

Consultation on Species Listing Eligibility and Conservation Actions

Pultenaea rodwayi (a bush pea)

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

1) the eligibility of *Pultenaea rodwayi* (a bush pea) for inclusion on the EPBC Act threatened species list; 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@awe.gov.au

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 8 July 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.awe.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: 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: https://www.awe.gov.au/environment/biodiversity/threatened/nominations.

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 Pultenaea rodwayi

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:

□ 1–50 □ 51–250 □ 251–1000 □ >1000 □ >10 000

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
- \Box 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

<u>SECTION D</u> 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 during the 1990s (generation length unknown but possibly at or soon after the start of the most recent three generation period)? 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:

 \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
- \Box 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:

- \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
- \Box 51–95% reasonably certain, suggests this range of decline
- \Box 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.

<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

- 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:

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

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

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 km² \Box 11 – 500 km² \Box 501 – 2000 km² \Box >2000 km²

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

<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

- 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:

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

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

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 km² \Box 11 – 500 km² \Box 501 – 2000 km² \Box >2000 km²

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
- \Box 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)

- 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?

<u>SECTION I</u> 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 *Pultenaea rodwayi*

In effect under the *Environment Protection and Biodiversity Conservation Act* 1999 from dd month yyyy.

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.

The survey effort is not considered adequate and there is insufficient scientific evidence to support an outcome under the listing criteria.

Conservation status

Pultenaea rodwayi is not listed as a threatened species list under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act).

Pultenaea rodwayi was assessed by the Threatened Species Scientific Committee and there was insufficient evidence to determine eligibility under the listing criteria. Therefore, the species is currently not eligible for listing under the EPBC Act. 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: Insufficient data
- Criterion 3: Insufficient data
- Criterion 4: Insufficient data
- Criterion 5: Insufficient data

The main factors that make the species ineligible for listing at this time are a lack of survey data and a lack of information about the key threats to the species. However, the lack of available information does not indicate that the species is not threatened. The species may become eligible for listing when further information on population size and threats becomes available. As such, field surveys are considered a high priority in order to establish the species' conservation status.

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 *Pultenaea rodwayi* Tindale ex de Kok (2003). Described by de Kok and West in 2003 from specimens collected by Coveny in 1981 along the track to Pigeon House Mountain Didthul, Morton National Park. The species was previously referred to by the unpublished manuscript name *P. rodwayi* Tindale, and as *Pultenaea* sp. D in the Flora of New South Wales (Weston 1991). There does not appear to be a common name in regular use.

Description

Pultenaea rodwayi is a bush pea (family Fabaceae). It is an erect shrub, 1–2 m high, with sparsely to moderately hairy branchlets. The leaves are linear, terete (circular in cross section) with a groove on the upper surface, 15–34 mm long by 0.8–1.8 mm wide. The leaves are numerous, arranged alternately on branchlets. The inflorescences are terminal (at the end of the branchlets), dense, with yellow or orange flowers with red striations, that are 8–12 mm long (de Kok & West 2003, PlantNet 2021).

Distribution

Pultenaea rodwayi has a restricted distribution in the northern Budawang Range. Nearly all herbarium collections have been made from Morton National Park in the vicinity of The Castle, Mt Talaterang, Mt Bibbenluke, Crooked Falls, Endrick Trig and the Pigeon House Mtn Didthul area. There is one outlying collection from Flat Rock Creek where it crosses Turpentine Road c. 20 km south-west of Nowra. Turpentine Road was upgraded and substantially widened in 2018, and plants may have been impacted as a result. There is only one record (herbarium collection or other available record) after 1998 (ALA 2021, AVH 2021, BioNet 2021).

Pultenaea rodwayi occurs in relatively remote areas, and it is likely to be under-reported owing to the difficulty in identifying *Pultenaea* species and a lack of surveys in areas where the species is recorded.

