dracophyllum macranthum (Ericaceae) in Coorabakh National Park, Lansdowne Plateau, NSW*. Unpublished Report to NSW Office of Environment & Heritage. 21 June 2018. Eastcoast Flora Survey.

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- Benson D, McDougall L (1995) Ecology of Sydney plant species. Part 3: Dicotyledon families Cabombaceae to Eupomatiaceae. *Cunninghamia* **4**, 217–431.
- Brown EA, Streiber N (1999) Systematic studies in *Dracophyllum* (Epacridaceae) 2. New species of *Dracophyllum* in New South Wales. *Telopea* **8**, 393–401.
- Keith DA, McDougall KL, Simpson CC, Walsh JL (2012) Spatial analysis of risks posed by root rot pathogen, *Phytophthora cinnamomi*: Implications for disease management. *Proceedings of the Linnean Society of New South Wales* **134**, B147–B179.
- Newby Z-J (2014) *Quantification of the risk of Phytophthora dieback in the Greater Blue Mountains World Heritage Area*. Unpublished PhD Thesis, Faculty of Agriculture and Environment, University of Sydney. February 2014.
- NSW Scientific Committee (2008) Final Determination: *Dracophyllum macranthum* – vulnerable species listing.
- O’Gara E, Howard K, Wilson B, Hardy G, StJ (2005) *Management of Phytophthora cinnamomi for Biodiversity Conservation in Australia: Part 2 - National Best Practice Guidelines*. A report funded by the Commonwealth Government Department of the Environment and Heritage by the Centre for Phytophthora Science and Management. Murdoch University, Western Australia. Available at: <https://www.environment.gov.au/system/files/resources/23925ac2-8fda-4036-aa56-5451f5d8b06d/files/part2.pdf>
- Smale MC, Fitzgerald NB, Richardson SJ (2011) Resilience to fire of *Dracophyllum subulatum* (Ericaceae) frost flat heathland, a rare ecosystem in central North Island, New Zealand. *New Zealand Journal of Botany* **49**, 231–241.
- Streiber N, Brown EA, Conn BJ, Quinn CJ (1999) Systematic studies in *Dracophyllum* (Epacridaceae) 1. Morphometric analyses of *Dracophyllum secundum* sensu lato. *Telopea* **8**, 381–391.
- Thomas P, Morris C, Auld T (2003) Interactive effects of heat shock and smoke on germination of nine species forming soil seedbanks within the Sydney region. *Austral Ecology* **28**, 674–683.