



Consultation on Species Listing Eligibility and Conservation Actions

Acacia gordonii

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

- 1) the eligibility of *Acacia gordonii* for inclusion on the EPBC Act threatened species list in the Endangered category; and
- 2) the necessary conservation actions for the above species.

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

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

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

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

Please include species scientific name in Subject field.

or by mail to:

The Director
Bushfire Affected Species Assessments Section
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 24 March 2022.

Contents of this information package	Page
General background information about listing threatened species	2
Information about this consultation process	3
Consultation questions specific to the assessment	3
Information about the species and its eligibility for listing	12
Conservation actions for the species	27
References cited	30
Listing assessment	35

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: <http://www.environment.gov.au/biodiversity/threatened/index.html>.

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: <http://www.environment.gov.au/system/files/pages/d72dfd1a-f0d8-4699-8d43-5d95bbb02428/files/tssc-guidelines-assessing-species-2018.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: <http://www.environment.gov.au/biodiversity/threatened/nominations.html>.

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: <http://www.environment.gov.au/biodiversity/threatened/recovery.html>.

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 '[Common Assessment Method](#)' (CAM). As a result, any personal information that you have provided in connection with your comments may be shared between Commonwealth, State or Territory government entities to assist with their assessment processes.

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

Information about this consultation process

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

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 ACACIA GORDONII

SECTION A - GENERAL

1. Is the information used to assess the nationally threatened status of the species/subspecies 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/subspecies? If so, in what capacity?

PART 1 – INFORMATION TO ASSIST LISTING ASSESSMENT

SECTION B DO YOU HAVE ADDITIONAL INFORMATION ON THE ECOLOGY OR BIOLOGY OF THE SPECIES/SUBSPECIES? (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/subspecies not in the current advice?

SECTION C **ARE YOU AWARE OF THE STATUS OF THE TOTAL NATIONAL POPULATION OF THE SPECIES/SUBSPECIES? (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/subspecies? 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/subspecies (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/subspecies 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:

☐ 1–500 ☐ 500–1000 ☐ 1000–2000 ☐ 2000–5000 ☐ >5000

Level of your confidence in this estimate:

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

SECTION D **ARE YOU AWARE OF TRENDS IN THE OVERALL POPULATION OF THE SPECIES/SUBSPECIES? (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 early 2000s (*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/subspecies numbers, and also choose the level of confidence you have in this estimate.

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

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

Level of your confidence in this estimate:

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

11. Are you able to comment on the extent of decline in the species/subspecies' total population size over the last approximately 20 years (i.e. three generations)? Please provide justification for your response.

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

Decline estimated to be in the range of:

☐ 1–30% ☐ 31–50% ☐ 51–80% ☐ 81–100% ☐ 90–100%

Level of your confidence in this estimated decline:

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

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

SECTION E ARE YOU AWARE OF INFORMATION ON THE TOTAL RANGE OF THE SPECIES/SUBSPECIES? (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/subspecies? If not, please provide justification for your response.
- 14. Has the survey effort for this species/subspecies been adequate to determine its national distribution? If not, please provide justification for your response.
- 15. Is the distribution described in the assessment accurate? If not, please provide justification for your response and provide alternate information.
- 16. Do you agree that the way the current extent of occurrence and/or area of occupancy have been estimated is appropriate? Please provide justification for your response.
- 17. Can you provide estimates (or if you disagree with the estimates provided, alternative estimates) of the extent of occurrence and/or area of occupancy.

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

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

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

Level of your confidence in this estimated extent of occurrence

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

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

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

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

Level of your confidence in this estimated extent of occurrence:

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

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

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

18. Do you consider that the way the historic distribution has been estimated is appropriate? Please provide justification for your response.
19. Can you provide estimates (or if you disagree with the estimates provided, alternative estimates) of the former extent of occurrence and/or area of occupancy.

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

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

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

Level of your confidence in this estimated extent of occurrence

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

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

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

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

Level of your confidence in this estimated extent of occurrence:

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

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

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

- 25. What planning, management and recovery actions are currently in place supporting protection and recovery of the species/subspecies? 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/subspecies?
27. Would you recommend translocation (outside of the species' historic range) as a viable option as a conservation actions for this species/subspecies?

