

NSW Threatened Species Scientific Committee

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Notice of 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 list *Astrotricha* sp. Howe Range (D.E.Albrecht 1054) Vic. Herbarium 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.

The NSW Threatened Species Scientific Committee is satisfied that *Astrotricha* sp. Howe Range (D.E.Albrecht 1054) Vic. Herbarium has been duly assessed by the Commonwealth Threatened Species Scientific Committee under the Common Assessment Method, as provided by Section 4.14 of the Act. After due consideration of Commonwealth DCCEEW (2024), the NSW Threatened Species Scientific Committee has made a decision to list the species as Critically Endangered.

Summary of Conservation Assessment

Astrotricha sp. Howe Range (D.E.Albrecht 1054) Vic. Herbarium was found to be Critically Endangered in accordance with the following provisions in the *Biodiversity Conservation Regulation 2017*: Clause 4.3(a)(d)(e i,ii,iii,iv) because: 1) the species has a very highly restricted geographic distribution with an extent of occurrence of 38 km²; 2) the species is known from a single threat-defined location; and 3) the species is estimated to be undergoing continuing decline in the number of mature individuals, the geographic distribution of the species, the number of populations and area, extent and quality of habitat, due to the threats of high frequency fire, disturbance from timber harvesting, and more frequent drought due to climate change.

The NSW Threatened Species Scientific Committee has found that:

1. *Astrotricha* sp. Howe Range (D.E.Albrecht 1054) Vic. Herbarium (family Araliaceae) is not yet formally described. It is characterised in VicFlora (2023) (as *Astrotricha* sp. 2) as “Erect shrubs 1.5–4.2 m high; stems felted. Leaves narrowly ovate to narrowly elliptic, 106–133 mm long, 11–18 mm wide, more or less acute, upper surface flat, smooth, lacking asperities, midvein obvious in shallow depression above, obvious below, margins flat or very slightly recurved; petiole 8–11 mm long. Inflorescence 80–150 mm long; axes closely lanate to closely floccose; bracts triangular, c. 3 mm long. Pedicels 5–11 mm long; petals 2–2.5 mm long, those of terminal (primary) and lateral umbels concolorous, white or rarely greenish-yellow; anthers c. 0.9 mm long. Fruits compressed, depressed-obloid, 2–2.5 mm long, 3.5–4 mm wide, not locellate. Flowers November–December.”
2. *Astrotricha* sp. Howe Range is known from three populations which span the New South Wales (NSW)-Victorian border, all separated by less than 20 km. One NSW population, recorded in 1984, occurs in the Howe Range in Nadgee Nature Reserve, close to the Victorian border. The second NSW population is located further north in Nadgee State Forest (SF), close to Watergums Creek, and was

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first recorded in 1992. Surveys following the 2019–2020 bushfires failed to relocate this population (Tasker *et al.* 2024). The single Victorian population is located in East Gippsland northeast of Mallacoota in the upper reaches of Harrison's Creek, close to the NSW border, and has not been recorded since 1969, despite an extensive search in 2021 (Tasker *et al.* 2024), although the herbarium record has imprecise geographic coordinates.