Table 1 Known	subpopulations of	Pultenaea	rodwayi
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Subpopulation	Abundance (where noted in collection notes; data from AVH 2021)	Year collected	Fire history since 1980 (DPIE 2021)	Location notes
Flat Rock Creek (Turpentine Rd)		1989	2019-20: Bushfire 2001-02: Bushfire 1980-1981: Bushfire	Turpentine Road upgraded and widened in 2018, which may have impacted this subpopulation
Little Forest Plateau	"Locally abundant" (Liney 2022 pers. comm.)	1998	2019-20: Bushfire 1988-89: Bushfire 1980-1981: Bushfire	Confined to N side of gully in wet heath habitat (Liney 2022 pers. comm.)
Mt Talaterang area		1940 1940	2019-20: Bushfire 2016-17: Presc. burn	Lower slopes Mt Talaterang
Northern Budawang Ra NW of Crooked Falls	"Common" [1985]	1985	2019-20: Bushfire	Steep rock slope, NW aspect.
2 mile south of Endrick Trig		1965	2019-20: Bushfire 1980-81: Bushfire	Dry sclerophyll forest on floor of open valley
1km E of Mt Bibbenluke	"Localised, but there frequent"	1984	2019-20: Bushfire	
The Castle area	"Rare" [1966] "Locally common in understorey" [1982] "Occasional" [1990] "Abundant" [1998; Liney 2022 pers. comm.]	1940, 1966, 1971, 1974 x2, 1982, 1984, 1990, 1998	2019-20: Bushfire	Sandstone shelf at foot of cliff, SW aspect. Sandstone ledge below cliffs. Mountainous, ledge on cliff SW aspect. Dry sclerophyll forest on sandstone shelf at foot of cliff, SW aspect. Cliffs below castle, on conglomerate cliffs.
Pigeon House Mountain/Didthul area	"Locally common" [1981]	1975, 1981 x2, 1994, 2010	2019-20: Bushfire 1995-96: Presc. burn 1981-82: Bushfire 1980-81: Presc. burn	Among sandstone rocks in dry sclerophyll forest Edge of S facing cliff. South ridge of Pigeon House Mtn, rocky sandstone escarpment. Pigeon House Mtn walking track. On rocky soil.



Map 1 Modelled distribution of Pultenaea rodwayi

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

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.

Aboriginal Australians have a long history of management of the country on which *P. rodwayi* occurs. The species occurs across Ulladulla and Nowra Local Aboriginal Land Councils (NSW Aboriginal Land Council 2021). The area around Didthul (Pigeon House Mountain) is of particular significance to the Yuin peoples, and is connected to dreamtime stories of the area.

There is no published information about the cultural significance of *P. rodwayi* or other similar bush peas. 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

Very little is known about the biology and ecology of *P. rodwayi*. It flowers from October to November and produces fruits from November to December (De Kok & West 2003).

It occurs in dry to wet sclerophyll forest or heathlands in sandy soil over sandstone or conglomerate (De Kok & West 2003). It has been recorded growing on steep rocky slopes, sandstone shelves and ledges below cliffs, and on open valley floors. At Turpentine Road, it grows in *Kunzea ambigua* shrub community, while in the Budawangs it grows in heathland or shrubland dominated by *Eucalyptus multicaulis* (whipstick ash) (in the Castle area) or *Eucalyptus gummifera* (red bloodwood) (in the Pigeon House Mountain Didthul area).

Reproductive ecology

Nothing is known about the pollination of *P. rodwayi*, however other species of *Pultenaea* and other small peas are thought to be pollinated primarily by bees from various families (Armstrong 1979, Gross 1992). Like many other peas, flowers of *Pultenaea* species have hidden floral rewards that require manipulation of flower parts to access. In the Queensland species *P. villosa* (hairy bush-pea), bees were the only floral visitors that were capable of manipulating the lower petals to gain access to the nectar and reproductive structures (Ogilvie et al. 2009).

The South Australian species *P. densifolia* is known to be self-incompatible and therefore reliant on insect vectors for pollination (Gross 1990), but it is unclear how common self-incompatibility is among other *Pultenaea*.

Seed ecology

Nothing is known about the seed ecology of *P. rodwayi*; however, other species of *Pultenaea* typically eject seeds a short distance (<1 m) from parent plants, followed by secondary myrmecochory (dispersal by ants) (Berg 1975; Auld 1996). Ant dispersal typically occurs over short distances (<10 m) (Berg 1975; Beaumont et al. 2013). Seed predation by *Bruchidius* beetles (Auld 1996) and moth larvae (Campbell & Clarke 2006) has been noted in some *Pultenaea* species.

Pultenaea species have hard, impermeable seed coats which impose a level of physical dormancy on the seed (Morrison et al. 1992). Seed germination is promoted by heat (80–100 °C) or scarification (Auld & O'Connell 1991; Lynch 1999; Fraser et al. 2004), although low to moderate levels of non-dormant seed have been observed in some, but not all, species (Auld & O'Connell 1991; Fraser et al. 2004; Orscheg & Enright 2011).

