



Consultation on Species Listing Eligibility and Conservation Actions

Astrotricha sp. Wingan Inlet (Wingan star-hair)

You are invited to provide your views and supporting reasons related to:

- 1) the eligibility of *Astrotricha* sp. Wingan Inlet (Wingan star-hair) for inclusion on the EPBC Act threatened species list in the Endangered category; and
- 2) the necessary conservation actions for the above species.

The purpose of this consultation document is to elicit additional information to better understand the status of the species and help inform on conservation actions and further planning. As such, the below draft assessment should be considered to be **tentative** as it may change following responses to this consultation process.

Evidence provided by experts, stakeholders and the general public are welcome. Responses can be provided by any interested person.

Anyone may nominate a native species, ecological community or threatening process for listing under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or for a transfer of an item already on the list to a new listing category. The Threatened Species Scientific Committee (the Committee) undertakes the assessment of species to determine eligibility for inclusion in the list of threatened species and provides its recommendation to the Australian Government Minister for the Environment.

Responses are to be provided in writing by email to:
species.consultation@environment.gov.au.

Please include species scientific name in Subject field.

or by mail to:

The Director
Bushfire Affected Species Assessments Section
Biodiversity Conservation Division
Department of Climate Change, Energy, the Environment and Water
(Attention: species.consultation@environment.gov.au)
GPO Box 3090
Canberra ACT 2600

Responses are required to be submitted by 22 November 2022.

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General background information about listing threatened species

The Australian Government helps protect species at risk of extinction by listing them as threatened under Part 13 of the EPBC Act. Once listed under the EPBC Act, the species becomes a Matter of National Environmental Significance (MNES) and must be protected from significant impacts through the assessment and approval provisions of the EPBC Act. More information about threatened species is available on the department's website at: <https://www.dcceew.gov.au/environment/biodiversity/threatened>

Public nominations to list threatened species under the EPBC Act are received annually by the department. In order to determine if a species is eligible for listing as threatened under the EPBC Act, the Threatened Species Scientific Committee (the Committee) undertakes a rigorous scientific assessment of its status to determine if the species is eligible for listing against a set of criteria. These criteria are available on the Department's website at: [Guidelines for assessing the conservation status of native species according to the Environment Protection and Biodiversity Conservation Act 1999 and Environment Protection and Biodiversity Conservation Regulations 2000 \(dcceew.gov.au\)](#)

As part of the assessment process, the Committee consults with the public and stakeholders to obtain specific details about the species, as well as advice on what conservation actions might be appropriate. Information provided through the consultation process is considered by the Committee in its assessment. The Committee provides its advice on the assessment (together with comments received) to the Minister regarding the eligibility of the species for listing under a particular category and what conservation actions might be appropriate. The Minister decides to add, or not to add, the species to the list of threatened species under the EPBC Act. More detailed information about the listing process is at: [Nominating a species, ecological community or key threatening process under the EPBC Act - DCCEEW](#)

To promote the recovery of listed threatened species and ecological communities, conservation advices and where required, recovery plans are made or adopted in accordance with Part 13 of the EPBC Act. Conservation advices provide guidance at the time of listing on known threats and priority recovery actions that can be undertaken at a local and regional level. Recovery plans describe key threats and identify specific recovery actions that can be undertaken to enable recovery activities to occur within a planned and logical national framework. Information about recovery plans is available on the department's website at: <https://www.dcceew.gov.au/environment/biodiversity/threatened/recovery-plans>

Privacy notice

The Department will collect, use, store and disclose the personal information you provide in a manner consistent with the Department's obligations under the Privacy Act 1988 (Cth) and the Department's Privacy Policy. Personal information means information or an opinion about an identified individual, or an individual who is reasonably identifiable.

Any personal information that you provide within, or in addition to, your comments in the threatened species assessment process may be used by the Department for the purposes of its functions relating to threatened species assessments, including contacting you if we have any questions about your comments in the future.

Further, the Commonwealth, State and Territory governments have agreed to share threatened species assessment documentation (including comments) to ensure that all States and Territories have access to the same documentation when making a decision on the status of a potentially threatened species. This is also known as the '[Common Assessment Method](#)' (CAM). As a result, any personal information that you have provided in

connection with your comments may be shared between Commonwealth, State or Territory government entities to assist with their assessment processes.

The Department's Privacy Policy contains details about how respondents may access and make corrections to personal information that the Department holds about the respondent, how respondents may make a complaint about a breach of an Australian Privacy Principle, and how the Department will deal with that complaint. Alternatively, email the department at privacy@awe.gov.au. A copy of the Department's Privacy Policy is available at: <https://www.dcceew.gov.au/about/commitment/privacy>

Information about this consultation process

Responses to this consultation can be provided electronically or in hard copy to the contact addresses provided on Page 1. All responses received will be provided in full to the Committee and then to the Australian Government Minister for the Environment and Water.

In providing comments, please provide references to published data where possible. Should the Committee use the information you provide in formulating its advice, the information will be attributed to you and referenced as a 'personal communication' unless you provide references or otherwise attribute this information (please specify if your organisation requires that this information is attributed to your organisation instead of yourself). The final advice by the Committee will be published on the department's website following the listing decision by the Minister.

Information provided through consultation may be subject to freedom of information legislation and court processes. It is also important to note that under the EPBC Act, the deliberations and recommendations of the Committee are confidential until the Minister has made a final decision on the nomination, unless otherwise determined by the Minister.

CONSULTATION QUESTIONS FOR *Astrotricha* sp. Wingan Inlet

SECTION A - GENERAL

1. Is the information used to assess the nationally threatened status of the species robust? Have all the underlying assumptions been made explicit? Please provide justification for your response.
2. Can you provide additional data or information relevant to this assessment?
3. Have you been involved in previous state, territory or national assessments of this species? If so, in what capacity?

PART 1 – INFORMATION TO ASSIST LISTING ASSESSMENT

SECTION B DO YOU HAVE ADDITIONAL INFORMATION ON THE ECOLOGY OR BIOLOGY OF THE SPECIES? (If no, skip to section C)

Biological information

4. Can you provide any additional or alternative references, information or estimates on longevity, average life span and generation length?
5. Do you have any additional information on the ecology or biology of the species not in the current advice?

SECTION C ARE YOU AWARE OF THE STATUS OF THE TOTAL NATIONAL POPULATION OF THE SPECIES? (If no, skip to section D)

Population size

6. Has the survey effort for this taxon been adequate to determine its national adult population size? If not, please provide justification for your response.
7. Do you consider the way the population size has been derived to be appropriate? Are there any assumptions and unquantified biases in the estimates? Did the estimates measure relative or absolute abundance? Do you accept the estimate of the total population size of the species? If not, please provide justification for your response.

8. If not, can you provide a further estimate of the current population size of mature adults of the species (national extent)? Please provide supporting justification or other information.

If, because of uncertainty, you are unable to provide a single number, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of possible species numbers, and also choose the level of confidence you have in this estimate:

Number of mature individuals is estimated to be in the range of:

- 1–50 51–250 251–1000 >1000 >10 000

Level of your confidence in this estimate:

- 0–30% - low level of certainty/ a bit of a guess/ not much information to go on
- 31–50% - more than a guess, some level of supporting evidence
- 51–95% - reasonably certain, information suggests this range
- 95–100% - high level of certainty, information indicates quantity within this range
- 99–100% - very high level of certainty, data are accurate within this range

SECTION D ARE YOU AWARE OF TRENDS IN THE OVERALL POPULATION OF THE SPECIES? (If no, skip to section E)

9. Does the current and predicted rate of decline used in the assessment seem reasonable? Do you consider that the way this estimate has been derived is appropriate? If not, please provide justification of your response.

Evidence of total population size change

10. Are you able to provide an estimate of the total population size in ~2012 (*generation length unknown so 10 year time frame would be used in Criterion 1*)? Please provide justification for your response.

If, because of uncertainty, you are unable to provide a single number, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of possible species numbers, and also choose the level of confidence you have in this estimate.

Number of mature individuals is estimated to be in the range of:

- 1–50 51–250 251–1000 >1000 >10 000

Level of your confidence in this estimate:

- 0–30% - low level of certainty/ a bit of a guess/ not much information to go on
- 31–50% - more than a guess, some level of supporting evidence
- 51–95% - reasonably certain, information suggests this range
- 95–100% - high level of certainty, information indicates quantity within this range
- 99–100% - very high level of certainty, data are accurate within this range

11. Are you able to comment on the extent of decline in the species' total population size since the 1990s? Please provide justification for your response.