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

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/subspecies has?
30. What individuals or organisations are currently, or potentially could be, involved in management and recovery of the species/subspecies?
31. How aware of this species/subspecies are land managers where the species/subspecies is found?
32. What level of awareness is there with individuals or organisations around the issues affecting the species/subspecies?
 - 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/subspecies?

Conservation Advice for *Acacia gordonii*

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.

Note: 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.



Acacia gordonii in flower © Copyright, Steven Douglas

Conservation status

Acacia gordonii is proposed to remain in the Endangered category of the threatened species list under the *Environment Protection and Biodiversity Conservation Act 1999*.

Acacia gordonii 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 factors that make the species eligible for listing in the Endangered category is its restricted distribution, low number of locations and inferred continuing decline in quality of habitat.

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

Species information

Taxonomy

Conventionally accepted as *Acacia gordonii* (Tindale) Pedley (1980). The species has no common name.

Description

Acacia gordonii (Fabaceae) is an erect or spreading shrub growing from 0.5–1.5 m high, with smooth grey bark. Branchlets and leaves (phyllodes) are usually hairy. Phyllodes are alternate or sometimes whorled or clustered, straight or almost sickle-shaped, 5 – 15 mm long, and about 1 mm wide, with a pointed tip. Golden-yellow flowers arise singly between phyllodes and the stem on a hairy peduncle (stalk) that is 8–12 mm long. The fruit is a flat, oblong pod containing 5–8 hard-coated seeds. The seed pod is 25–55 mm long, 9–14 mm wide, and dull blue green in colour, with a whitish bloom. The species flowers in August and September and produces fruit from October to February (DoE 2014; OEH 2019).

Distribution

Acacia gordonii has a disjunct distribution in the Sydney Basin Bioregion, New South Wales (NSW) on public land, private land, and reserved land (Map 1). It is primarily found in the lower Blue Mountains (Benson & McDougall 1996; Douglas 2020; DPIE 2021a), though it also grows in the Glenorie area in the north-western outskirts of Sydney (Benson & McDougall 1996; Harden 2002; OEH 2019; Douglas 2020; DPIE 2021a). It is endemic to the Wollemi and Yengo Subregions (IBRA) (Douglas 2020). The species has been recorded at Linden Ridge, Falconbridge Point, and Paterson Range, as well as near Bilpin, Forest Glen, Hillside, and parts

of western Glenorie (Benson & McDougall 1996; Orchard & Wilson 2001; Harden 2002, cited in DoE 2014; Douglas 2020). The subpopulations in the Blue Mountains and the western Hornsby Plateau may be genetically distinct, though this has not been examined (Douglas 2020).

It is unclear why the species has such a restricted range, and why it doesn't occur in some surveyed areas that appear to be suitable habitat and that are proximate to known populations. The species' disjunct distribution is intersected by areas which have been subject to land clearing and is potentially indicative of long-term decline and fragmentation (Douglas 2020).

Until recently, many records of the species in the NSW State Government and other databases were erroneous. Reviews (Corkish 2004-2006; Douglas 2016, 2018, 2019, cited in Douglas 2020) indicated that many records were from a smaller number of collection sites over a much smaller area than they appeared to be based on where the records were originally plotted. As of 2020, records in the NSW State Government BioNet Atlas database for the species are considered to be spatially accurate (Douglas 2020).

Tenure

Other than two spatially ambiguous records in eastern Bilpin, all plants in the Blue Mountains are known to occur in Blue Mountains National Park (NP) or Wollemi NP. The location of these two records is unclear but it appears that one is north of the Bells Line of Road (likely relating to a known occurrence in Wollemi NP) and one is to the south (likely in Blue Mountains NP) (Douglas 2020). Conversely, none of the occurrences in north-western Sydney (western Hornsby Plateau) are within conservation estates. Records from those subpopulations occur on council road reserves, privately-owned freehold rural and rural-residential tenure, and on the former Maroota State Forest that was granted to the Deerubbin Local Aboriginal Land Council under the 1983 NSW Aboriginal Land Rights Act (Douglas 2020). NSW DPIE does not have access to the lands now owned by Deerubbin Local Aboriginal Land Council, and subpopulations on privately-owned freehold title land in the area have also not been surveyed (Douglas 2020).