Fire ecology:

The effects of fire on *P. rodwayi* are unknown. Most *Pultenaea* are fire sensitive obligate seeders (i.e. adult plants are killed by fire, and fire stimulates germination from the soil seed bank) (Auld & O'Conell 1991; Auld 1996; Read et al. 2000). However, some species are known to resprout following fire. The threatened species *P. baeuerlenii* (Budawangs bush-pea), which is also restricted to the Budawang ranges, was observed resprouting and regenerating from seed after having been burnt in the 2019-20 bushfires (DPE, pers. comm. 3 February 2022). In the New England Tablelands bioregion, seven *Pultenaea* species were considered obligate seeders, while four were considered resprouters from roots or basal buds (Clarke et al. 2009). In the rare NSW species *P.* sp. Olinda, regeneration from seedlings, resprouting of adults, and higher levels of

flowering and fruiting in adult plants was observed in burnt sites compared with unburnt sites, indicating that periodic fire may be important in maintaining healthy populations (Clarke 2013). In the Victorian species *P. glabra* (smooth bush-pea), fire stimulates mass germination of seed and subsequent seedling recruitment, although there are also reduced levels of on-going seedling recruitment in intervening years (Fraser et al. 2004).

Threats

Given the lack of available information on the biology and ecology of *P. rodwayi*, it is difficult to define the major threats and how they may affect the species. Based on inference from related species, fire regimes that cause declines in biodiversity and dieback caused by *Phytophthora cinnamomi* are likely to be threats. Climate change is likely to increase the frequency of droughts and fires which may impact the species.

Threat	Status and severity ^a	Evidence					
Habitat disturbance a	Habitat disturbance and modification						
Fire regimes that cause declines in biodiversity [†]	 Timing: current/future Confidence: suspected Likelihood: likely Consequence: major Trend: increasing Extent: across the entire range 	 <i>High frequency fire:</i> Frequent fire has been identified as a likely threat for another range-restricted species in the Budawangs, the Budawangs bush-pea (NSWSC 2008). Repeated fire within a short period of time may kill regenerating seedlings before they can replenish the soil seedbank, or kill resprouting plants before they are able to develop fire resistance. Approximately 98% of modelled range of <i>P. rodwayi</i> overlapped with the burnt area extent of the 2019-20 fires (Gallagher 2021), suggesting that most or all subpopulations may be vulnerable to fire in the next 6–10+ years as the species recovers (see below). However, the 2019-20 fires alone are unlikely to have had a negative impact on the species, and may have contributed to increased recruitment (see low frequency fire below). There are no data on time to maturity in <i>P. rodwayi</i>; however, in other <i>Pultenaea</i> species the primary juvenile period in obligate seeders ranges from 3–7 years (Clarke et al. 2009), while in resprouting species the secondary juvenile period is 3–4 years (Clarke et al. 2009; Clarke 2013). Therefore, repeated fires within 6–10 years (primary juvenile period plus 3 years to allow at least some replenishment of the soil seedbank) may negatively impact <i>P. rodwayi</i>. Further information on the fire response of <i>P. rodwayi</i>, the length of the primary and secondary (if applicable) juvenile periods, and the rate of seedbank 					
		assessment. <i>Low frequency fire and fire competition interactions:</i> <i>Pultenaea rodwayi</i> occurs in areas that may decline if vegetation is long-unburnt, and it is likely that periodic fire is beneficial for healthy subpopulations and on-going recruitment. In the rare NSW species <i>P</i> . sp. Olinda, burnt patches contained more seedlings and adult plants had more flowers than in unburnt patches (Clarke 2013). In the Queensland species hairy bush-pea, plants live for 6–8 years in the absence of fire before populations start to decline					

Table 2 Threats impacting Pultenaea rodwayi

Threat	Status and severity ^a	Evidence
		(Ogilvie et al. 2009), indicating fire may play a role in maintaining population size.
		High severity fire
		High severity fire alone is unlikely to lead to population decline. High severity fire may lead to adult plant mortality and mortality of some seed in the soil seed bank close to the surface. However, like other <i>Pultenaea</i> species, fire is likely to trigger regeneration from seed, which will likely offset adult mortality.
		Interactions with fire and other threats
		Fires followed or preceded by periods of drought or intense rainfall events may have a negative impact on <i>P. rodwayi</i> e.g., seedlings may struggle to regenerate during post-fire drought, or intense rainfall following fire may wash away soil and part of the soil seedbank. Drought may impact the primary juvenile period of the species by making it longer due to the harsh conditions
		High frequency and high severity fires may lead to declines in pollinator abundance and therefore declines in seed set and recruitment, although the impact of fire regimes on invertebrates in Australia remains poorly understood. In a global meta-analysis, Carbone et al. (2019) found a positive effect of fire on Hymenopteran abundance and diversity, but with a negative effect of frequent fire. In Australia, Dorey et al. (2021) predicted that many bee species were negatively impacted by the widespread 2019-20 fires, although further empirical evidence is needed (e.g. Marquart 2018).
Disease		
Dieback caused by P. cinnamomi	 Timing: current Confidence: inferred Likelihood: unknown Consequence: potentially major Trend: unknown Extent: across the entire range 	No data are available for <i>Pultenaea rodwayi</i> , but many other species of <i>Pultenaea</i> are highly susceptible to <i>P.</i> <i>cinnamomi</i> (O'Gara et al. 2005). A few species of <i>Pultenaea</i> are tolerant (field resistant) to <i>P. cinnamomi</i> (Lynch 1999, O'Gara et al. 2005). Given the evidence for many <i>Pultenaea</i> species being susceptible, dieback caused by <i>P. cinnamomi</i> is inferred as a potential threat to <i>P. rodwayi</i> . The remote location of most subpopulations may
		reduce the likelihood of phytophthora introduction.
Climate change	1	
Increased temperatures, droughts and fire danger weather, and changes in precipitation	 Timing: future Confidence: projected Likelihood: likely Consequence: major Trend: increasing Extent: across the entire range 	Climate projections for eastern Australia include increases in temperature, changes in rainfall patterns and an increased frequency of drought (CSIRO & Bureau of Meteorology 2015). In the south-east and tablelands region of NSW, there is a projected increase in minimum and maximum temperatures, the number of hot days (above 35°C), fire danger weather and extreme events (e.g. drought), and changes to precipitation patterns (increased precipitation in autumn and decreased precipitation in spring) (OEH 2014). South-eastern Australia has experienced two significant drought events since 2000 (Bureau of Meteorology 2020). Drought may cause plant mortality, as many plants are vulnerable to drought