If, because of uncertainty, you are unable to provide an estimate of decline, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of ranges of decline, and also choose the level of confidence you have in this estimated range.

Decline estimated to be in the range of:

- 1–30% 31–50% 51–80% 81–100% 90–100%

Level of your confidence in this estimated decline:

- 0–30% - low level of certainty/ a bit of a guess/ not much information to go on
- 31–50% - more than a guess, some level of supporting evidence
- 51–95% - reasonably certain, suggests this range of decline
- 95–100% - high level of certainty, information indicates a decline within this range

99–100% - very high level of certainty, data are accurate within this range

12. Please provide (if known) any additional evidence which shows the population is stable, increasing or declining.

SECTION E ARE YOU AWARE OF INFORMATION ON THE TOTAL RANGE OF THE SPECIES? (If no, skip to section F)

Current Distribution/range/extent of occurrence, area of occupancy

13. Does the assessment consider the entire geographic extent and national extent of the species? If not, please provide justification for your response.

14. Has the survey effort for this species been adequate to determine its national distribution? If not, please provide justification for your response.

15. Is the distribution described in the assessment accurate? If not, please provide justification for your response and provide alternate information.

16. Do you agree that the way the current extent of occurrence and/or area of occupancy have been estimated is appropriate? Please provide justification for your response.

17. Can you provide estimates (or if you disagree with the estimates provided, alternative estimates) of the extent of occurrence and/or area of occupancy.

If, because of uncertainty, you are unable to provide an estimate of extent of occurrence, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of ranges of extent of occurrence, and also choose the level of confidence you have in this estimated range.

Current extent of occurrence is estimated to be in the range of:

<100 km² 100 – 5 000 km² 5 001 – 20 000 km² >20 000 km²

Level of your confidence in this estimated extent of occurrence

0–30% - low level of certainty/ a bit of a guess/ not much data to go on

- 31–50% - more than a guess, some level of supporting evidence
- 51–95% - reasonably certain, data suggests this range of decline
- 95–100% - high level of certainty, data indicates a decline within this range
- 99–100% - very high level of certainty, data is accurate within this range

If, because of uncertainty, you are unable to provide an estimate of area of occupancy, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of ranges of area of occupancy, and also choose the level of confidence you have in this estimated range.

Current area of occupancy is estimated to be in the range of:

- <10 km² 11 – 500 km² 501 – 2000 km² >2000 km²

Level of your confidence in this estimated extent of occurrence:

- 0–30% - low level of certainty/ a bit of a guess/ not much data to go on
- 31–50% - more than a guess, some level of supporting evidence
- 51–95% - reasonably certain, data suggests this range of decline
- 95–100% - high level of certainty, data indicates a decline within this range
- 99–100% - very high level of certainty, data is accurate within this range

SECTION F ARE YOU AWARE OF TRENDS IN THE TOTAL RANGE OF THE SPECIES? (If no, skip to section G)

Past Distribution/range/extent of occurrence, area of occupancy

18. Do you consider that the way the historic distribution has been estimated is appropriate? Please provide justification for your response.

19. Can you provide estimates (or if you disagree with the estimates provided, alternative estimates) of the former extent of occurrence and/or area of occupancy.

If, because of uncertainty, you are unable to provide an estimate of past extent of occurrence, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of ranges of past extent of occurrence, and also choose the level of confidence you have in this estimated range.

Past extent of occurrence is estimated to be in the range of:

<100 km² 100 – 5 000 km² 5 001 – 20 000 km² >20 000 km²

Level of your confidence in this estimated extent of occurrence

0–30% - low level of certainty/ a bit of a guess/ not much data to go on

31–50% - more than a guess, some level of supporting evidence

51–95% - reasonably certain, data suggests this range of decline

95–100% - high level of certainty, data indicates a decline within this range

99–100% - very high level of certainty, data is accurate within this range

If, because of uncertainty, you are unable to provide an estimate of past area of occupancy, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of ranges of past area of occupancy, and also choose the level of confidence you have in this estimated range:

Past area of occupancy is estimated to be in the range of:

<10 km² 11 – 500 km² 501 – 2000 km² >2000 km²

Level of your confidence in this estimated extent of occurrence:

- 0–30% - low level of certainty/ a bit of a guess/ not much data to go on
- 31–50% - more than a guess, some level of supporting evidence
- 51–95% - reasonably certain, data suggests this range of decline
- 95–100% -high level of certainty, data indicates a decline within this range
- 99–100% - very high level of certainty, data is accurate within this range

PART 2 – INFORMATION FOR CONSERVATION ADVICE ON THREATS AND CONSERVATION ACTIONS

SECTION G DO YOU HAVE INFORMATION ON THREATS TO THE SURVIVAL OF THE SPECIES? (If no, skip to section H)

20. Do you consider that all major threats have been identified and described adequately?
21. To what degree are the identified threats likely to impact on the species in the future?
22. Are the threats impacting on different populations equally, or do the threats vary across different populations?
23. Can you provide additional or alternative information on past, current or potential threats that may adversely affect the species at any stage of its life cycle?
24. Can you provide supporting data/justification or other information for your responses to these questions about threats?

SECTION H DO YOU HAVE INFORMATION ON CURRENT OR FUTURE MANAGEMENT FOR THE RECOVERY OF THE SPECIES? (If no, skip to section I)

25. What planning, management and recovery actions are currently in place supporting protection and recovery of the species? To what extent have they been effective?
26. Can you recommend any additional or alternative specific threat abatement or conservation actions that would aid the protection and recovery of the species?
27. Would you recommend translocation (outside of the species' historic range) as a viable option as a conservation actions for this species?

SECTION I DO YOU HAVE INFORMATION ON STAKEHOLDERS IN THE RECOVERY OF THE SPECIES?

28. Are you aware of other knowledge (e.g. traditional ecological knowledge) or individuals/groups with knowledge that may help better understand population trends/fluctuations, or critical areas of habitat?
29. Are you aware of any cultural or social importance or use that the species has?
30. What individuals or organisations are currently, or potentially could be, involved in management and recovery of the species?
31. How aware of this species are land managers where the species is found?
32. What level of awareness is there with individuals or organisations around the issues affecting the species?
 - a. Where there is awareness, what are these interests of these individuals/organisations?
 - b. Are there populations or areas of habitat that are particularly important to the community?

PART 3 – ANY OTHER INFORMATION

33. Do you have comments on any other matters relevant to the assessment of this species?

Conservation Advice for *Astrotricha* sp. Wingan Inlet (Wingan star-hair)

This draft document is being released for consultation on the species listing eligibility and conservation actions

The purpose of this consultation document is to elicit additional information to better understand the eligibility of the species for listing and inform conservation actions, further planning and the potential need for a Recovery Plan.

The draft assessment below should therefore be considered **tentative** at this stage, as it may change as a result of responses to this consultation process.

Note: Specific consultation questions relating to the below draft assessment and preliminary determination have been included in the consultation cover paper

This document combines the approved conservation advice and listing assessment for the species. It provides a foundation for conservation actions and further planning.



Astrotricha sp. Wingan Inlet (inflorescence) © Copyright, Daniel Ohlsen, Royal Botanic Gardens Victoria (CC-BY-NC-SA 4.0).

Conservation status

Astrotricha sp. Wingan Inlet (Wingan star-hair) is proposed to be listed in the Endangered category of the threatened species list under the *Environment Protection and Biodiversity Conservation Act 1999*.

Astrotricha sp. Wingan Inlet was assessed by the Threatened Species Scientific Committee to be eligible for listing as Endangered under criterion 2. The Committee's assessment is at Attachment A. The Committee's assessment of the species' eligibility against each of the listing criteria is:

- Criterion 1: Insufficient data
- Criterion 2: B1ab(iii)+2ab(iiii): Endangered
- Criterion 3: Insufficient data
- Criterion 4: D1 Vulnerable
- Criterion 5: Insufficient data

The main factors that make the species proposed for listing in the Endangered category are a severely fragmented and restricted distribution, and a continuing decline inferred in the area, extent and quality habitat.

Species can also be listed as threatened under state and territory legislation. For information on the current listing status of this species under relevant state or territory legislation, see the [Species Profile and Threats Database](#).

Species information

Taxonomy

Conventionally accepted as *Astrotricha* sp. Wingan Inlet (J.A.Jeanes 2268) Vic. Herbarium (APNI 2022). Also known as *Astrotricha* sp. 3, *sensu* Henwood et al. (1999). Family: Araliaceae.

