

# Consultation on Species Listing Eligibility and Conservation Actions

### Chiloglottis anaticeps (duck's-head wasp-orchid)

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

1) the eligibility of *Chiloglottis anaticeps* (duck's-head wasp-orchid) 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: <a href="mailto:species.consultation@awe.gov.au">species.consultation@awe.gov.au</a>

Please include species scientific name in Subject field.

or by mail to:

The Director Bushfire Affected Species Assessments Section Department of Agriculture, Water and the Environment John Gorton Building, King Edward Terrace GPO Box 858 Canberra ACT 2601

### Responses are required to be submitted by 5 January 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: <a href="https://www.awe.gov.au/environment/biodiversity/threatened/recovery-plans">https://www.awe.gov.au/environment/biodiversity/threatened/recovery-plans</a>.

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: https://www.awe.gov.au/sites/default/files/env/pages/d72dfd1a-f0d8-4699-8d43-5d95bbb02428/files/tssc-guidelines-assessing-species-2021.pdf.

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: <a href="https://www.awe.gov.au/environment/biodiversity/threatened/nominations">https://www.awe.gov.au/environment/biodiversity/threatened/nominations</a>.

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.awe.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.

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 <u>'Common Assessment Method' (CAM)</u>. 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. A copy of the Department's Privacy Policy is available at: <u>https://www.awe.gov.au/about/commitment/privacy</u>.

#### 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.

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 CHILOGLOTTIS ANATICEPS

### **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

### <u>SECTION B</u> 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?

# <u>SECTION C</u> 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:

□ 0-5000 □ 5000-10 000 □ 10 000-50 000 □ 50 000-100 000 □ >100 000

Level of your confidence in this estimate:

 $\Box$  0–30% - low level of certainty/ a bit of a guess/ not much information to go on

 $\Box$  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
- 9. Do you consider the five subpopulations that did not undergo recruitment during the 2019–20 bushfires to be extinct?

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

10. 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

11. Are you able to provide an estimate of the total population size during the late 2010s? 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:

□ 0-5000 □ 5000-10 000 □ 10 000-50 000 □ 50 000-100 000 □ >100 000

Level of your confidence in this estimate:

- $\Box$  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
- 12. Are you able to comment on the extent of decline in the species' total population size over the last approximately 10 years? 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:

- $\Box$  0–30% low level of certainty/ a bit of a guess/ not much information to go on
- $\Box$  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
- 13. Please provide (if known) any additional evidence which shows the population is stable, increasing or declining.

# <u>SECTION E</u> 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

- 14. Does the assessment consider the entire geographic extent and national extent of the species? If not, please provide justification for your response.
- 15. Has the survey effort for this species been adequate to determine its national distribution? If not, please provide justification for your response.
- 16. Is the distribution described in the assessment accurate? If not, please provide justification for your response and provide alternate information.

- 17. 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.
- 18. 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:

 $\Box$  <100 km<sup>2</sup>  $\Box$  100 – 5 000 km<sup>2</sup>  $\Box$  5 001 – 20 000 km<sup>2</sup>  $\Box$  >20 000 km<sup>2</sup>

Level of your confidence in this estimated extent of occurrence

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

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

 $\Box$  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:

 $\Box$  <10 km<sup>2</sup>  $\Box$  11 – 500 km<sup>2</sup>  $\Box$  501 – 2000 km<sup>2</sup>  $\Box$  >2000 km<sup>2</sup>

Level of your confidence in this estimated extent of occurrence:

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

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

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

 $\Box$  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

# <u>SECTION F</u> 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

- 19. Do you consider that the way the historic distribution has been estimated is appropriate? Please provide justification for your response.
- 20. 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:

 $\Box$  <100 km<sup>2</sup>  $\Box$  100 - 5 000 km<sup>2</sup>  $\Box$  5 001 - 20 000 km<sup>2</sup>  $\Box$  >20 000 km<sup>2</sup>

Level of your confidence in this estimated extent of occurrence

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

 $\Box$  <10 km<sup>2</sup>  $\Box$  11 – 500 km<sup>2</sup>  $\Box$  501 – 2000 km<sup>2</sup>  $\Box$  >2000 km<sup>2</sup>

Level of your confidence in this estimated extent of occurrence:

- $\Box$  0–30% low level of certainty/ a bit of a guess/ not much data to go on
- $\Box$  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
- $\Box$  99–100% very high level of certainty, data is accurate within this range

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

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

- 21. Do you consider that all major threats have been identified and described adequately?
- 22. To what degree are the identified threats likely to impact on the species in the future?
- 23. Are the threats impacting on different populations equally, or do the threats vary across different populations?
- 24. 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?
- 25. Can you provide supporting data/justification or other information for your responses to these questions about threats?