Total number of mature individuals

The number of mature individuals of *A. gordonii* in each subpopulation is highly dependent on the timing of sampling events relative to fire, as the species occurs in relatively low abundance at long-unburnt sites but may become abundant after suitable fires. For example, in the years after a 1994 fire at Faulconbridge Point, mature individuals of the species were abundant. However, at this site in 2016 the species had reduced in abundance, become patchily distributed, and was often found only on the margins of patches that were dominated by larger co-occurring species (Douglas 2016, cited in Douglas 2020). These fluctuations in the number of mature individuals occur in response to both inappropriate fire intervals for population renewal and fire severity. Plants that germinate and resprout after fires senesce due to natural aging but can also be progressively outcompeted and suppressed by larger shrubs and trees.

The number of mature individuals prior to the 2019-20 fires was likely to have been around 3000–4000, though the size and status of the western Hornsby Plateau subpopulations is unknown. The known population has increased recently after the discovery of approximately 1800 mature plants at Linden Ridge and Dawes Ridge. Prior to these discoveries, the total population of mature individuals prior to the 2019–20 bushfires were estimated by Douglas (2020) to be <1500 (likely range 500–1500). This is the same estimate proposed for the historical population size by the NSW Scientific Committee in 1997.

Number of mature individuals as of 2021 (post 2019–20 bushfires)

During the summer of 2019–20, the Gospers Mountain bushfire burnt 50 percent of the modelled distribution of the species (Gallagher 2020) and 33 percent of known records were in the fire-affected area (DPIE 2020a). The main conservation site near Bilpin was affected and much of the known population in Wollemi and Blue Mountains NPs were also burnt. Subpopulations at Faulconbridge Point, Linden Ridge and Dawes Ridge were unaffected. Subpopulation estimates are available in Table 1. Based on the most recent estimates from 2021 surveys, approximately 1850 mature individuals are known from survey plots, with an estimated 2750 mature individuals across all surveyed sites. The vast majority (2500+) of these are at the long unburnt Linden and Dawes Ridge sites (DPIE 2021b; Mickaill 2021; Table 1). It remains unknown how many individuals are present at subpopulations in the Western Hornsby Plateau.

It was previously estimated that 2000–3000 individuals of all ages were reserved within the Blue Mountains and Wollemi NPs (Douglas 2020). However, surveys of Linden Ridge and Dawes Ridge in September 2021 found 1791 mature individuals across two plots, the vast majority of which had not previously been identified. It is estimated that there are at least 2500 plants in this area, as many individuals were not able to be counted due to lack of time and resources (Mickaill 2021; Table 1)

Notably, high levels of recruitment have been observed at burnt sites. Over 200 at Wollemi NP Plot 1, despite plants at this site being burnt during a hazard reduction burn two years prior. This indicates that the site retained some soil-stored seed after the hazard reduction burn, and the site has transformed the plot from having a substantial proportion of resprouts after the prescribed burn to being dominated by seedlings, which may be indicative of the first fire being of low to moderate severity, and the second being of high severity (Douglas 2020).



Table 1: Count estimates of *Acacia gordonii* at plots from multiple subpopulations in the Blue Mountains as of October 2019 (adapted from Douglas 2020; DPIE 2020b; DPIE 2021b; Mickaill 2021)