Description

The Wingan star-hair is a small shrub to c. 1.5 m tall with soft stems (Vic Flora 2022a). The leaves are c. 20–42 (occasionally to 55) mm long and 2–4 (occasionally to 5) mm wide, narrowly oblanceolate (rounded apex and slightly tapering base), with small, narrow horn-like protuberances on the upper surface. The inflorescence is 45–80 (occasionally to 140) mm long, comprising a terminal umbel and several lateral umbels with small, clustered, cream-white flowers. The fruit is compressed, slightly obovoid, approximately 3 mm long by 4 mm wide. The Wingan star-hair flowers in November and December.

Distribution

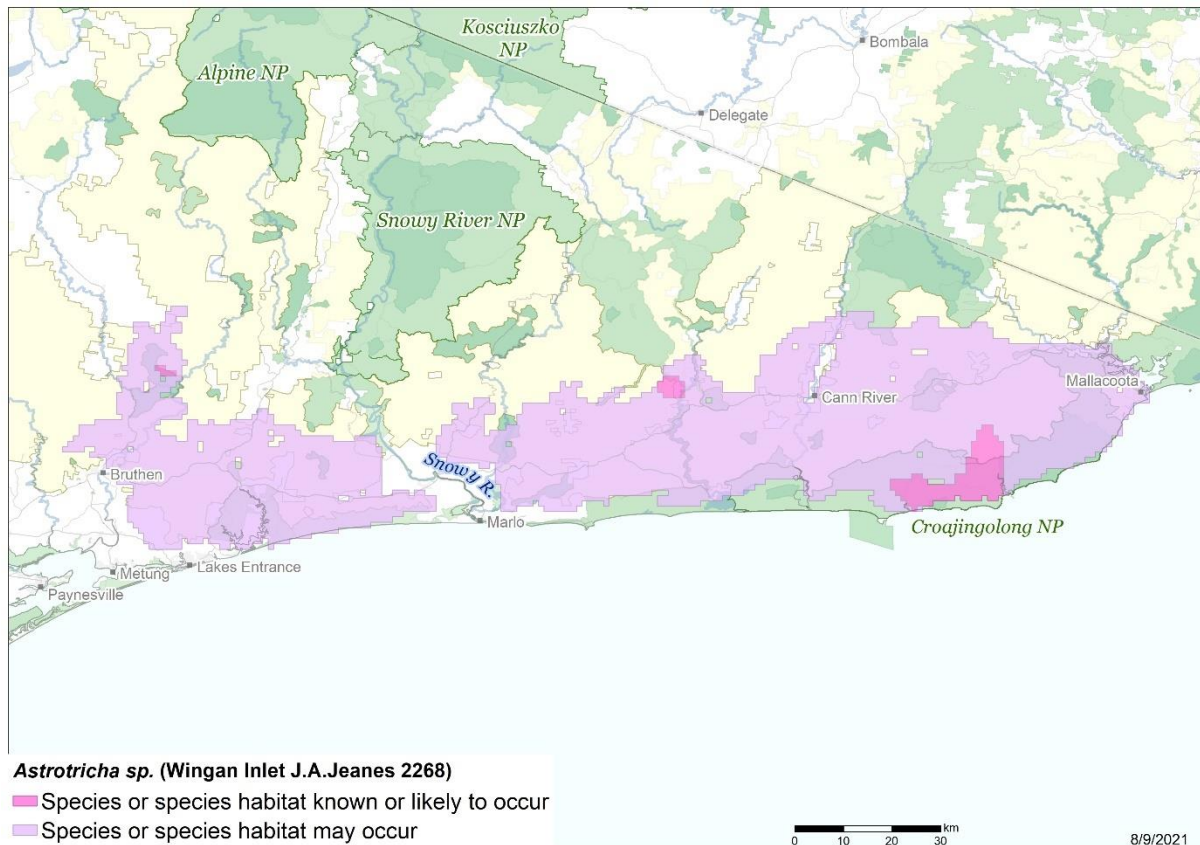
The Wingan star-hair is restricted to East Gippsland, Victoria (see Table 1) in the South East Corner bioregion (DAWE 2021). There are two subpopulations known from recent records (post-2010) at Wingan Inlet in Croajingolong National Park (NP) and Mount Elizabeth Nature Conservation Reserve (NCR). In addition, there are records from Dingo Creek near Club Terrace,

Mueller River near Point Hicks (Croajingolong NP), Little Rich River in Ellery State Forest (SF), and Morris Peak Road (near Bullumwaal). However, these records are only represented by specimens that were collected prior to 2003 and there have been no subsequent surveys. A historical collection from Goolengook Creek is excluded on the basis of age and a lack of spatial information (AVH 2022).

Table 1 Subpopulations of the Wingan star-hair

Subpopulation	Tenure	Date collected or observed	Abundance and locality Summarised from AVH (2022) and DELWP (2017)
Wingan Inlet West Wingan Road	Croajingolong National Park	1948, 1951, 1969, 2009, 2016	<u>Up to 70 mature plants before the 2019-20 fires:</u> 20 plants along 400 m road, 2km from campground [2009]; 3 plants in immediate vicinity [2016] 40 – 50 plants along 100 m roadside [2016] Rare, small populations of <10 plants vulnerable to roadside disturbance (ABRS 2017)
Mt Elizabeth	Mount Elizabeth Nature Conservation Reserve	1968, 1984, 2002, 2014, 2015, 2017, 2021	<u>Recent estimate of 40 seedlings:</u> 2 plants 3 km from Collins Rd [2002] 15–20 plants [2014] 'Common' [2015] 10–20 plants [2017] 40 plants [2021], all seedlings regenerating post-fire (Tolsma & Sutter 2022)
Dingo Creek	Club Terrace State Forest	1993, 2002	Abundance unknown. Goolengook Road
Mueller River	Croajingolong National Park	1994	Abundance unknown. Cicada Trail
Little Rich River	Ellery State Forest	1987	Abundance unknown. Near Rich River Road bridge
Bullumwaal	?	1971	Abundance unknown. Morris Peak Road

Map 1 Modelled distribution of Wingan star-hair



Source: Base map Geoscience Australia; species distribution data [Species of National Environmental Significance](#) database.

Caveat: The information presented in this map has been provided by a range of groups and agencies. While every effort has been made to ensure accuracy and completeness, no guarantee is given, nor responsibility taken by the Commonwealth for errors or omissions, and the Commonwealth does not accept responsibility in respect of any information or advice given in relation to, or as a consequence of, anything contained herein.

Species distribution mapping: The species distribution mapping categories are indicative only and aim to capture (a) the habitat or geographic feature that represents to recent observed locations of the species (known to occur) or habitat occurring in close proximity to these locations (likely to occur); and (b) the broad environmental envelope or geographic region that encompasses all areas that could provide habitat for the species (may occur). These presence categories are created using an extensive database of species observations records, national and regional-scale environmental data, environmental modelling techniques and documented scientific research.

Cultural and community significance

The cultural, customary and spiritual significance of species and the ecological communities they form are diverse and varied for Indigenous Australians and their stewardship of Country. This section describes some examples of this significance but is not intended to be comprehensive or applicable to, or speak for, Indigenous Australians. Such knowledge may be held by Indigenous Australians who are the custodians of this knowledge and have the rights to decide how this knowledge is shared and used.

The Wingan star-hair occurs on the lands of the Gunaikurnai and Bidwell peoples (Aboriginal Victoria 2022; AIATSIS 2022). There is little published information about the cultural significance of the Wingan star-hair or other similar star-hairs. *Astrotricha latifolia* (broad-leaf star-hair) and *A. longifolia* (long-leaf star-hair) are noted as ‘native tobacco’ by Packer et al.

(2012), although further information is not given. However, given the acknowledged importance to Aboriginal peoples of Connection to Country and the widespread importance of Caring for Country (which includes biodiversity, 'place', custom and totemic elements) it is considered likely that the species has or is associated with some cultural and/or community significance. Ascertaining the cultural significance of this species is identified as a priority action in the Conservation and Recovery actions.

Relevant biology and ecology

Habitat

Little is known about the biology and ecology of the Wingan star-hair. The species occurs primarily in dry open forest dominated by *Eucalyptus sieberi* (silvertop ash) with a scrubby or heathy understorey. The following information about habitat preferences are derived from collection notes of herbarium specimens (AVH 2022).