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

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

### <u>SECTION I</u> DO YOU HAVE INFORMATION ON STAKEHOLDERS IN THE RECOVERY OF THE SPECIES?

- 29. 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?
- 30. Are you aware of any cultural or social importance or use that the species has?
- 31. What individuals or organisations are currently, or potentially could be, involved in management and recovery of the species?
- 32. How aware of this species are land managers where the species is found?
- 33. 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

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

# Conservation Advice for Chiloglottis anaticeps (duck's-head wasp-orchid)

# 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 status of the species and help inform conservation actions, further planning and a potential 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.

<u>Note</u>: Specific consultation questions relating to the below draft assessment and preliminary determination have been included in the consultation cover paper for your consideration.

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



Chiloglottis anaticeps © Copyright, Gavin Phillips

Threatened Species Scientific Committee

# Conservation status

*Chiloglottis anaticeps* (duck's-head wasp-orchid) is proposed to be listed under the Endangered category of the threatened species list under the *Environment Protection and Biodiversity Conservation Act 1999.* 

The duck's-head wasp-orchid 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 assessment of the species' eligibility against each of the listing criteria is:

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

The main factor that makes the species eligible for listing in the Endangered category is its restricted distribution, restricted number of locations and inferred continuing decline in quality of habitat due to disturbance by feral pigs (*Sus scrofa*), impacts from recreational and infrastructure maintenance activities, and projected declines from high severity future bushfire events.

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 <u>Species Profile and Threat Database</u>.

# Species information

# Taxonomy

Conventionally accepted as *Chiloglottis anaticeps* D.L.Jones (1991). The duck's-head wasp-orchid is in the *Chiloglottis reflexa* clade, and is morphologically distinct (Jones 2021), has an obligate insect pollinator and is confirmed by genetic support (Peakall et al. 2010).

# Description

The duck's-head wasp-orchid (family Orchidaceae) is a terrestrial, herbaceous, clonal orchid. It has two opposite leaves. The flower is narrow, 28–32 mm long, and green to reddish-brown. The dorsal sepal is linear to spathulate, 14–16 mm long, 3–4 mm wide; with osmophores approximately 4 mm long, and erect (held away from the column). Lateral sepals are linear, 16–18 mm long, 0.8 mm wide, erect and decurved; with osmophores 5–7 mm long (thinner than the sepal blade). Petals are lanceolate and reflexed, 10–12 mm long and 3–3.5 mm wide. The labellum is obovate, 9–11 mm long, 5–6 mm wide, with recurved anterior margins. The calli are green to greenish-brown, occupying most of the lamina, with the major stalked callus resembling a duck's head. The column is 8–9 mm long, about 3 mm wide, broadly winged, green with red anterior spots. Description adapted from PlantNet (2021) and DPIE (2021).

The duck's-head wasp-orchid is similar in appearance to other members of the *Chiloglottis reflexa* (Wasp Orchid) clade, but is distinguished by the erect dorsal sepal held away from the

column, the long sepal clubs that are thinner than the sepal blade, the broad column wings and the duck's-head shaped major stalked callus (Jones 2021).

# Distribution

The duck's-head wasp-orchid is known from three subpopulations at Barokee (Cathedral Rock National Park), Mooraback (Werrikimbe National Park) and Hastings Forest Way (Werrikimbe National Park) in New South Wales (NSW). All subpopulations occur at high elevation (800–1400 m above sea level).

There are likely to be approximately 100,000 known plants across the three subpopulations (Table 1). Given the species can reproduce clonally (Phillips 2021 pers. comm. 3 June), the number of distinct individuals (effective population size) is likely to be substantially less than 100,000, possibly around 20 percent of the apparent number of plants (Chung et al. 2004).

Substantial areas of apparently suitable habitat occur, and as the species is only identifiable when flowering, it is highly likely that additional subpopulations of the species exist.

| Subpopulation          | Number of plants (Year)                  | Area (ha)   | Tenure                          | Notes   |
|------------------------|--|-------------|---------------------------------|---|
|                        | New                                      | South Wales |                                 |   |
| Barokee                | >1000 (2021)                             | 0.15 ha     | Cathedral Rock<br>National Park | Burnt in 2019/20<br>bushfires.<br>Phillips 2021 pers.<br>comm. 3 June |
| Hastings Forest<br>Way | Similar to Mooraback<br>(~50,000) (2021) | ?           | Werrikimbe<br>National Park     | Burnt in 2019/20<br>bushfires.<br>Fawcett 2021 pers<br>comm. 22 June  |
| Mooraback              | >50,000 (2021)                           | 1.5 ha      | Werrikimbe<br>National Park     | Burnt in 2019/20<br>bushfires.<br>Phillips 2021 pers.<br>comm. 3 June |

Table 1 Known subpopulations of the duck's-head wasp-orchid





**Source:** Base map Geoscience Australia; species distribution data <u>Species of National Environmental Significance</u> 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 containing herein.

**Species distribution mapping**: The species distribution mapping categories are indicative only and aim to capture (a) the specific habitat type or geographic feature that represents to recent observed locations of the species (known to occur) or preferred 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**

Indigenous Australians have a long history of management of the country on which the duck'shead wasp-orchid occurs. The species currently occurs on country of the Armidale and Kemspey Aboriginal Land Councils in New South Wales (New South Wales Aboriginal Land Council 2021). Although little is known of the cultural significance of Duck's-head Wasp-orchid, other orchid species are culturally significant plants for Indigenous peoples, with their tubers used as a food source (Australian National Botanic Gardens 2007).