Threat	Status and severity a	Evidence
		Drought may be a particular issue for plants which grow at sites with low water holding capacity.
		Climate change may also exacerbate threats posed by fire regimes that cause declines in biodiversity through mechanisms such as interval squeeze (Enright et al. 2015). The 2019-20 fires burnt area extent overlapped with an 98% of the modelled range of the species. Although the fire extent covered most or all known subpopulations, it is possible that some plants or subpopulations were unburnt, or only burnt at low severity. The predicted increase in bushfire frequency may negatively impact <i>Pultenaea rodwayi</i> into the future (see high frequency fire section).

[†]Fire 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.

^a 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) 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.

Likelihood	Consequences								
	Not significant	Minor	Moderate	Major	Catastrophic				
Almost certain	Low risk	Moderate risk	Very high risk Very high ris		lerate risk Very high risk		Very high risk		
Likely	Low risk	Moderate risk	High risk	Very high risk Fire regimes that cause declines in biodiversity Climate change	Very high risk				
Possible	Low risk	Moderate risk	High risk	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 Dieback from <i>P. cinnamomi</i>	Very high risk				

Table 3 Pultenaea rodwayi risk matrix

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 basis but only a few times 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 a watching brief.

Conservation and recovery actions

Primary conservation outcome

By 2032, the abundance, distribution and threats impacting *P. rodwayi* will better understood, and subpopulations will be sustained in habitats in which threats are managed effectively.

Conservation and management priorities

Fire

- Develop and implement a fire management strategy that optimises the survival of *P. rodwayi*.
 - 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

- Determine susceptibility of P. rodwayi to Phytophthora cinnamomi.
- Implement a *P. cinnamomi* management plan to ensure it is not introduced into known locations of *P. rodwayi* and the spread in surrounding areas is limited. Refer to the threat abatement plan for disease in natural ecosystems caused by *P. cinnamomi* (DOEE 2018).
- Ensure that appropriate hygiene protocols are adhered to when entering or exiting the known locations of *P. rodwayi*.

Breeding, seed collection, propagation and other ex situ recovery action

• To manage the risk of losing genetic diversity, undertake appropriate seed collection, and storage in appropriate institutions (such as the NSW Plantbank, Royal Botanic Gardens Sydney). Best practice seed storage guidelines and procedures should be adhered to, to

maximise seed viability and germinability (see Martyn Yenson et al. 2021). Seeds from all major natural subpopulations should be collected and stored.

Stakeholder engagement/community engagement

- Engage and involve Traditional Owners in conservation actions, including surveying for new populations and management actions. Work with Traditional Owners to divulge any traditional knowledge associates 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.
- 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

- Survey of extent and population size of known subpopulations
- Maintain a monitoring program to:
 - document the number of plants in all subpopulations;
 - record response to future bushfires (particularly the length of the juvenile period and whether the species is an obligate seeder or whether there is some resprouting);
 - 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.
- Survey areas of likely habitat for new subpopulations

Information and research priorities

- Investigate the basic ecology of the species, including whether it is an obligate seeder or whether there is some resprouting, and to what extent seeds require fire cues to germinate.
- Investigate the susceptibility of the species to *Phytophthora cinnamomi*.
- Identify and protect current and future habitat likely to remain or become suitable habitat due to climate change.
- Assess the feasibility of translocation as an option to mitigate against climate change to ensure population persistence for the species in the future.
- Undertake vulnerability assessments of the species sensitivity and adaptive capacity to changing climate conditions which draw from genetic, physiological or ecological evidence.