At Wingan Inlet (West Wingan Road), the species occurs in grey sandy loam in dry open forest dominated by silvertop ash, with associated taxa including *Acacia longifolia* subsp. *longifolia* (golden wattle), *A. terminalis* (sunshine wattle), *Allocasuarina littoralis* (black she-oak), *Elaeocarpus reticulatus* (blueberry ash), *Banksia serrata* (old-man banksia), *Ricinocarpus pinifolius* (wedding bush), *Dianella tasmanica* (Tasman flax-lilly), *Gahnia clarkei* (tall saw-sedge), *Epacris impressa* (common heath), *Pteridium esculentum* (bracken), *Goodenia ovata* (hop goodenia), *Lasiopetalum macrophyllum* (shrubby velvet-bush), *Platylobium* sp. (flat-pea) and *Tetrarrhena* sp. A collection from Wingan Inlet in 1951 described the species as growing in 'damp sand in heavy scrub near permanent camp'. At Mueller River, also in Croajingolong NP, the species was described as growing in 'riparian tall open forest/warm temperate forest ecotone'.

At Mt Elizabeth, the species grows in dry open forest dominated by silvertop ash, with associated taxa including *E. globoidea* (white stringybark), golden wattle, sunshine wattle, *Pomaderris aspera* (hazel pomaderris), *Hakea eriantha* (tree hakea) and *Pultenaea juniperina* (prickly bush-pea). At Dingo Creek, the species occurs alongside a creek bank in lowland forest dominated by silvertop ash and white stringybark, with associated taxa including *Bursaria spinosa* (blackthorn), hop goodenia, *Hibbertia dentata* (toothed guinea flower), *Geranium* sp. and *Blechnum cartilagineum* (gristle fern).

All collections of the Wingan star-hair are from plants growing on roadsides (most subpopulations) or on creek banks (Dingo Creek subpopulation). At Wingan Inlet and Mt Elizabeth, the species is known entirely from roadsides. Post-fire surveys of the Mt Elizabeth subpopulation detected ~40 regenerating seedlings primarily in steep ground along the low side of the track (Tolsma & Sutter 2022).

A preference for road or track margins has also been noted in the related *Astrotricha* sp. Wallagarragh (Merimbula star-hair). Following drought-breaking rains in 2020-21, regenerating seedlings of the Merimbula star-hair were observed growing along roadside embankments and walking track edges at the margins of forest and woodland, but were rarely seen in denser bush dominated by bracken and other shrubs (Farrow 2021). However, similar areas of disturbance/increased availability of light are likely to be naturally occurring away from

roads and tracks (e.g. tree falls, creek banks, animal diggings, post-fire conditions generally, etc.) and it is highly likely that the Wingan star-hair also occurs away from roadsides.

Reproductive Ecology

Little is known of the pollination of *Astrotricha* spp., although they are almost certainly insect pollinated. The related Merimbula star-hair, which also has cream-white flowers, is likely to be pollinated primarily by flies and bees, although the flowers attract a range of insect species (Farrow 2019).

Little is known of the seed ecology of *Astrotricha* spp., including the method of seed dispersal and whether seed germination is fire-cued. The seed of the Wingan star-hair, along with other *Astrotricha* spp., are thought to be water-dispersed (hydrochorous) (Falster et al. 2021). Most *Astrotricha* spp. are thought to release seeds en masse when the seeds mature, and have long persistent soil seed banks (Falster et al. 2021).

Fire Ecology

At Mt Elizabeth, the Wingan star-hair was observed regenerating from seedlings in 2021 following a low severity burn during the 2019-20 bushfires (Tolsma & Sutter 2022). No plants were observed resprouting, although it was noted that the species is thought to be capable of resprouting following fire (Tolsma & Sutter 2022). One larger individual was observed flowering at the time of the survey, indicating the species is capable of flowering within 2 years post-fire. However, as only one individual was flowering, the primary juvenile period is estimated to be approximately 3 years for the purposes of this assessment.

Other star-hairs are known to regenerate primarily from seedlings (VicFlora 2022c-i) or via resprouting and seedlings (NSW TSSC 2007; VicFlora 2022b).

Habitat critical to the survival

The Wingan star-hair occurs in dry open forest dominated by silvertop ash with a scrubby or heathy understorey. Habitat features commonly associated with the Wingan star-hair include, but are not limited to, roadside verges, embankments and creek banks and possibly natural areas of disturbance, and associated shrubby species (see examples in Relevant biology and ecology section).

Due to the limited number of individuals and subpopulations, habitat critical to the survival of the Wingan star-hair comprises the entire area of occupancy of known subpopulations, including any subpopulations discovered in the future, areas of similar habitat adjoining known subpopulations which provide potential habitat for expansion of known subpopulations, and areas identified as suitable for translocations.

Areas of appropriate habitat where the species is likely to occur (i.e., dark pink areas in Map 1) should be considered as potential habitat for the species, and surveys undertaken to determine whether the species is likely to be present or absent. Appropriate habitat is defined as silvertop ash dry open forest with a scrubby or heathy understorey on roadside verges, embankments, creek banks and in areas of natural disturbance.

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat.

Important populations

In this section, the word ‘population’ is used to refer to a subpopulation, in keeping with the terminology used in the EPBC Act and state/territory environmental legislation.

Given the small number of known populations and individuals, all populations of the Wingan star-hair are considered important for the long-term recovery and survival of the species.

Threats

There is little information on the threats to the Wingan star-hair. The two relatively well-documented subpopulations (Wingan Inlet and Mt Elizabeth) occur along roadsides and are likely to be at risk from track maintenance, vehicular damage and roadside management activities. There is less information concerning the subpopulations at Dingo Creek, Mueller River, Little Rich River and Bullumwaal, but these also appear to occur along roadsides and may therefore also be at risk of damage from vehicles and track maintenance.

The fire response of the species is not yet well understood, but fire regimes that cause declines in biodiversity is likely to be a threat to the species. The susceptibility of *Astrotricha* spp. to *Phytophthora cinnamomi* is not well documented, however dieback from *P. cinnamomi* is inferred as a potential threat to the species.

Weed invasion is a potential threat, as the species is primarily known from roadsides which may be at risk of weed invasion following fire or management activities. However, weed invasion is currently not considered to be a major problem in areas where the species is known to occur (DELWP 2017), and therefore is not included in Table 2.

Table 2 Threats

Threats in Table 2 are noted in approximate order of highest to lowest impact, based on available evidence.

Threat	Status and severity ^a	Evidence
Habitat disturbance		
Track maintenance and roadside management activities	<ul style="list-style-type: none"> • Status: current • Confidence: suspected • Likelihood: likely • Consequence: major • Trend: static • Extent: across the entire range 	Although some disturbance may be favourable for the Wingan star-hair, destruction of habitat and plants is a high risk, as plants at the two well-known subpopulations (Wingan Inlet and Mt Elizabeth) are restricted to road verges and embankments. Activities such as road maintenance, roadside slashing, or road widening (particularly along West Wingan Road near Wingan Inlet campground) could impact a large proportion of the known individuals of the species. The use of machinery and vehicles, and potential movement of soil, may also promote the risk of <i>Phytophthora cinnamomi</i> infection or weed invasion (see relevant sections below). The small number of known subpopulations, all of which occur along or near roadsides, increases the species’ risk to such activities.

Threat	Status and severity ^a	Evidence
<p>Fire regimes that cause declines in biodiversity^b</p>	<ul style="list-style-type: none"> • Status: current • Confidence: suspected • Likelihood: likely • Consequence: major • Trend: static • Extent: across the entire range 	<p>Fire regimes that cause declines in biodiversity is listed as a Key Threatening Process under the EPBC Act (DAWE 2022). The mechanisms by which fire can impact species are diverse and can be direct or indirect.</p> <p><i>High frequency fire</i></p> <p>The Wingan star-hair is likely to be negatively impacted by high frequency fires, where they are severe enough to kill adult plants and they occur at short enough timescales to kill regenerating seedlings and resprouting plants before they are able to replenish the soil seed bank or develop sufficient woody tissue to withstand further fires.</p> <p>The minimum fire-free interval required to sustain subpopulations of the Wingan star-hair is unknown, although possibly in the order of 6–7 years. The species has been observed both resprouting and regenerating from seedlings following fire, and likely has a relatively short primary juvenile period of ~3 years (see Relevant biology and ecology). Allowing a further 3 years for some accumulation of the soil seed bank gives an estimate of minimum fire-free interval of 6 years, which is similar to the minimum fire-free interval of 7 years for NSW <i>Astrotricha</i> spp. (NSW RFS 2013). Multiple fires within the minimum fire-free interval are likely to negatively impact the Wingan star-hair population.</p> <p><i>Fire effects on competitive interactions</i></p> <p>Fire-competition interactions may pose a threat to the Wingan star-hair when fire alters the structure and composition of plant communities (DAWE 2022). The Wingan star-hair was not located at the Wingan Inlet subpopulation in 2021 due to dense post-fire regeneration hampering surveys (Tolsma & Sutter 2022). While it is unclear if plants still remain at this subpopulation, it is possible that dense post-fire regeneration may shade out Wingan star-hair seedlings before they are able to establish.</p> <p><i>Out of season fire</i></p> <p>Out of season fire preceding dry conditions e.g. spring fires, can affect plants which germinate in response to fire, as the vulnerable seedlings are exposed to desiccation and thus post-recruitment mortality (Keith 1996; DAWE 2022).</p> <p><i>Interactions with fire and other threats</i></p> <p>Interaction between fire and other threats may adversely affect persistence of the species (DAWE 2022). Climate change is predicted to increase both the frequency and intensity of bushfires (as a projected increase in the average number of days with high Forest Fire Danger Index scores) and result in changes in rainfall patterns (Clarke et al. 2019) (see climate change section below). Fires preceded or followed by periods of drought or intense rainfall events may have a negative impact on the Wingan star-hair e.g. seedlings may struggle to regenerate during post-fire drought (Auld et al. 2020), or intense rainfall following fire</p>