# **Relevant biology and ecology**

### Reproductive ecology

Flowering occurs from December to March and flowers may last for days or weeks until pollinated, after which they rapidly senesce (Jones 2021). As flowering material is required for identification, surveys must be undertaken during this period. The duck's-head wasp-orchid has a very specialised pollination strategy, with pollination only carried out by sexual deception of male *Neozeleboria* sp. 33 (a thynnine wasp), which are likely attracted to the flowers by

chemical and visual stimuli (Peakall et al. 2010). Once attracted, the male wasp attempts to copulate with the labellum, mistaking it for the female wasp, removing or depositing pollinia in the process, which effects pollination. Fruits take approximately one month to mature following pollination. Each mature capsule contains hundreds of minute seeds that are dispersed by wind when the capsule dehisces. After fruits have ripened, the plant dies back to its dormant subterranean tubers. Plants reproduce from seed and clonally, with each tuber living for one year and producing two to three tubers during that time (Jones 2021). Seed germination requires infection by mycorrhizal fungi from the genus *Tulasnella* (Roche et al. 2010).

No data are available regarding the generation length or plant longevity for the duck's-head wasp-orchid. However, as the species is capable of reproducing clonally, colonies are expected to have a very long lifespan. The length of the juvenile period is several years for most terrestrial orchids in cultivation (Freestone 2021 pers. comm. 30 June).

### Habitat ecology

At Mooraback, the duck's-head wasp-orchid grows on a steep slope in clay loam over basalt, in montane wet sclerophyll forest with *Eucalyptus radiata* (narrow-leaf peppermint), *E. viminalis* (manna gum), *E. pauciflora* (snow gum), *E. campanulata* (New England blackbutt), *E. nobilis* (giant white gum), *Leucopogon affinis* (lance beard-heath), *Lomatia silaifolia* (crinkle bush), *Podolobium ilicifolium* (prickly podolobium), *Lomandra longifolia* (spiny-headed mat-rush) and *Poa sieberiana* (grey tussock-grass). The Hastings Forest Way subpopulation occurs in similar vegetation to Mooraback, although the site is flatter. At Cathedral Rock, it grows on a flat site in coarse sandy soil over granite in *E. acaciiformis* (wattle-leaved peppermint) forest with *Banksia integrifolia* (coast banksia) and Grey Tussock-grass (ALA 2021; Copeland 2021 pers. comm. 2 June).

### Fire ecology

All subpopulations were burnt at low severity during the 2019–20 bushfires (canopy and understorey trees mostly remaining unburnt) and all subpopulations exhibited a very strong post-fire flowering response 14 months post-fire (January 2021) (Phillips 2021 pers. comm. 3 June). Flowering was more prolific than in previous years. However, the response of this species to more intense or frequent fires, or those occurring at other times of the year (e.g. planned burns) is unknown, but fires during the active growth and flowering stages are likely to be deleterious. Fires may also affect thynnine wasp pollinator communities (Brown et al. 2016) on which the orchid is dependent for pollination.

# Habitat critical to the survival

Due to the species eligibility for listing (restricted range), all habitat is considered critical to the survival of the species.

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 subpopulation, in keeping with the terminology used in the EPBC Act and state/territory environmental legislation.

There is sufficient evidence through the species eligibility for listing, to declare all populations/the national population as important populations of this species under particular pressure of survival and which therefore require protection to support the recovery of the species.

# Threats

The main threats to the duck's-head wasp-orchid currently are invasive pests, habitat degradation and climate change (Table 2).