3. At the only known extant population (Howe Range) there were three mature plants located post-fire in 2022, along with an estimated 1000+ seedlings (Tasker *et al.* 2024). The estimated number of mature individuals is between 500–700, assuming a 30–50% attrition of juvenile plants takes place before seedlings reach maturity (Benwell 1998; Ooi 2010).
4. The geographic distribution of *Astrotricha* sp. Howe Range is very highly restricted. The area of occupancy (AOO) is estimated to be 4–12 km² based on 2 x 2 km grid cells, the scale recommended by IUCN (2024). The extent of occurrence (EOO) is based on a minimum convex polygon enclosing all mapped occurrences of the species, the method of assessment recommended by IUCN (2024) and was estimated to be 4–38 km². Both AOO and EOO assume that the three known subpopulations may remain extant.
5. *Astrotricha* sp. Howe Range occurs as an understorey shrub in areas of regrowth in *Acacia longifolia* and *Eucalyptus sieberi* or *E. fraxinoides* sclerophyll forest on loamy stony soil over fine grained quartzite or amongst Conglomerate rock (AVH 2022). Associated understorey species include *Amperea xiphoclada*, *Boronia muelleri*, *Cassinia longifolia*, *Elaeocarpus reticulatus*, *Gahnia sieberiana*, *Lomandra longifolia*, *Platysace lanceolata*, *Pultenaea benthamii* and *Xanthosia ternifolia* (AVH 2022).
6. Based on inference from other *Astrotricha* species, the primary juvenile period of *A. sp.* Howe Range is likely to be 1–6 years, with a lifespan probably less than 10 years (OEH 2014; Falster *et al.* 2021). Seedlings recruited at Howe Range after the 2019–20 fire season were not yet mature in 2022, more than 2 years post fire (D. Albrecht 2022. pers. comm. October 2022; Tasker *et al.* 2024).
7. Some *Astrotricha* species are thought to depend on infrequent fire for substantial recruitment from long-lived, soil-stored seed (Benson and McDougall 1993; Ferrer-Paris and Keith 2022). Numbers of standing plants may fluctuate between fires, especially in obligate seedling species (NSW Scientific Committee 2007). For *A. sp.* Howe Range, there is little known about fire dependence for recruitment, although a large number of seedlings were recorded just over 2 years after the 2019–20 fire season at the Howe Range population, with adults surviving only in unburnt areas, and no resprouts observed (Tasker *et al.* 2024). *Astrotricha* sp. Howe Range is unlikely to have the capacity to resprout (Henwood *et al.* 1999), i.e., it is an obligate seeder.
8. *Astrotricha* sp. Howe Range is threatened by a range of ongoing threats including high frequency fire, timber harvesting, and drought. 'High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of

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vegetation structure and composition' and 'Anthropogenic Climate Change' are Key Threatening Processes under the Act.

9. *Astrotricha* sp. Howe Range is restricted to one threat-based location based on the most serious plausible threat of high frequency fire. A single fire event could rapidly act across all populations of the species (should more than one population be found extant), which are separated by approximately 20 km of relatively contiguous habitat.
10. Of the three subpopulations of *Astrotricha* sp. Howe Range known historically, only one has been relocated after the 2019–2020 fire season, despite targeted surveys. It is possible that the northern subpopulation at Watergums Creek has been lost to timber harvesting and associated disturbance in the time since it was discovered, with the area extensively harvested in the years since its discovery (Tasker *et al.* 2024). It is also plausible that the short fire free interval of between 1973 and 1981 (NSW DPE 2022), may be responsible for the loss of the population. A fire return time of between 3–6 years is likely to cause rapid declines and intervals >10 years may also lead to declines in the species. The Mallacoota population has not been recorded since 1969 and may have also been lost in the intervening decades, although the location record is vague, and the species may possibly survive in the soil seed bank. The probable loss of at least one or possibly two subpopulations is inferred to represent a decline in the number of mature individuals, geographic distribution of the species (EOO and AOO), and number of populations. Based on the historical and current threats to the population of *A.* sp. Howe Range, particularly related to the probability of frequent return droughts and fires under climate change, it is also inferred to be undergoing continuing decline in area, extent and quality of habitat.
11. *Astrotricha* sp. Howe Range (D.E.Albrecht 1054) Vic. Herbarium 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.

Overall Assessment Outcome:

Critically Endangered under Clause 4.3(a)(d)(e i,ii,iii,iv).

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

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	(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: Critically Endangered under Clause 4.3(a)(d)(e i,ii,iii,iv).

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,
		(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 Clause C)

Assessment Outcome: Endangered under Clause 4.4(b)(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

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		(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: Vulnerable under Clause 4.5(c)

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

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 under Clause 4.7

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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Chairperson
NSW Threatened Species Scientific Committee

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Supporting Documentation:

Commonwealth DCCEEW (Department of Climate Change, Energy, the Environment and Water) (2024) Conservation Advice for *Astrotricha* sp. Howe Range (D.E.Albrecht 1054) (long-leaf star-hair). (Australian Government, Canberra)

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