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

<u>Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi* (2018)</u>

Conservation Advice and Listing Assessment references

- ALA (2021) Records of *Pultenaea rodwayi* species page. Atlas of Living Australia. Accessed 23 September 2021. Available from: <u>https://biocache.ala.org.au/occurrences/search?q=lsid:https://id.biodiversity.org.au/no</u> <u>de/apni/2902582#tab_mapView</u>
- Armstrong JA (1979) Biotic pollination mechanisms in the Australian flora a review. *New Zealand Journal of Botany* 17: 467-508.
- Auld TD, O'Connell MA (1991) Predicting patterns of post-fire germination in 35 eastern Australian Fabaceae. *Australian Journal of Ecology*, 16, 53–70.
- Auld TD (1996) Ecology of the Fabaceae in the Sydney region: fire, ants and the soil seedbank. *Cunninghamia*, 4, 535 551.
- AVH (2021) Records of *Pultenaea rodwayi* species page. Australian Virtual Herbarium. Accessed 23 September 2021. Available from: <u>https://avh.ala.org.au/occurrences/search?taxa=pultenaea+rodwayi#tab_mapView</u>
- BioNet (2022) Records of *Pultenaea rodwayi*. New South Wales BioNet atlas. Accessed 9 February 2022. Availabe from: <u>https://www.environment.nsw.gov.au/atlaspublicapp/UI Modules/ATLAS /atlasreport.</u> <u>aspx</u>
- Beaumont KP, Mackay DA, Whalen MA (2013) Multiphase myrmecochory: the roles of different ant species and effects of fire. *Oecologia*, 172, 791–803.
- Berg RY (1975) Myrmecochorous plants in Australia and their dispersal by ants. *Australian Journal of Botany*, 23, 475–508.
- Bureau of Meteorology (2020) *Drought rainfall deficiencies and water availability.* Bureau of Meteorology. Accessed: 6 August 2021. Available at: <u>http://www.bom.gov.au/climate/drought/archive/20200107.archive.shtml</u>
- Campbell ML, Clarke PJ (2006) Seed dynamics of resprouting shrubs in grassy woodlands: Seed rain, predators and seed loss constrain recruitment potential. *Austral Ecology*, 31, 1016–1026.
- Carbone LM, Tavella J, Pausas JG & Aguilar R (2019) A global synthesis of fire effects on pollinators. *Global Ecology and Biogeography*, 28, 1487–1498.
- Clarke PJ, Kox KJE, Campbell ML & Copeland LM (2009) Post-fire recovery of woody plants in the New England Tableland Bioregion. *Cunninghamia*, 11, 221–239.
- Clarke S (2013) Preliminary field observations on fire and the endangered and data deficient *Pultenaea* sp. 'Olinda'. *Australasian Plant Conservation*, 22, 11–12.

- 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.
- CSIRO and Bureau of Meteorology (2015) *Climate Change in Australia Information for Australia's Natural Resource Management Regions*: Technical Report. Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Bureau of Meteorology.
- De Kok RPJ, West JG (2003) A revision of the genus *Pultenaea* (Fabaceae) 2. Eastern Australian species with velutinous ovaries and incurved leaves. *Australian Systematic Botany*, 16, 229–273.
- DOEE (Department of the Environment and Energy) (2018) *Threat abatement plan for disease in natural ecosystems caused by* Phytophthora cinnamomi. Department of the Environment and Energy (Commonwealth), Canberra.
- Dorey JB, Rebola CM, Davies OK, Prendergast KS, Parslow BA, Hogendoorn K, Leijs R, Hearn LR, Leitch EJ, O'Reilly RL, Marsh J, Woinarski JCZ & Caddy-Retalic S (2021) Continental risk assessment for understudied taxa post-catastrophic wildlife indicates severe impacts on the Australian bee fauna. *Global Change Biology*, 27, 6551–6567.
- DPIE (2021) NPWS Fire History Wildfires and prescribed burns. Department of Planning, Industry and Environment, New South Wales. Accessed: 29 September 2021. Available at: https://datasets.seed.nsw.gov.au/dataset/fire-history-wildfires-and-prescribedburns-1e8b6#:~:text=NPWS%20Fire%20History%20-%20Wildfires%20and%20Prescribed%20Burns,year%20and%20they%20often%20ext end%20outside%20NPWS%20Estate
- Enright NJ, Fontaine JB, Bowman DMJS, Bradstock RA & Williams RJ (2015) Interval squeeze: altered fire regimes and demographic responses interact to threaten woody species persistence as climate changes. *Frontiers in Ecology and the Environment*, 13, 265–272.
- Fraser M, Simmons D, Adams R (2004) Population decline and potential for local extinction in a population of *Pultenaea glabra* (Fabaceae) in Victoria. *Cunninghamia*, 8, 431–438.
- Gallagher R (2021) Bushfire Expert Panel Fire-affected plant species data. <u>https://doi.org/10.5281/zenodo.5908826</u>
- Gross CL (1990) The breeding systems of three co-occurring legumes: *Dillwynia hispida*, *D. uncinata*, and *Pultenaea densifolia* (Leguminosae: Papilionoideae). *Australian Journal of Botany*, 38, 207–215.
- Gross CL (1992) Floral traits and pollinator constancy: foraging by native bees among three sympatric legumes. *Australian Journal of Ecology*, 17, 67–74.
- IUCN (2022) *Guidelines for Using the IUCN Red List Categories and Criteria*. Version 15. Prepared by the Standards and Petitions Committee, International Union for the Conservation of Nature. Available from: <u>http://www.iucnredlist.org/documents/RedListGuidelines.pdf</u>
- Lynch AJJ (1999) Distribution, ecology and rarity of the nationally Vulnerable species *Pultenaea selaginoides* (Fabaceae). *Australian Journal of Botany*, 47, 865–876.