| Threat  | Status and severity a   | Evidence  |  |  |  |  |  |
|---|---|---|--|--|--|--|--|
| Introduced species                            |   |   |  |  |  |  |  |
| Grazing and soil disturbance<br>by feral pigs | <ul> <li>Timing: current</li> <li>Confidence: known</li> <li>Consequence: major</li> <li>Trend: unknown</li> <li>Extent: across its entire range</li> </ul>       | Disturbance and herbivory from feral<br>pigs ( <i>Sus scrofa</i> ) is a listed Key<br>Threatening Process under the EPBC Act<br>(DOEE 2017) and can have serious<br>impacts on orchids (Wraith & Pickering<br>2019) by eating tubers and causing soil<br>disturbance that can facilitate weed<br>invasion (DOEE 2017). Feral pigs are a<br>known threat at all three subpopulations<br>with observed impacts on the species<br>(DPIE 2021; Fawcett 2021 pers. comm.<br>22 June). Subpopulations are<br>concentrated in small areas at Barokee<br>and Mooraback (Table 1) in sites that are<br>accessible to feral pigs. |  |  |  |  |  |
| Habitat loss, disturbance, mod                | lification  |   |  |  |  |  |  |
| Recreational/management<br>activities         | <ul> <li>Timing: current</li> <li>Confidence: suspected</li> <li>Consequence: moderate</li> <li>Trend: static</li> <li>Extent: across its entire range</li> </ul> | Disturbance from recreation and<br>associated walking tracks and roads<br>threatens the Barokee and Hastings<br>Forest Way subpopulations (Fawcett<br>2021 pers comm. 22 June). Any ground<br>disturbance to upgrade or maintain trails<br>could impact plants along the edge of<br>existing trails (Fawcett 2021 pers. comm.<br>22 June).  |  |  |  |  |  |
| Forestry                                      | <ul> <li>Timing: current</li> <li>Confidence: suspected</li> <li>Consequence: minor</li> <li>Trend: static</li> <li>Extent: across part of its range</li> </ul>   | Although all known subpopulations are<br>within National Parks, a substantial<br>amount of apparently suitable habitat<br>exists within the NSW forestry estate,<br>and as such, forestry activity is a<br>potential threat to the species.   |  |  |  |  |  |
| Pollinator rarity                             |   |   |  |  |  |  |  |
| Lack of pollination                           | <ul> <li>Timing: future</li> <li>Confidence: suspected</li> <li>Consequence: unknown</li> <li>Trend: unknown</li> <li>Extent: across its entire range</li> </ul>  | The duck's-head wasp-orchid has a<br>specific pollination system that leaves<br>the species vulnerable to any decline or<br>loss of its specific pollinator. Pollination<br>is likely critical to maintaining gene flow<br>within subpopulations (Peakall & Beattie<br>1996). The loss of specific pollinators is a<br>known threat to other threatened<br>orchids (Reiter et al. 2017). As little is<br>known about the ecology of the thynnine<br>wasp pollinator, it is currently unclear to<br>what extent this threat may affect the   |  |  |  |  |  |

Table 2 Threats impacting Duck's-head Wasp-orchid

| Climate change                                |  | species, although changes to fire regimes,<br>particularly high fire frequency or out-of-<br>season fire may threaten the persistence<br>of the pollinator (Brown et al. 2016).  |
|---|--|--|
| Increasing severity and frequency of bushfire | <ul> <li>Timing: current/future</li> <li>Confidence: suspected</li> <li>Consequence: moderate</li> <li>Trend: increasing</li> <li>Extent: across its entire range</li> </ul> | Climate projections for eastern Australia<br>include more frequent and intense<br>bushfires as a result of increases in the<br>Forest Fire Danger Index (CSIRO &<br>Bureau of Meteorology 2015).<br>Although the duck's-head wasp-orchid<br>responded strongly following the 2019-<br>20 bushfires, all subpopulations were<br>burnt by low severity fire. It is unknown<br>what effect high severity fire would have<br>on this species, although populations of<br>other species of <i>Chiloglottis</i> can be killed<br>by intense bushfires (Duncan 2012).<br>Therefore, high severity fire events could<br>negatively impact this species, although<br>these events are rare in northeast NSW.<br>The species may also be threatened by<br>out-of-season fires, which may disrupt<br>leaf phenology (Miller et al. 2019),<br>mycorrhizal fungal communities (Jasinge<br>et al. 2019) or pollinator communities<br>(Brown et al. 2016). If fires occur soon<br>after leaf emergence, the tubers may<br>store insufficient resources to sustain a<br>second flush of leaf production, resulting<br>in tuber mortality (Jasinge et al. 2019).<br>Similar interactions between fire and<br>drought may also result in elevated<br>mortality (Keith 1996). Increasing fire<br>frequency may also affect mycorrhizal<br>fungal communities (Cairney et al. 2007)<br>and disrupt pollinator communities<br>(Brown et al. 2016). Finally, certain types<br>of fires may increase and spatially<br>concentrate the foraging activity of<br>herbivores such as pigs (see above),<br>particularly small, patchy and low<br>severity fires that result in high survival<br>rates of the herbivores (Wan et al. 2014). |

Timing—identify the temporal nature of the threat;

Confidence—identify the extent to which we have confidence about the impact of the threat on the species; Consequence—identify the severity of the threat;

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

Extent—identify its spatial content in terms of the range of the species.

Each threat has been described in Table 2 in terms of the extent that it is operating on the species. The risk matrix (Table 3) 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; 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 in-house expertise using available literature.