Threat	Status and severity ^a	Evidence
		may wash away soil and part of the soil seedbank (see Erosion below). Post-fire environments can also facilitate the spread of <i>P. cinnamomi</i> (Moore et al. 2014).
Erosion	<ul style="list-style-type: none"> • Status: current • Confidence: suspected • Likelihood: possible • Consequence: moderate • Trend: static • Extent: across the entire range 	All known subpopulations of the Wingan star-hair occur in areas that are likely to be susceptible to erosion, such on roadsides, near tracks or on creek banks. Erosion may wash away plants or soil-stored seed. Erosion can be particularly severe post-fire, as incineration of vegetation and leaf litter, together with the formation of an ash layer, reduces the protective cover of the soil and increases runoff and erosion during rainfall events (Girona-García et al. 2021).
Disease		
<i>Phytophthora cinnamomi</i> dieback	<ul style="list-style-type: none"> • Status: future • Confidence: suspected • Likelihood: unknown • Consequence: major • Trend: static • Extent: across the entire range 	'Dieback caused by the root-rot fungus <i>P. cinnamomi</i> ' is listed as a key threatening processes under the EPBC Act (DotE 2014). Since its listing, further research has determined that <i>P. cinnamomi</i> is a water mould and not a fungus. There is little information concerning the susceptibility of <i>Astrotricha</i> spp. to <i>P. cinnamomi</i> dieback. However, <i>P. cinnamomi</i> is listed as a potential threat to the related Merimbula star-hair (NSW TSSC 2007), other Araliaceae (e.g. <i>Polyscias</i> sp.) are known to be susceptible (O'Gara et al. 2005; DEWHA 2008). Therefore, <i>P. cinnamomi</i> dieback is inferred as a potential threat to the Wingan star-hair in this assessment.
Climate change		
Increased temperatures, increased frequency of drought and extreme rainfall events, and reduced precipitation	<ul style="list-style-type: none"> • Status: current, future • Confidence: inferred • Likelihood: almost certain • Consequence: moderate • Trend: increasing • Extent: across the entire range 	<p>In Victoria, temperatures have already warmed by over 1 °C between 1910 and 2018, and rainfall over the past 30 years has been lower than the long term average (Clarke et al. 2019). In the Gippsland region of Victoria, maximum temperatures are projected to increase by 1.8–2.0 °C by 2050 compared to 1986–2005 levels (Clarke et al. 2019). Rainfall is projected to continue to decrease in winter and spring (medium to high confidence) and possibly autumn (low to medium confidence), while the frequency of extreme rainfall events is projected to increase (Clarke et al. 2019). From 2017–19, Gippsland experienced severe drought (Bureau of Meteorology 2022).</p> <p>Changes in temperature, rainfall patterns and the frequency of drought conditions and extreme weather events may impact seed set, germination, fecundity and survival in the Wingan star-hair. These changes may interact with other threats to the species, such as fire, erosion and weed invasion. However, due to the lack of information on the species' ecology, it is difficult to determine to what extent these changes may impact the Wingan star-hair in the future. Nevertheless, given the broad changes in climate, it is considered likely that the Wingan star-hair will be impacted by these projected changes.</p>

Threat	Status and severity ^a	Evidence
Invasive species		
Weed invasion	<ul style="list-style-type: none"> • Status: future • Confidence: inferred • Likelihood: unlikely • Consequence: minor • Trend: unknown • Extent: across the entire range 	

^aTiming—identifies the temporal nature of the threat

Confidence—identifies the nature of the evidence about the impact of the threat on the species

Likelihood—identifies the likelihood of the threat impacting on the whole population or extent of the species

Consequence—identifies the severity of the threat

Trend—identifies the extent to which it will continue to operate on the species

Extent—identifies its spatial context in terms of the range of the species

^bFire regimes that cause declines in biodiversity include the full range of fire-related ecological processes that directly or indirectly cause persistent declines in the distribution, abundance, genetic diversity or function of a species or ecological community. ‘Fire regime’ refers to the frequency, intensity or severity, season, and types (aerial/subterranean) of successive fire events at a point in the landscape

Categories for likelihood are defined as follows:

Almost certain – expected to occur every year

Likely – expected to occur at least once every five years

Possible – might occur at some time

Unlikely –known to have occurred only a few times

Unknown – currently unknown how often the threat will occur

Categories for consequences are defined as follows:

Not significant – no long-term effect on individuals or populations

Minor – individuals are adversely affected but no effect at population level

Moderate – population recovery stable or declining

Major – population decline is ongoing

Catastrophic – population trajectory close to extinction

Each threat has been described in Table 2 in terms of the extent that it is operating on the species. The risk matrix (Table) provides a visual depiction of the level of risk being imposed by a threat and supports the prioritisation of subsequent management and conservation actions. In preparing a risk matrix, several factors have been taken into consideration, they are: the life stage they affect; the duration of the impact; the spatial extent, and the efficacy of current management regimes, assuming that management will continue to be applied appropriately. The risk matrix and ranking of threats has been developed in consultation with experts and using available literature.

Table 3 Risk Matrix

Likelihood	Consequences				
	Not significant	Minor	Moderate	Major	Catastrophic
Almost certain			Climate change		
Likely				Roadside management activities; Fire regimes that cause declines in biodiversity	
Possible			Erosion		
Unlikely		Weed invasion			
Unknown				<i>Phytophthora</i> dieback	

Risk Matrix legend/Risk rating:

Low Risk	Moderate Risk	High Risk	Very High Risk
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Priority actions have then been developed to manage the threats, particularly where the risk was deemed to be ‘very high’ (red shading) or ‘high’ (orange shading). For those threats with an unknown or low risk (blue and green shading respectively) research and monitoring actions have been developed to understand and evaluate the impact of the threats, where appropriate.

Conservation and recovery actions

Primary conservation objective

By 2032, the abundance, distribution and threats impacting the Wingan star-hair will better understood, and subpopulations will be sustained in habitats in which threats are managed effectively.

Conservation and management priorities

Habitat loss, disturbance and modifications impacts

- Ensure that accurate information on the location of subpopulations is kept updated on state databases, in particular those used by fire, road infrastructure and land management agencies.
- Ensure that roadside management activities do not result in irreversible damage to the species or its habitat, noting that some disturbance may be beneficial but disturbance that results in the removal of suitable habitat is likely to be detrimental to the species. Although the optimal disturbance regimes for the species are unknown (see Information and Research Priorities), one-off management activities that may significantly impact suitable habitat (e.g. road widening) should be avoided near Wingan star-hair subpopulations until the impacts on the species are known. It may be appropriate to continue on-going

management activities associated with the maintenance of road verges (e.g. slashing), in combination with appropriate monitoring of Wingan star-hair subpopulations to ensure the species is not negatively impacted.

- Install markers near roadside subpopulations, or protect plants that may be at risk of accidental damage.

Fire impacts

- Develop and implement a fire management strategy that optimises the survival of the Wingan star-hair.
- Avoid planned burns in all subpopulations (particularly recently burnt subpopulations), until the fire ecology of the species is better understood.
- Avoid impacts to subpopulations during fire-fighting operations, or other fire management works, by ensuring accurate location information of the species is available on databases used by the relevant fire management agencies.

Disease impacts

- As a precaution, pending further investigation into the susceptibility of the Wingan star-hair to *P. cinnamomi* (see Information and Research Priorities), ensure that appropriate hygiene protocols are adhered to when entering or exiting the known location of the threatened species, such as those outlined in O’Gara et al. (2005) and the Arrive Clean, Leave Clean guidelines (Commonwealth of Australia 2015). Appropriate hygiene measures should also be implemented during road maintenance activities, including any machinery and materials associated with activities.