Plot	Number of living mature plants (date of survey)	Number of seedlings & resprouts (date of survey)	Fire history	Subpopulation history	Additional information	
Falconbridge Point Plot 1	22 (2019) 7 (10/2020)	60 (0) (2019) 28 (10/2020)	Burnt in 2018 prescribed burn. Unburnt in 2019–20.	Long unburnt prior to 2018 prescribed burn.	Long unburnt and senescing adult subpopulation with little to no juvenile recruitment. Prescribed burn did not achieve sufficient severity or coverage of the population. Lower severity resulted in a relatively higher portion of resprouts relative to seedlings.	There are some individuals outside these plots but not many as the rocky platform drops off either side of the point and becomes less suitable for the species. As of surveys in August 2021, both Falconbridge plots support a mix of seedlings (75%), resprouting adults (15%) and unburnt adults (10%) across a population of 115 individuals combined.
Falconbridge Point Plot 2	20 (2016) 0 (2019) 2 (10/2020)	Unknown (2016) 5 S, 30 R (2019) 10 (17) (10/2020)	Burnt in 2018 prescribed burn. Unburnt in 2019–20.	Long unburnt prior to 2018 prescribed burn.	Difference in counts between 2019 and 2020 considered within the margin for error given that individuals are not marked. Adults may be resprouts. Prescribed fire removed a lot of competing larger species, but post-fire recovery was relatively poor compared to post-wildfire germination seen in 1998.	
Wollemi NP plot 1	32 (10/2020)	14 S, 0 R (10/2020) >200 (2021)	Burnt at high severity in the 2019–20 bushfires.	Not previously documented since at least 1987, perhaps since the 1960s.	100–150 more adult and subadult plants and 1000+ seedlings subsequently found at burnt and unburnt sites outside of Wollemi NP plots.	
Linden Ridge	50 (2016) 47 (2019)		Long unburnt, dominated by old/senescent plants.	Surveyed from 2016, though only extensively	All but three plants across both sites were adults. Hundreds (perhaps thousands) of plants beyond the plots were observed in September 2021 – it is assumed there are at least 2500+ plants across this area in total, though fire is crucial to the persistence of these sites.	

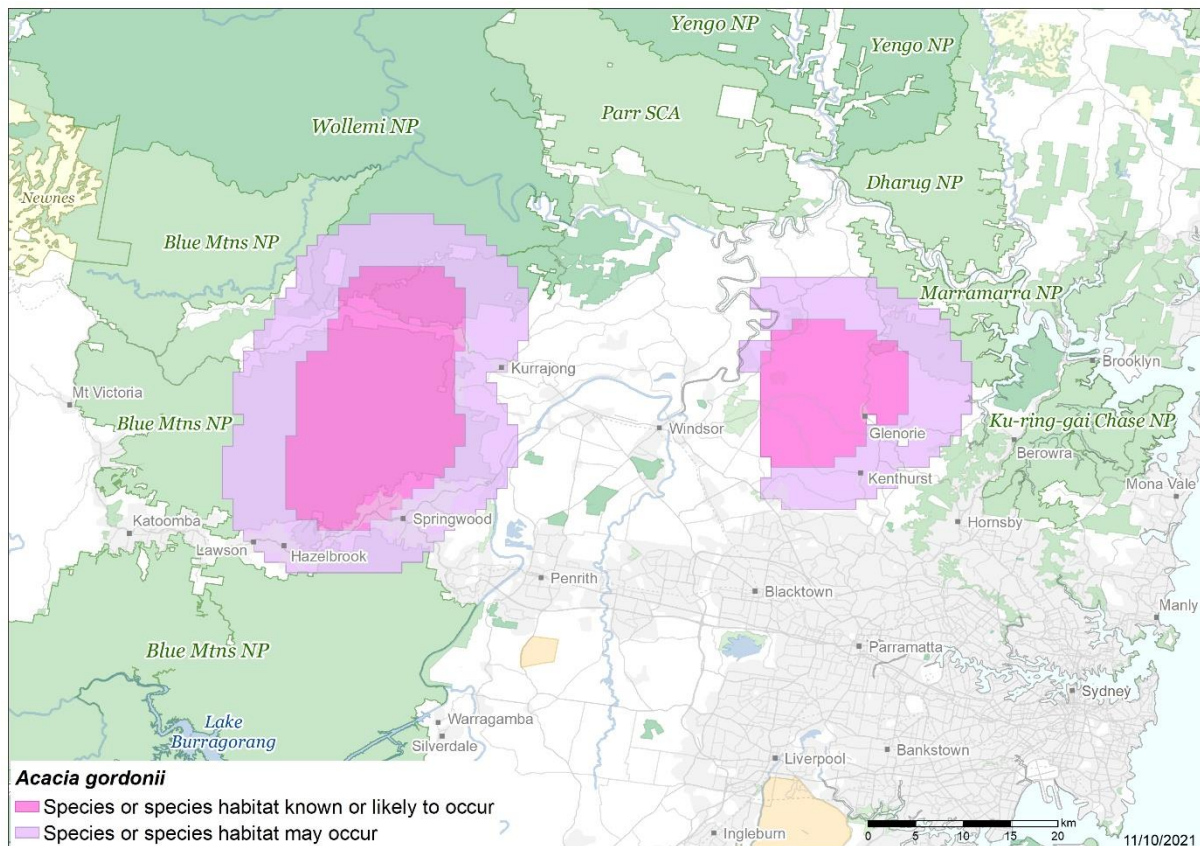
Acacia gordonii (*Acacia gordonii*) Conservation Advice