Table 3 Duck's-head wasp-orchid risk matrix

| Likelihood     | Consequences    |   |   |   |                |  |  |
|----------------|-----------------|---|---|---|----------------|--|--|
|                | Not significant | Minor   | Moderate  | Major   | Catastrophic   |  |  |
| Almost certain | Low risk        | Moderate risk                                       | Very high risk  | Very high risk  | Very high risk |  |  |
| Likely         | Low risk        | Moderate risk                                       | High risk<br>Increasing<br>severity and<br>frequency of<br>bushfire | Very high risk<br>Grazing and<br>soil<br>disturbance by<br>pigs | Very high risk |  |  |
| Possible       | Low risk        | Moderate risk<br>Forestry<br>Lack of<br>pollination | High risk<br>Recreational/<br>management<br>activities              | Very high risk  | Very high risk |  |  |
| Unlikely       | Low risk        | Low risk  | Moderate risk   | High risk   | Very high risk |  |  |
| Unknown        | Low risk        | Low risk  | Moderate risk   | High risk   | Very high risk |  |  |

### 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 - such events are known to have occurred on a worldwide bases but only a few ties

Unknown – currently unknown how often the incident 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 stalls or reduces

Major – population decreases

Catastrophic – population extirpation/extinction

Priority actions have then been developed to manage the threat particularly where the risk was deemed to be 'very high' or 'high'. For those threats with an unknown or low risk outcome it may be more appropriate to identify further research or maintain monitoring.

# Conservation and recovery actions

# **Primary conservation outcome**

By 2030, the population of the duck's-head wasp-orchid will have increased in abundance and subpopulations are sustained in habitats in which very high threats are managed effectively.

# **Conservation and management priorities** Habitat loss disturbance and modifications

- Ensure locations of populations are kept updated on state databases used by fire, road and land management agencies.
- Implement measures to reduce trampling and impacts from recreational activities where appropriate, such as fencing and signage.
- Determine potential habitat for the species in the NSW forestry estate.
- Forestry: undertake pre-harvest surveys in areas of suitable habitat that are designated for harvesting, and implement 100 m buffer exclusion zones from any forestry activity around all subpopulations.

### Climate change and fire

- Develop a fire management plan to ensure that fire regimes occurring at the sites are consistent with population persistence of the species
- Ensure fire management authorities are supplied with updated maps of species occurrence and that fire suppression and mop up operations avoid known populations.
- Avoid out of season planned fires from November to March.
- Avoid small fires that may concentrate post-fire herbivory on subpopulations.
- Identify and protect current and future habitat likely to remain or become suitable habitat due to climate change.

### Invasive species (including threats from grazing, trampling, predation)

- Continue ongoing feral pig control near all subpopulations.
- If necessary, protect subpopulations from browsing by feral pigs (e.g. by fencing).

### Ex situ recovery actions

- Collect and maintain seed collections and fungal symbionts for ex situ seed banking, as per the Plant Germplasm Conservation Guidelines (Martyn Yenson et al. 2021).
- Undertake ex situ propagation and, where appropriate, translocation trials in accordance with the *Guidelines for the Translocation of Threatened Plants in Australia* (Commander et al. 2018). However, due to the large area of apparently suitable habitat, further surveys remain the priority for this species.
- Where translocation is undertaken, monitor all translocated individuals to maturity, seed set and recruitment to ensure they are viable and are contributing to a reduction in the extinction risk for the species.

# Stakeholder engagement/community engagement

- Engage and involve Traditional Owners in conservation actions, including surveying for new populations and management actions.
- 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.
- Engage community groups by encouraging participation in surveys or monitoring for the species.
- Inform managers of sites where there are known populations and consult with these groups regarding options for conservation management and protection of the species.

# Survey and monitoring priorities

- Conduct targeted surveys throughout the range of the duck's-head wasp-orchid to better determine its population size. Surveys should be undertaken when the species is flowering from December to March.
- Improve understanding of the pollinator, its life cycle and ecology (and that of its prey species), and its response to fire seasonality, frequency and severity.

- Improve understanding of the orchid's life history, including tuber dynamics, leaf dynamics and seedling recruitment including the microbial symbionts involved in germination.
- Improve understanding of the sensitivities of the duck's-head wasp-orchid to fire seasonality, frequency and severity.
- Maintain a monitoring program to:
  - record response to future bushfires;
  - determine trends in population size and distribution;
  - determine threats and their impacts; and,
  - monitor the effectiveness of management actions and the need to adapt them if necessary.

# Information and research priorities

- Increase survey effort to locate additional populations.
- Investigate the population genetics of known subpopulations, particularly the number of genetically distinct individuals in subpopulations expected to contain a large proportion of clones.
- Identify the time of year plants are dormant, and the timing of leaf emergence.
- Investigate the biology and ecological requirements of the pollinator.
- Investigate recruitment, seedling survival and plant longevity/generation length.
- Identify fire regimes that are detrimental and those that allow population persistence.

# **Recovery plan decision**

No recovery plan is in place for the duck's-head wasp-orchid. This consultation document will elicit the additional information needed to inform the requirement of a Recovery Plan for the species.