Climate change and severe weather impacts

- Investigate options for maintaining in situ persistence as the climate changes, for example by minimising other population pressures, enhancing resilience and promoting recruitment or supplementing existing subpopulations.

Ex situ recovery actions

- To manage the risk of losing genetic diversity, undertake appropriate seed collection and storage, and monitor the viability of stored seed. For species where few seed are produced, seed quality is low, or seeds are difficult to store long-term, undertake alternative ex situ storage such as tissue culture and cryopreservation, vegetative propagation or cultivation of living collections. Seed/tissue collection and storage should be conducted in accordance with best practice guidelines and procedures (refer to Martyn Yenson et al. 2021 or Commander 2021).
- If appropriate, investigate the feasibility of establishing translocated subpopulations that will improve the conservation outlook of the species. Translocations should be conducted in accordance with best practice guidelines and procedures (refer to Commander et al. 2018), including monitoring translocated subpopulations through to recruitment to ensure they are viable.

Stakeholder engagement/community engagement

- Work with Traditional Owners to divulge any traditional knowledge associated with the species ensuring the practices to record, store and share this knowledge are mutually supported.
- Liaise with the local community and government agencies to ensure that up-to-date population data and scientific knowledge inform the implementation of conservation actions for this species.
- Inform managers of sites where there are known subpopulations, and consult with these groups regarding options for conservation management and protection of the species.

Survey and monitoring priorities

- Improve knowledge of the extent and size of known subpopulations, particularly for population not visited and sampled in the past decade (Dingo Creek near Club Terrace, Mueller River near Point Hicks, Little Rich River, and Morris Peak Road near Bullumwaal.
- Undertake targeted surveys in areas of suitable habitat along roadsides and areas away from roadsides adjacent to known subpopulations.
- If new populations are located on privately owned land seek to secure land in the national reserve system through acquisition or conservation coventing.
- Develop and maintain a monitoring program to:
 - determine trends in population size and distribution;
 - record the species' response to disturbance events such as fire or slashing, where they occur, including mode of regeneration (resprouting or seedling regeneration), changes in surrounding vegetation structure (including competition from other species, particularly at the Wingan Inlet subpopulation) and long-term population trends;
 - determine threats and their impact; and
 - monitor the effectiveness of management actions and the need to adapt them if necessary.

Information and research priorities

- Investigate the impacts of disturbance regimes on the Wingan star-hair, and identify optimal regimes for the species' persistence.
- Investigate the basic ecology of the species, including pollinators, levels of seed set and recruitment, levels of herbivory, seed dispersal, seed germination requirements and plant longevity.
- Investigate seed germination biology, dormancy and seedbank dynamics in relation to fires and ground disturbance regimes
- Investigate the effects of competition from other plants, including whether the species benefits from periodic disturbance.
- Investigate the susceptibility of the species to *P. cinnamomi*.
- Identify fire regimes that have a negative effect on the Wingan star-hair.

- Undertake vulnerability assessments of the species' sensitivity and adaptive capacity to changing climatic conditions which draw on genetic, physiological or ecological evidence.
- If vulnerability assessments indicate the species has a high likelihood of extinction due to climate change, undertake research to identify climate refuges that may be suitable for translocations, including both modelling and experimental approaches (e.g. trial translocations). Consideration should be given to the benefits to the species in mitigating climate change related threats, as well as the risks to the recipient site (e.g. introduction of diseases, pests and/or pathogens, and invasiveness of the species).

Recovery Plan decision

A decision about whether there should be a Recovery Plan for this species has not yet been determined. The purpose of this consultation document is to elicit additional information to help inform this decision.

Links to relevant implementation documents

This Conservation Advice is developed to be able to subsequently inform other planning instruments such as a Bioregional Plan or a multi-entity Conservation Plan.

[Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi* \(2018\)](#)

[Arrive Clean, Leave Clean guidelines](#)

[Plant Germplasm Conservation in Australia - Strategies and guidelines for developing, managing and utilising ex situ collections 3rd ed.](#)

[Guidelines for Translocation of Threatened Plants in Australia 3rd ed](#)

[Florabank Guidelines - Best practice guidelines for native seed collection and use](#)

Conservation Advice and Listing Assessment references

Aboriginal Victoria (2022) Map of formally recognised Traditional Owners. Last viewed 10 May 2022. Available from: <https://achris.vic.gov.au/weave/wca.html>

ABRS (2017) *Croajingolong National Park Victoria 2016: A BushBlitz survey report*. Commonwealth of Australia, Canberra.

<https://aiatsis.gov.au/explore/map-indigenous-australia>

APNI (2022) *Astrotricha* sp. Wingan Inlet species page. Australian Plant Name Index. Last viewed 20/5/2022. Available at: <https://biodiversity.org.au/nsl/services/rest/name/apni/241495/api/apni-format>

Auld TD, Mackenzie BE, Le Breton T, Keith DA, Ooi MK, Allen S & Gallagher R (2020) *A preliminary assessment of the impact of the 2019/2020 fires on NSW plants of national significance*. Department of Planning Industry and Environment (NSW), Paramatta.

- Bureau of Meteorology (2022) Previous droughts (web page). Last viewed 10 May 2022.
Available at: <http://www.bom.gov.au/climate/drought/knowledge-centre/previous-droughts.shtml>
- Commander LE, Coates D, Broadhurst L, Offord CA, Makinson RO & Matthes M (2018) *Guidelines for the translocation of threatened plants in Australia. 3rd edn.* Australian Network for Plant Conservation, Canberra.
- Commander LE (ed.) (2021) *Florabank Guidelines – best practice guidelines for native seed collection and use. 2nd edn.* Florabank Consortium Australia. Available at <https://www.florabank.org.au/guidelines>
- Clarke JM, Grose M, Thatcher M, Round V & Heady C (2019) Gippsland Climate Projections 2019. CSIRO, Melbourne Australia. Available at: <https://www.climatechange.vic.gov.au/victorias-changing-climate>
- DoE (2015) *Arrive Clean, Leave Clean.* Department of the Environment, Commonwealth of Australia. Available at: <https://www.awe.gov.au/biosecurity-trade/invasive-species/publications/arrive-clean-leave-clean>
- DAWE (2021) *Interim Biogeographic Regionalisation for Australia Version 7.* Department of Agriculture, Water and the Environment, Canberra. Available at: <https://www.dcceew.gov.au/environment/land/nrs/science/ibra>
- DAWE (2022) *Fire regimes that cause biodiversity decline as a key threatening process.* Department of Agriculture, Water and the Environment, Canberra. Available at: <https://www.awe.gov.au/environment/biodiversity/threatened/key-threatening-processes/fire-regimes-that-cause-declines-in-biodiversity>
- DELWP (2017) Conservation status assessment for *Astrotricha* sp. 3. Department of Environment, Land, Water and Planning, Victoria.
- DEWHA (2008) Approved Conservation Advice for *Polyscias bellendenkerensis*. Department of the Environment, Water, Heritage and the Arts, Canberra. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/7237-conservation-advice.pdf>
- Girona-García A, Vieira DCS, Silva J, Fernández C, Robichaud PR, & Keizer JJ (2021). Effectiveness of post-fire soil erosion mitigation treatments: A systematic review and meta-analysis. *Earth-Science Reviews* 217: 103611.
- Farrow R (2019) Insect pollination of the endangered Merimbula star-hair. *Journal of the Australian Native Plants Society, Canberra Region*, 19, 30-35.
- Farrow R (2021) Unpublished report to the Threatened Species Unit, Department of Planning and Environment, Queanbeyan. May 2021.
- Henwood MJ, Makinson RO & Maling KL (1999) Araliaceae. In: Walsh NG & Entwistle TJ (eds), *Flora of Victoria Vol. 4, Cornaceae to Asteraceae.* Inkata Press, Melbourne.