- 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*. Third edition. Australian Network for Plant Conservation, Canberra.
- Marquart AE (2018) Insects, orchids and fire: the effects of fire on orchid pollinators in eucalypt woodlands of South Australia. PhD thesis, School of Biological Sciences, University of Adelaide.
- Morrison DA, Auld TD, Rish S, Porter C, McClay K (1992) Patterns of testa-imposed seed dormancy in native Australian legumes. *Annals of Botany*, 70, 157–163.
- Muir AM, Vesk PA, Hepworth G (2014) Reproductive trajectories over decadal time-spans after fire for eight obligate-seeder shrub species in south-eastern Australia. *Australian Journal of Botany*, 62, 369–378.
- New South Wales Aboriginal Land Council (2021) Map of Local Aboriginal Land Council boundaries. Accessed: 23 September 2021. Available from: <u>https://alc.org.au/</u>
- O'Gara E, Howard K, Wilson B, Hardy GEStJ (2005) Management of *Phytophthora cinnamomi* for Biodiversity Conservation in Australia: Part 2 – National Best Practice Guidelines. A report funded by the Commonwealth Government Department of the Environment and Heritage by the Centre for *Phytophthora* Science and Management, Murdoch University, Western Australia. Available from: <u>https://environment.gov.au/system/files/resources/23925ac2-8fda-4036-aa56-</u>

5451f5d8b06d/files/part2.pdf

- Ogilvie JE, Zalucki JM, Boulter SL (2009) Pollination biology of the sclerophyllous shrub *Pultenaea villosa* Willd. (Fabaceae) in southeast Queensland, Australia. *Plant Species Biology*, 24, 11–19.
- OEH (2014) South East and Tablelands climate change snapshot. Office of Environment and Heritage, New South Wales. Accessed: 29 September 2021. Available at: <u>https://climatechange.environment.nsw.gov.au/Climate-projections-for-NSW/Climate-projections-for-your-region/South-East-and-Tablelands-Climate-Change-Downloads</u>
- Orscheg CK, Enright NJ (2011) Patterns of seed longevity and dormancy in obligate seeding legumes of box-ironbark forests, south-eastern Australia. *Austral Ecology*, 36, 185–194.
- PlantNet (2021) New South Wales Flora Online page for *Pultenaea rodwayi*. Accessed on 23 September 2021. Available at: <u>https://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Pultenaea~rodwayi</u>
- Read TR, Bellairs SM & Lamb D (2000) Smoke and heat effects on soil seedbank germination for the re-establishment of a native forest community in New South Wales. *Austral Ecology*, 25, 48–57.
- Weston PH (1991) *Pultenaea*. In: Flora of New South Wales vol. 2 (ed. GJ Harden), pp. 481–497. New South Wales University Press, Kensington.

Other sources

- DPE (2022) Personal communication via email, 2 February 2022, Jedda Lemmon, Senior Threatened Species Officer, NSW Department of Planning and Environment.
- Liney J (2022) Personal communication via email, 16 February 2022, former collector at the Eurobodalla Regional Botanic Gardens.

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 Pultenaea rodwayi.

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 3 includes the key assessment parameters used in the assessment of eligibility for listing against the criteria.