# Links to relevant implementation documents

Draft survey guidelines for Australia's threatened orchids

NSW Duck's-head Wasp-orchid Profile

Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*) (2017)

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# 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 Chiloglottis anaticeps

### 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 <u>EPBC Regulations</u>. The thresholds used correspond with those in the <u>IUCN Red List criteria</u> except where noted in criterion 4, subcriterion 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.

| Metric                          | Estimate used<br>in the<br>assessment | Minimum<br>plausible<br>value | Maximum<br>plausible<br>value | Justification   |  |
|---------------------------------|---------------------------------------|-------------------------------|-------------------------------|---|--|
| Number of mature<br>individuals | ~100,000                              | 100,000                       | > 100,000                     | There are an estimated ~100,000<br>plants across all three<br>subpopulations, with the majority of<br>these from Mooraback and Hastings<br>Forest Way (Table 1). As the species<br>is capable of clonal reproduction, the<br>effective population size may be<br>substantially less (Chung et al.<br>2004). However, individual plants<br>within a clone are counted as<br>individuals if capable of surviving or<br>their own (as is the case with the<br>Duck's-head Wasp-orchid) (IUCN<br>2019), leading to the figure of<br>~100,000 individuals for this<br>species. |  |
| Trend                           | Stable                                |                               |                               | The number of known plants<br>increased substantially in the season<br>following the 2019–20 bushfires, but<br>this is likely due to the fire-<br>stimulated flowering of dormant<br>tubers.  |  |
| Generation time<br>(years)      | 30 years                              | <30 years                     | > 30 years                    | The generation length of this species<br>is not well understood. As the<br>species reproduces clonally, the<br>colony as a whole may be capable of<br>surviving for many decades.   |  |
| Extent of<br>occurrence         | 722 km <sup>2</sup>                   | 722 km <sup>2</sup>           | > 722 km <sup>2</sup>         | The current estimated EOO is 722 km <sup>2</sup> . This estimate of EOO was attained by mapping point records from a 20-year period (2000–2020), obtained from state governments, museums, and CSIRO. The EOO was then calculated using a minimum convex hull.  |  |

### **Table 4 Key assessment parameters**

| Metric   | Estimate used<br>in the<br>assessment   | Minimum<br>plausible<br>value | Maximum<br>plausible<br>value | Justification   |  |
|--|---|-------------------------------|-------------------------------|---|--|
| Trend  | Unknown   |                               |                               | Due to the large area of apparently<br>suitable habitat, it is possible that<br>additional subpopulations exist that<br>would increase EOO.   |  |
| Area of<br>Occupancy                                 | 16 km <sup>2</sup>  | 16 km <sup>2</sup>            | >12 km <sup>2</sup>           | The current estimated A00 is 12 km <sup>2</sup> . This estimate is based on the mapping of point records from a 20-year period (2000–2020) obtained from state governments, museums and CSIRO. The A00 itself was calculated using a 2x2 km grid cell method, based on the IUCN Red List Guidelines (IUCN 2019).  |  |
| Trend  | Increasing  |                               |                               | Due to the large area of apparently<br>suitable habitat, it is likely that<br>additional subpopulations exist that<br>would increase AOO.   |  |
| Number of<br>subpopulations                          | 3   | 3                             | >3                            | All three known subpopulations are<br>separated by large distances<br>(minimum ~15 km between Barokee<br>and Hastings Forest Way) making<br>them distinct subpopulations.   |  |
| Trend  | Increasing Due to the large area of appar<br>suitable habitat, it is likely the<br>additional subpopulations ex   |                               |                               |   |  |
| Basis of<br>assessment of<br>subpopulation<br>number | All three known subpopulations are separated by large distances (minimum ~15 km between Barokee and Hastings Forest Way) making them distinct subpopulations. |                               |                               |   |  |
| No. locations  | 2   | 2                             | >2                            | The most significant threat facing<br>this species is herbivory from feral<br>pigs. Maximum home ranges of 18<br>km in length have been recorded for<br>feral pigs in eucalypt woodland in<br>New South Wales (Saunders & Kay<br>1996). As the minimum distance<br>between known subpopulations of<br>duck's-head wasp-orchid is 15 km<br>(between Hastings Forest Way and<br>Mooraback) it is possible that both<br>these subpopulations could be<br>impacted by a single feral pig group<br>and both subpopulations are<br>therefore considered a single<br>location. The distance between the<br>Barokee subpopulation and both the<br>Mooraback and Hastings Forest Way<br>subpopulations is about 80 km. The<br>Barokee subpopulation is therefore<br>likely to be affected by separate<br>groups of feral pigs and represents a<br>second location. |  |
| Trend  | Increasing  |                               |                               | Due to the large area of apparently<br>suitable habitat, it is likely that<br>additional subpopulations exist at<br>other locations.  |  |