- Horton DR (1996) The AIATSIS Map of Indigenous Australia. Australian Institute of Aboriginal and Torres Strait Islander Studies. Available at:
- Keith DA (1996) Fire-drive extinction of plant populations: a synthesis of theory and review of evidence from Australian vegetation. *Proceedings of the Linnean Society of NSW*, 116, 37–78.
- Martyn Yenson AJ, Offord CA, Meagher PF, Auld T, Bush D, Coates DJ, Commander LE, Guja LK, Norton SL, Makinson RO, Stanley R, Walsh N, Wrigley D & Broadhurst L (2021) *Plant germplasm conservation in Australia: Strategies and guidelines for developing, managing and utilising ex situ collection*. 3rd edn. Australian Network for Plant Conservation, Canberra.
- Moore N, Barrett S, Howard K, Craig MD, Bowen B, Shearer B & Hardy G (2014) Time since fire and average fire interval are the best predictors of *Phytophthora cinnamomi* activity in heathlands of south-western Australia. *Australian Journal of Botany* 62, 587–593.
- O’Gara E, Howard K, Wilson B & Hardy G (2005) *Management of Phytophthora cinnamomi for Biodiversity Conservation in Australia: Part 2 National Best Practice Guidelines*. Centre for Phytophthora Science and Management, Murdoch University, Western Australia.
- Packer J, Brouwer N, Harrington D, Gaikwad J, Heron R, Yaegl Community Elders, Ranganathan S, Vemulpad S & Jamie J (2012) An ethnobotanical study of medicinal plants used by the Yaegl Aboriginal community in northern New South Wales, Australia. *Journal of Ethnopharmacology* 139, 244–255.
- NSW RFS (2013) Threatened species hazard reduction list – Part 1 – Plants. New South Wales Rural Fire Service. Available at:
https://www.rfs.nsw.gov.au/_data/assets/pdf_file/0017/24335/Web-Version-ThreatenedSpeciesHazardReductionList-Part1-Plants-06-04-2017.pdf
- NSW TSSC (2007) *Astrotricha* sp. Wallagaraugh – endangered species listing. New South Wales Threatened Species Scientific Committee. Last viewed 20/5/2022. Available at:
<https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2004-2007/astrotricha-sp-wallagaraugh-endangered-species-listing>
- Tolsma A & Sutter G (2022) *Responses of threatened plant species to the 2019-20 fires in eastern Victoria*. Draft client report for the Department of Agriculture, Water and the Environment. Arthur Rylah Institute for Environmental Research, Department of Environment, Land, Water and Planning, Heidelberg, Victoria.
- VicFlora (2022a) *Astrotricha* sp. 3 species page. Last viewed 17 May 2022. Available at:
<https://vicflora.rbg.vic.gov.au/flora/taxon/13cdd120-af0d-46ca-95ef-1b43b0451240>
- VicFlora (2022b) *Astrotricha ledifolia* species page. Last viewed 17 May 2022. Available at:
<https://vicflora.rbg.vic.gov.au/flora/taxon/f4900ade-c377-4ac2-a957-23d60d4c7201>

VicFlora (2022c) *Astrotricha asperifolia* species page. Last viewed 17 May 2022. Available at:
<https://vicflora.rbg.vic.gov.au/flora/taxon/e40f1ca2-dfd7-46a2-842d-7d1067d5d00d>

VicFlora (2022d) *Astrotricha linearis* species page. Last viewed 17 May 2022. Available at:
<https://vicflora.rbg.vic.gov.au/flora/taxon/b8e51082-2431-4dcb-9e1d-3ec1c54bf987>

VicFlora (2022e) *Astrotricha parvifolia* species page. Last viewed 17 May 2022. Available at:
<https://vicflora.rbg.vic.gov.au/flora/taxon/e29a5667-fbcf-4731-82ef-daec6ff50125>

VicFlora (2022f) *Astrotricha* sp. 1 species page. Last viewed 17 May 2022. Available at:
<https://vicflora.rbg.vic.gov.au/flora/taxon/8f30f6f7-57d1-4f71-94c2-9c021e46a29a>

VicFlora (2022g) *Astrotricha* sp. 2 species page. Last viewed 17 May 2022. Available at:
<https://vicflora.rbg.vic.gov.au/flora/taxon/c24be0a9-acfc-4335-aa10-97f58e54b549>

VicFlora (2022h) *Astrotricha* sp. 4 species page. Last viewed 17 May 2022. Available at:
<https://vicflora.rbg.vic.gov.au/flora/taxon/a9f25929-65de-4557-bfde-5a7795640be0>

VicFlora (2022i) *Astrotricha* sp. 5 species page. Last viewed 17 May 2022. Available at:
<https://vicflora.rbg.vic.gov.au/flora/taxon/f31aa8d4-eb42-45c7-86e5-60eed0dd64ba>

DRAFT

THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

The Threatened Species Scientific Committee finalised this assessment on DD Month Year.

Attachment A: Listing Assessment for *Astrotricha* sp. Wingan Inlet

Reason for assessment

This assessment follows prioritisation of a nomination from the TSSC.

Assessment of eligibility for listing

This assessment uses the criteria set out in the [EPBC Regulations](#). The thresholds used correspond with those in the [IUCN Red List criteria](#) except where noted in criterion 4, sub-criterion D2. The IUCN criteria are used by Australian jurisdictions to achieve consistent listing assessments through the Common Assessment Method (CAM).

Key assessment parameters

Table 4 includes the key assessment parameters used in the assessment of eligibility for listing against the criteria. The definition of each of the parameters follows the [Guidelines for Using the IUCN Red List Categories and Criteria](#).

Table 4 Key assessment parameters

Metric	Estimate used in the assessment	Minimum plausible value	Maximum plausible value	Justification
Number of mature individuals	110-1000	110	>1000	<p>There is little available information on the population size of the Wingan star-hair. Collection notes from specimens collected at Wingan Inlet indicate two roadside sites with 3-20 and 40-50 plants respectively. As of 2021, there are 40 known immature plants (seedlings) at Mt Elizabeth. There are no details on abundance for the remaining subpopulations.</p> <p>The total number of known plants from Wingan Inlet and Mt Elizabeth is 110 and this value is used as the minimum plausible value, assuming that the Wingan Inlet subpopulation is stable and all plants at Mt Elizabeth survive to become mature individuals.</p> <p>However, the number of mature individuals is likely to exceed 110. There have been no surveys of the other four known subpopulations, and the species is primarily known from roadside sites in areas where there is substantial intact habitat. Therefore, there are likely to be more individuals and subpopulations than currently known. Nevertheless, available information from collection notes suggests low numbers at each site (largest estimate of 50 individuals) and the species appears to be patchily distributed and present in low numbers. The current average of 55 plants per subpopulation (based on two subpopulations only) would lead to an estimate of ~330 plants if extrapolated to the four subpopulations lacking abundance data. However, there is significant uncertainty associated with such an estimate.</p>

Metric	Estimate used in the assessment	Minimum plausible value	Maximum plausible value	Justification
				Nevertheless, on current knowledge, the number of mature individuals appears likely to be <1000. Therefore, an estimate of 110–1000 mature individuals is used here as a plausible estimate which reflects the current knowledge of the species' population size.
Trend	Unknown			There are no survey data with which to estimate trends on the number of mature individuals.
Generation time (years)	unknown	3	unknown	The generation time of the Wingan star-hair is unknown. The minimum plausible value could be as low as three years, as one individual was observed flowering two years post-fire (Tolsma & Sutter 2022) indicating that plants could mature within three years. As there is insufficient evidence to assess rates of decline under Criterion 1 (which requires an estimate of generation length), and given the lack of information on the species' biology, an estimate of generation time has not been attempted.
Extent of occurrence	2906 km ²	2906 km ²	>2906 km ²	Based on the six known subpopulations, the EOO is estimated to be 2906 km ² . The EOO may increase slightly if additional subpopulations are discovered, although based on current knowledge EOO is unlikely to be substantially larger than 2906 km ² as the species appears to be restricted to Gippsland.
Trend	Unknown			There is no information with which to assess trends in the species' EOO.
Area of Occupancy	>24 km ²	24 km ²	unknown	Based on the six known subpopulations (see basis of assessment of subpopulation number), the AOO is estimated to be 24 km ² , although this number is likely to be higher (see Justification of number of mature individuals).
<p>AOO is a standardised spatial measure of the risk of extinction, that represents the area of suitable habitat known, inferred or projected to be currently occupied by the taxon. It is estimated using a 2 x 2 km grid to enable comparison with the criteria thresholds. The resolution (grid size) that maximizes the correlation between AOO and extinction risk is determined more by the spatial scale of threats than by the spatial scale at which AOO is estimated or shape of the taxon's distribution. It is not a fine-scale estimate of the actual area occupied. In some cases, AOO is the smallest area essential at any stage to the survival of existing populations of a taxon (e.g. breeding sites for migratory species).</p>				
Trend	Unknown			There is no information with which to assess trends in the species' AOO.
Number of subpopulations	6	2	>6	There are only two subpopulations with recent records (Wingan Inlet and Mt Elizabeth). Therefore, the minimum plausible number of subpopulations is two. Including all collections, there are six subpopulations. As discussed above (see justification for Number of mature individuals), there are likely to be additional undiscovered subpopulations, although there is insufficient information to infer how many subpopulations there may be.
Trend	Unknown			There is no information with which to assess trends in the species' number of subpopulations.