Metric	Estimate used in the assessment	Minimum plausible value	Maximum plausible value	Justification
Number of mature individuals	unknown	unknown unknown		There are no data on population size. The species occurs in remote terrain and is likely more widespread than currently known. Nevertheless, the species has a restricted distribution, and in 2021 is still only known from eight subpopulations. Descriptions from herbarium collections imply the species is localised at known subpopulations.
Trend	unknown			There are no data on population trends. The species occurs in remote areas in relatively intact habitat; therefore habitat extent or quality is unlikely to have declined. The extent of the 2019-20 bushfires overlapped with 98% of the modelled species range including all known subpopulations (Gallagher 2021), although survey data are required to confirm the impact of the fires on individuals. While some individuals are likely to have been killed by fire, there is also likely to be recruitment from seed, and it is unknown whether the fires have had a negative or positive impact on the species.
Generation time (years)	unknown	unknown	unknown	The generation time of <i>P. rodwayi</i> and other <i>Pultenaea</i> species is unknown. <i>Pultenaea</i> sp. Olinda has secondary juvenile period (i.e. from resprouting to first flowering) of 3 years (Clark 2013). The Queensland species hairy bush-pea lives for 6–8 years before population starts to decline (Ogilvie et al. 2009). In Victorian forests, <i>P. scabra</i> (rough bush-pea) reaches 80% of maximum flowering at 5–9 years (Muir et al. 2014).

Table 1 Key assessment parameters

Metric	Estimate used in the assessment	Minimum plausible value	Maximum plausible value	Justification	
Extent of occurrence	300 - 1200 km²	280 km ²	>1200 km ²	Based on herbarium records, the extent of occurrence (EOO) is estimated at 280 km ² . Given the species is found in remote areas, and the difficulties associated with identification of <i>Pultenaea</i> species, there are likely to be additional subpopulations and therefore the EOO is likely to be larger than this estimate. However, the species appears to be restricted to the Budawang Ranges, and based on this, a rudimentary estimate of maximum EOO (performed in GeoCAT) is $\sim 1000 \text{ km}^2$.	
Trend	unknown			There is no available information on EOO trends.	
Area of Occupancy	30 - 100 km ²	28 km ² >100 km ²		Based on herbarium records, the area of occupancy is estimated at 28 km ² using the 2 km ² grid method (IUCN 2022). Given the species is found in remote areas, there are likely to be undiscovered subpopulations and therefore the AOO is likely to be larger than this estimate. An estimate of 30–100 km ² is used here as a plausible estimate which reflects the current knowledge on the species' distribution and abundance.	
Trend	unknown			There is no available information on AOO trends.	
Number of subpopulations	unknown	<7	unknown	There are currently 8 known subpopulations, all restricted to the Budawangs and Flat Rock Creek area. Given the remote terrain the species occupies, and the difficulties in identifying <i>Pultenaea</i> species, it is likely that there are additional subpopulations which have not been documented. On the other hand, the species is restricted and seemingly localised within its range, indicating there are unlikely to be high numbers of subpopulations. Until further information is available, the number of subpopulations are unknown. The Flat Rock Creek subpopulation may have been impacted by road widening; therefore the minimum plausible estimate is considered <7.	
Trend	unknown	I	I	There is no available information on subpopulation trends.	
Basis of assessment of subpopulation number	As herbarium collections are the only available records for the species, it is difficult to determine how widespread plants are outside these records and therefore which records reflect different subpopulations. Dispersal distances are unlikely to be large in this species, due to the combination of insect pollination and short-range ballistic/ant-mediated dispersal. In this case, herbarium collections separated by >5 km are likely far enough apart to comprise distinct subpopulations.				

Metric	Estimate used in the assessment	Minimum plausible value	Maximum plausible value	Justification	
No. locations	1 - 2	1	2	Based on current knowledge, fire regimes that cause declines in biodiversity are considered to be the highest threat to this species. All known subpopulations were likely to have been burnt during the 2019-20 fires (Gallagher 2021), although there are likely to be unburnt patches throughout the species distribution. If <i>Pultenaea rodwayi</i> is an obligate seeder, then another fire in the near future may impact immature plants before they are able to adequately replenish the soil seed bank. It is possible, although perhaps unlikely, that a single fire could impact both the Budawangs subpopulations and the Flat Rock Creek subpopulation, but it is reasonable to assume single fires could impact all Budawang subpopulations and the Flat Rock Creek subpopulation. Therefore, the number of locations has been estimated as 1–2.	
Trend	Unknown		I		
Basis of assessment of location number	Based on current knowledge, fire regimes that cause declines in biodiversity is considered the highest threat. All known subpopulations were likely to have been burnt during the 2019-20 fires (Gallagher 2021), although there are likely to be unburnt patches throughout the species distribution. If <i>Pultenaea rodwayi</i> is an obligate seeder, then another fire in the near future may impact immature plants before they are able to adequately replenish the soil seed bank. It is possible, although perhaps unlikely, that a single fire could impact both the Budawangs subpopulations and the Flat Rock Creek subpopulation, but it is reasonable to assume single fires could impact all Budawang subpopulations and the Flat Rock Creek subpopulation. Therefore, the number of locations has been estimated as 1–2.				
Fragmentation	Not considered fragmented. Long distance dispersal of seed unlikely, due to short-range ballistic/ant dispersal. However, given the remote terrain the species occupies, and the large tracts of relatively intact habitat, there are likely to be additional subpopulations between the known subpopulations. The region where the species occurs remains largely intact, thus it is unlikely that habitat clearing has resulted in fragmentation.				
Fluctuations	The number of available infor fluctuations in no evidence to 2019-20 fires.	⁷ mature indivion mation, it is no EOO, AOO, nur suggest that an	duals is likely to flu t possible to deterr nber of subpopulat ny parameter was (actuate following fire. However, based on nine if the species exhibits extreme tions, locations or mature individuals – there is changed by an order of magnitude by the	