#### Chiloglottis anaticeps (Duck's-head Wasp-orchid) Conservation Advice

| Metric                                       | Estimate used<br>in the<br>assessment  | Minimum<br>plausible<br>value   | Maximum<br>plausible<br>value  | Justification   |  |  |
|--|--|---|--|---|--|--|
| Basis of<br>assessment of<br>location number | The most signific<br>ranges of 18 km i<br>South Wales (Sau<br>subpopulations o<br>Mooraback) it is<br>pig group and bo<br>between the Barc<br>subpopulations is<br>by separate group | ant threat facing th<br>n length have been<br>nders & Kay 1996<br>f duck's-head was<br>possible that both<br>th subpopulations<br>okee subpopulations<br>about 80 km. The<br>ps of feral pigs and | g this species is herbivory from feral pigs. Maximum home<br>een recorded for feral pigs in eucalypt woodland in New<br>96). As the minimum distance between known<br>vasp-orchid is 15 km (between Hastings Forest Way and<br>th these subpopulations could be impacted by a single feral<br>ns are therefore considered a single location. The distance<br>tion and both the Mooraback and Hastings Forest Way<br>The Barokee subpopulation is therefore likely to be affected |   |  |  |
| Fragmentation                                | Not severely frag<br>conservation rese   | lot severely fragmented. All known subpopulations are located in medium to large sized onservation reserves and national parks.   |  |   |  |  |
| Fluctuations                                 | Not subject to ext<br>mature individua<br>bushfires, this is<br>change in state fr   | reme fluctuations<br>ls. Although the m<br>unlikely to represe<br>om non-flowering  | in EOO, AOO, num<br>umber of flowering<br>ent fluctuations in t<br>to flowering indivi   | ber of subpopulations, locations or<br>plants changes dramatically following<br>he total population size, rather a<br>iduals. |  |  |

### **Criterion 1 Population size reduction**

| Red                  | Reduction in total numbers (measured over the longer of 10 years or 3 generations) based on any of A1 to A4  |  |                              |                                     |                                 |   |  |  |
|----------------------|--|--|------------------------------|-------------------------------------|---------------------------------|---|--|--|
|                      |  | Critically Endangered<br>Very severe reduction   | Enda<br>Sevei                | ngered<br>re reduction              |                                 | Vulnerable<br>Substantial reduction   |  |  |
| A1                   |  | ≥ 90%  | ≥ 70%                        | 6                                   |                                 | ≥ 50%   |  |  |
| A2, A                | .3, A4   | ≥ 80%  | ≥ 50%                        | б                                   |                                 | ≥ 30%   |  |  |
| A1<br>A2<br>A3<br>A4 | Population reduction observed, estimat<br>past and the causes of the reduction are<br>understood AND ceased.<br>Population reduction observed, estimat<br>past where the causes of the reduction<br>be understood OR may not be reversibl<br>Population reduction, projected or susp<br>to a maximum of 100 years) [( <i>a</i> ) cannot<br>An observed, estimated, inferred, proje<br>reduction where the time period must i | ted, inferred or suspected in<br>e clearly reversible AND<br>ted, inferred or suspected in<br>may not have ceased OR ma<br>e.<br>bected to be met in the futur<br>t be used for A3]<br>cted or suspected populatio | the<br>the<br>y not<br>e (up | Based on<br>any of the<br>following | (a)<br>(b)<br>(c)<br>(d)<br>(e) | direct observation [except<br>A3]<br>an index of abundance<br>appropriate to the taxon<br>a decline in area of<br>occupancy, extent of<br>occurrence and/or quality of<br>habitat<br>actual or potential levels of<br>exploitation<br>the effects of introduced<br>taxa, hybridization,<br>pathogens, pollutants,<br>compations |  |  |
|                      | reduction may not have ceased OR may<br>be reversible.   | not be understood OR may   | not                          |                                     |                                 |   |  |  |

# Criterion 1 evidence Insufficient data

The generation length of the duck's-head wasp-orchid is inferred to be approximately 30 years, giving a 90-year period for this criterion (three generations).

There are an estimated 100,000 known individuals of the duck's-head wasp-orchid observed following the 2019–20 bushfires. Although long-term monitoring of this species has not been undertaken, there is no evidence to suggest the population is in decline (Table 1).

The Committee considers that there is insufficient information to determine the eligibility of the duck's-head wasp orchid 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<br>Endangered<br>Very restricted | Endangered<br>Restricted | Vulnerable<br>Limited    |  |  |  |
|-----|---|---|--------------------------|--------------------------|--|--|--|
| B1. | Extent of occurrence (EOO)  | < 100 km <sup>2</sup>                       | < 5,000 km <sup>2</sup>  | < 20,000 km <sup>2</sup> |  |  |  |
| B2. | Area of occupancy (AOO)   | < 10 km <sup>2</sup>                        | < 500 km <sup>2</sup>    | < 2,000 km <sup>2</sup>  |  |  |  |
| AND | at least 2 of the following 3 conditi   | ons:  |                          |                          |  |  |  |
| (a) | ) Severely fragmented OR Number $= 1$ $\leq 5$ $\leq 10$  |   |                          |                          |  |  |  |
| (b) | (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) | 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

The species' Extent Of Occurrence (EOO) is estimated at 722 km<sup>2</sup> and the Area Of Occupancy (AOO) is estimated at 16 km<sup>2</sup>, therefore the duck's-head wasp-orchid has a restricted EOO and AOO (Table 1).