Metric	Estimate used in the assessment	Minimum plausible value	Maximum plausible value	Justification
Basis of assessment of subpopulation number	Most collections are disjunct and are separated by distances of 15–40 km from the nearest collection, thus clearly representing different subpopulations. All collections from Mt Elizabeth and Wingan Inlet are each considered to represent one subpopulation respectively, as most records at each site are close together (<1 km), with the exception of older records which have poor spatial accuracy.			
No. locations	6	5-6	unknown	<p>The number of locations is estimated at six based on the threat of track maintenance and other roadside management activities, which are likely to operate on a small spatial scale, and thus each subpopulation has been assessed as a separate location.</p> <p>The threat of repeat fire within the species' minimum fire free interval could also be used to define number of locations, although given the geographic distribution of the known subpopulations, it is unlikely that a single fire event would impact multiple subpopulations, except perhaps the two subpopulations in Croajingolong NP, thus leading to an estimate of 5–6 locations.</p>
Trend	Unknown			Given the limited information on the species' distribution and threats, it is not possible to determine the trend in the number of locations.
Basis of assessment of location number	See justification for the number of locations.			
Fragmentation	Based on current knowledge, the species is considered to be at risk of severe fragmentation. Although large areas of intact and potentially suitable habitat exist in Gippsland, the species is only known from six small subpopulations that are all separated by distances of 15-40+ km. The two subpopulations with abundance information are both small, although there is considerable uncertainty about the size of remaining subpopulations due to the lack of survey data. For the purposes of this assessment, and based on current knowledge, the species is considered to persist in small and isolated subpopulations and is therefore at risk of severe fragmentation.			
Fluctuations	There is little information on fluctuations in the Wingan star-hair. However, based on available evidence, the species is not considered likely to be prone to extreme fluctuations. The species is thought to be capable of both resprouting and regenerating from seed following fire, and there is no evidence to suggest the entire seed bank is exhaustible by a single fire event. Therefore, the species is unlikely to be prone to extreme fluctuations.			

Criterion 1 Population size reduction

Reduction in total numbers (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered Very severe reduction	Endangered Severe reduction	Vulnerable Substantial reduction
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.		(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
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, inferred 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

Criterion 1 evidence

Insufficient data to determine eligibility

There are insufficient survey data on which to base an assessment of population trends (see Table 4). Therefore, the Committee considers that there is insufficient information to determine the eligibility of the species for listing in any category under this criterion.

However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

Criterion 2 Geographic distribution as indicators for either extent of occurrence AND/OR area of occupancy

	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
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			

Criterion 2 evidence

Eligible under Criterion 2 B1ab(iii)+2ab(iii) for listing as Endangered

Geographic distribution

The species' Extent Of Occurrence (EOO) is estimated to be 2906 km² and it's Area Of Occupancy (AOO) is estimated to be >24 km². Although undiscovered subpopulations may exist, the species' EOO is unlikely to increase significantly as it appears to be restricted to East Gippsland, and the species' AOO is highly unlikely increase to beyond 500 km² (see Table 4). Therefore, the species' EOO and AOO is considered restricted.

Severely fragmented or number of locations

The species is considered to be severely fragmented, as on current knowledge all subpopulations are small and isolated (see Table 4). The number of locations is estimated to be 6 in this assessment as each subpopulation is considered a separate location (see Table 4).

Continuing decline

There is an inferred and projected continuing decline in the area, extent and quality of habitat due to the precarious nature of known subpopulations along roadsides (Wingan Inlet, Mt Elizabeth and likely other subpopulations) and the associated threats of track maintenance, road widening, vehicular damage, roadside management activities and/or erosion. Management activities may also promote the spread of *P. cinnamomi* to Wingan star-hair subpopulations, although further research is needed to understand the impact of *P. cinnamomi* on the species. Fire regimes that cause declines in biodiversity also pose a threat to the Wingan star-hair, and the projected increase in fire weather may contribute to the continuing decline in area, extent

and quality of habitat. As of 2021, the Mt Elizabeth subpopulation comprises 40 seedlings regenerating post-fire, and a further fire within the minimum fire free period (possibly 6–7 years) will likely kill individuals before they are able to mature and replenish the soil seed bank, leading to population decline. In addition, the number of individuals at the Wingan Inlet subpopulation is unknown, due to dense post-fire regeneration at the site which could shade out the species (see Table 2). Together, these ongoing threats are inferred to result in a continuing decline in the area, extent and quality of habitat of the Wingan star-hair. However, there is currently insufficient information on population trends to project a continuing decline in the number of mature individuals.

Conclusion

The Committee considers that the species' Extent Of Occurrence (EEO) and Area Of Occupancy (AOO) is restricted, it is severely fragmented, and continuing decline is inferred and projected in the area, extent and quality habitat. Therefore, the species has met the relevant elements of Criterion 2 to make it eligible for listing as Endangered.

Criterion 3 Population size and decline

	Critically Endangered Very low	Endangered Low	Vulnerable Limited
Estimated number of mature individuals	< 250	< 2,500	< 10,000
AND either (C1) or (C2) is true			
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future)	Very high rate 25% in 3 years or 1 generation (whichever is longer)	High rate 20% in 5 years or 2 generation (whichever is longer)	Substantial rate 10% in 10 years or 3 generations (whichever is longer)
C2. An observed, estimated, projected or inferred continuing decline AND its geographic distribution is precarious for its survival based on at least 1 of the following 3 conditions:			
(a) (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(a) (ii) % of mature individuals in one subpopulation =	90 - 100%	95 - 100%	100%
(b) Extreme fluctuations in the number of mature individuals			

Criterion 3 evidence

Insufficient data to determine eligibility

There are insufficient survey data on which to base an assessment of population trends. There are an estimated 110–1000 mature individuals, and the number of mature individuals in each subpopulation is <250 (see Table 4). However, although there is an inferred and projected continuing decline in the area, extent and quality of habitat, there are currently insufficient data on population trends to infer or project a continuing decline in the number of mature individuals.

Therefore, the Committee considers that there is insufficient information to determine the eligibility of the species for listing in any category under this criterion.

Criterion 4 Number of mature individuals

	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low
D. Number of mature individuals	< 50	< 250	< 1,000
D2.¹ Only applies to the Vulnerable 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: area of occupancy < 20 km ² or number of locations ≤ 5

¹ The IUCN Red List Criterion D allows for species to be listed as Vulnerable under Criterion D2. The corresponding Criterion 4 in the EPBC Regulations does not currently include the provision for listing a species under D2. As such, a species cannot currently be listed under the EPBC Act under Criterion D2 only. However, assessments may include information relevant to D2. This information will not be considered by the Committee in making its recommendation of the species' eligibility for listing under the EPBC Act, but may assist other jurisdictions to adopt the assessment outcome under the [common assessment method](#).

Criterion 4 evidence

Eligible under Criterion 4 D1 for listing as Vulnerable

Although there is considerable uncertainty in the number of mature individuals of the Wingan star-hair, based on current knowledge the Committee considers that the total number of mature individuals is likely to be 110–1000 which is low to very low. Although it is possible that there are fewer than 250 mature individuals, there are an estimated 110 individuals across two of the six known subpopulations, with population estimates suggesting the total number may exceed 250. Nevertheless, on current knowledge, the species appears to exist in small, disjunct subpopulations, and the number of mature individuals is considered likely to be <1000.

The species' AOO is estimated at >24 km² and the number of locations is estimated at 6, therefore the species does not meet the threshold for Vulnerable under subcriterion D2.

The Committee considers that the number of mature individuals of the species is low. Therefore, the species has met the relevant elements of Criterion 4 to make it eligible for listing as D Vulnerable.

Criterion 5 Quantitative analysis

	Critically Endangered Immediate future	Endangered Near future	Vulnerable Medium-term future
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

Criterion 5 evidence

Insufficient data to determine eligibility

Population viability analysis has not been undertaken. Therefore, there is insufficient information to determine the eligibility of the species for listing in any category under this criterion.

Adequacy of survey

The survey effort has been considered adequate and there is sufficient scientific evidence to support the assessment.

Public consultation

Notice of the proposed amendment and a consultation document is made available for public comment for a minimum of 30 business days. Any comments received relevant to the survival of the species are considered by the Committee as part of the assessment process.

Listing and Recovery Plan Recommendations

A decision about whether there should be a Recovery Plan for this species has not yet been determined. The purpose of this consultation document is to elicit additional information to help inform this decision.

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