Criterion 1 Population size reduction

Redu	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	Enda Sevei	ngered re reduction		Vulnerable Substantial reduction	
A1		≥ 90%	≥ 70%	6		≥ 50%	
A2, A	.3, A4	≥ 80%	≥ 50%	6		≥ 30%	
A1 A2 A3 A4	Population reduction observed, estimat past and the causes of the reduction are understood AND ceased. Population reduction observed, estimat past where the causes of the reduction be understood OR may not be reversibl Population reduction, projected or susp to a maximum of 100 years) [(<i>a</i>) cannot An observed, estimated, inferred, proje reduction where the time period must if future (up to a max. of 100 years in future)	ted, inferred or suspected in e clearly reversible AND ted, inferred or suspected in may not have ceased OR ma e. bected to be met in the futur t be used for A3] cted or suspected populatio include both the past and th ure), and where the causes of	n the ny not re (up n e of	Based on any of the following	(a) (b) (c) (d) (e)	direct observation [except A3] an index of abundance appropriate to the taxon a decline in area of occupancy, extent of occurrence and/or quality of habitat actual or potential levels of exploitation the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites	
	be reversible.						

Criterion 1 evidence Insufficient data to determine eligibility

There are no estimates of population size. 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.

		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 conditi	ons:				
(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) ex subpopulations; (iv) number of mate	ttent of occurrence; (ii) ar ure individuals	ea of occupancy; (iii) nu	mber of locations or		

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

Criterion 2 evidence Insufficient data to determine eligibility

Following assessment of the data the Committee has determined that the geographic distribution is restricted, however there are insufficient data available to judge whether there are threats operating that would make the species' geographic distribution precarious for its survival. The species' EOO, AOO and number of locations meets the threshold for Endangered, however there are insufficient data available to suggest continuing decline or extreme fluctuations in any category. Therefore, there is currently insufficient information to determine whether the species has met this required element of this criterion. This does not mean the species is secure and subsequent assessments should be completed when data from across the range for the species is available.

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 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:					
(i) Numbe in each	r of mature individuals subpopulation	≤ 50	≤ 250	≤ 1,000	
(ii) % of m subpop	ature individuals in one ulation =	90 - 100%	95 - 100%	100%	
(b) Extreme fluctuations in the number of mature individuals					

Criterion 3 evidence Insufficient data to determine eligibility

There are no available data on population size. There is no evidence of a decline in the number of mature individuals, or any data on the number of individuals in each subpopulation. 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 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 km² 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 <u>common</u> <u>assessment method</u>.

Criterion 4 evidence Insufficient data to determine eligibility

There are no available data on population size. Therefore, the Committee considers that there is insufficient information to determine the eligibility of the species for listing in any category under this criterion.

According to the IUCN guidelines, species may qualify for Vulnerable under subcriterion D2 if the area of occupancy is very restricted (typically <20 km²) or exists at typically five or fewer locations, and if there is a plausible natural or anthropogenic threat which may lead the species to become Critically Endangered or Extinct within one or two generations, or three to five years, whichever is longer (IUCN 2022). Therefore, it is possible that the species may meet the criteria for Vulnerable under subcriterion D2, as the number of locations is assessed as one or two, and repeated fires within a short period are a plausible threat which may rapidly (within one or two generations) impact the species. However, given the lack of available data on the species' response to fire, it is not possible to determine whether it would lead to the species becoming Critically Endangered or Extinct within one or two generations.

The EPBC Regulations does not currently include the provision for listing a species under D2, therefore the species is considered Not Eligible for listing 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 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 is not adequate and there is insufficient scientific evidence to support the assessment.

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