The most significant threat impacting the species is herbivory and disturbance by feral pigs. Feral pigs can be considered ecosystem engineers (Jones et al. 1997) because they are capable of causing severe ground disturbance that alters the floristic composition of ecosystems (Alexiou 1984). Pig rooting, even at relatively low levels, is capable of causing local extinction of plant species (Hone 2002). Feral pigs are known to reduce populations of tuberous perennial plants through selective herbivory and ground rooting (Alexiou 1984) and feral pigs are a known threat to orchids (DOEE 2017; Wraith & Pickering 2019). The duck's-head wasp-orchid is at particular threat from feral pigs as it occurs near streams (Jones 2021) and ground rooting and wallowing from feral pigs is often concentrated in or near drainage lines (Hone 2002). Feral pig activity has been observed to negatively impact the Barokee subpopulation and evidence of ground rooting was recently observed at the Mooraback subpopulation (Fawcett 2021 pers. comm. 28 July). Additionally, the very small area of known subpopulations (plants cover about 0.15 ha at Barokee and 1.5 ha at Mooraback) makes these subpopulations susceptible to a localised increase in feral pig activity.

Maximum home ranges of 18 km in length have been recorded for feral pigs in eucalypt woodland in New South Wales (Saunders & Kay 1996). As the minimum distance between known subpopulations of duck's-head wasp-orchid is 15 km (between Hastings Forest Way and Mooraback) it is possible that both these subpopulations could be impacted by a single feral pig group and both subpopulations are therefore considered a single location. The distance between the Barokee subpopulation and both the Mooraback and Hastings Forest Way subpopulations is about 80 km. The Barokee subpopulation is therefore likely to be affected by separate groups of feral pigs and represents a second location. The total number of locations is therefore likely to be two.

There is an inferred continuing decline of habitat quality caused by feral pig disturbance and recreational/management activities, and a projected decline due to inappropriate fire regimes. Feral pigs can alter the floristic composition of plant communities (Alexiou 1984; Hone 2002; DOEE 2017) and facilitate weed invasion (DOEE 2017) and ground rooting by feral pigs has been observed at the Barokee and Mooraback subpopulations (Fawcett 2021 pers. comm. 28 July).

Disturbance from recreation and associated walking tracks and roads is also a threat at the Barokee and Hastings Forest Way subpopulations as both subpopulations occur very close to the edge of established walking tracks, some of which are in need of maintenance works that could impact these subpopulations, particularly if the footprint of existing tracks is expanded (Fawcett 2021 pers comm. 28 July). In addition, maintenance works may cause degradation of habitat by damaging plants and causing soil disturbance that could facilitate the introduction of weeds. Impacts from recreational use are also affecting the Hastings Forest Way subpopulation, particularly trampling of plants along the edges of walking tracks and dumping of rubbish from a nearby camping area (Fawcett 2021 pers comm. 28 July).

High severity fire may be a threat to *Chiloglottis* species (Duncan 2012), while out-of-season fires may disrupt leaf phenology (Miller et al. 2019), mycorrhizal fungal communities (Jasinge et al. 2019) or pollinator communities (Brown et al. 2016) and may result in tuber mortality (Jasinge et al. 2019). Similar interactions between fire and drought may also result in elevated mortality (Keith 1996). Increasing fire frequency may affect mycorrhizal fungal communities (Cairney et al. 2007) and disrupt pollinator communities (Brown et al. 2016), while small, patchy and low severity fires could result in increased herbivory (Wan et al. 2014).

The Committee considers that the species' EOO and AOO is restricted, the number of locations is restricted and a continuing decline is inferred in area, extent and or quality habitat. Therefore, the species appears to have met the relevant elements of Criterion 2 to make it eligible for listing as Endangered.

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 3 Population size and decline**

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

# **Criterion 3 evidence** Not eligible

The total number of mature individuals is 100,000 which is not considered limited. There is also no evidence that the population of duck's-head wasp-orchid is declining or subject to extreme fluctuations. Therefore, the species appears to have not met this required element of 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 4 Number of mature individuals**

|  | Critically Endangered<br>Extremely low | Endangered<br>Very Low | Vulnerable<br>Low   |  |
|--|--|------------------------|---|--|
| <b>D.</b> Number of mature individuals   | < 50                                   | < 250                  | < 1,000   |  |
| <b>D2.</b> <sup>1</sup> Only applies to the Vulnerable<br>category<br>Restricted area of occupancy or number<br>of locations with a plausible future threat<br>that could drive the species to critically<br>endangered or Extinct in a very short<br>time |  |                        | D2. Typically: area of<br>occupancy < 20 km² or<br>number of locations<br>≤ 5 |  |

<sup>1</sup> 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 <u>common</u> <u>assessment method</u>.

### **Criterion 4 evidence** Not eligible

The total number of mature individuals is estimated at 100,000 which is not considered low. Therefore, the species appears to have not met this required element of 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 5 Quantitative analysis**

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

### **Criterion 5 evidence** Insufficient data to determine eligibility

Population viability analysis has not been undertaken. Therefore, there appears to be 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.

# Adequacy of survey

Despite the likelihood that additional subpopulations of duck's-head wasp-orchid exist, the survey effort is considered adequate and there is sufficient scientific evidence to support the assessment.

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