	50 (10/2020) 1358 (9/2021)			in September 2021.	
Dawes Ridge	436 (9/2021)	<1% of total subpopulation (9/2021)	Long unburnt, dominated by old/senescent plants	Surveyed recently in September 2021.	
Southernmost at Brown's Ridge Rd)	50 (2016) 0 (2020)	Unknown (2016) 110 (2020)	Burnt at high severity in the in the 2019-20 bushfires with strong germination post-fire. Previously long unburnt.		<1% cover. Fire removed all canopy, extensive Fabaceae recruitment in general but still only patches of <i>A. gordonii</i> , concentrated towards the southern end of this linear (10 x 40m) plot. The population outside of the Brown's Ridge road plots supports some adult and sub-adult plants in unburnt patches (<30), as well as some seedlings (~100) across other burnt areas.
Northernmost at Brown's Ridge Rd)	20 (2016) 2 (10/2020)	Unknown (2016) 90 S, 2 R (10/2020)	Burnt at low severity, apparently overnight during bushfire or associated backburning. Previously long unburnt.		<1% cover. Shrub layer was patchily burnt, and the canopy unburnt or lightly burnt.

S = Seedlings, R= Resprouts



Map 1 Modelled distribution of *A. gordonii*



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

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

This section describes some published examples of this significance but is not intended to be comprehensive, applicable to, or speak for, all Indigenous people. Such knowledge may be only held by Indigenous groups and individuals who are the custodians of this knowledge.

The cultural significance of *A. gordonii* is unknown, though the species' habitat includes ridgetop rock platforms that are likely to support cultural heritage artifacts such as rock engravings and ceremonial sites (Douglas 2020). The species occurs in land that traditionally belongs to the Darug, Gundungurra and Darkinjung Peoples, though these groups are divided into many

different clans, and it is unclear which are traditionally from the lands in which *A. gordonii* is found. Currently, some lands where the species is found are owned by the Deerubbin Local Aboriginal Land Council (Aboriginal Affairs NSW 2021).

Wattles also have cultural and community significance through their role as part of the Australian identity. The Australian national floral emblem is *Acacia pycnantha* (golden wattle), and the emblem of the Order of Australia is also a wattle. Australia's national colours are green and gold, and the wattle is considered a symbol of unity, remembrance and reflection (Australian Government 2018).

Relevant biology and ecology

Habitat

Acacia gordonii occurs primarily in heath on the margins of scrub, and in adjacent heathy low open dry sclerophyll forest and woodland (Harden 1991; Benson & McDougall 1996). The species primarily occurs on rock platforms and large ridgetop rock outcrops and spurs (Douglas 2020). The altitude of known occurrences ranges from ~110 to ~520 m above seas level (ASL) (Douglas 2020). Associated species include *Corymbia eximia* (yellow bloodwood), *Eucalyptus gummifera* (red bloodwood), *Eucalyptus piperita* (Sydney peppermint) and *Eucalyptus squamosa* (scaly bark) (Benson & McDougall 1996). The species is also sometimes associated with or found near other threatened flora species, including *Acacia bynoeana* (Bynoe's wattle), *Darwinia biflora*, *Epacris purpurascens* var. *purpurascens*, *Hibbertia superans*, *Persoonia hirsuta* (hairy persoonia), *Tetradlea glandulosa*, *Grevillea parviflora* ssp. *supplicans*, and potentially *Eucalyptus* sp. Cattai (Douglas 2020).

Acacia gordonii is found in soils that are usually shallow, skeletal loamy sands. The substrate is Hawkesbury Sandstone with some residual clay and laterite influence, low in nutrients and well drained (Benson & McDougall 1996). Douglas (2020) suggests that *A. gordonii* is typically associated with the Faulconbridge Soil Landscape, with possible associations with the Gynea and Hawkesbury Soil Landscapes, all of which derive from Triassic Hawkesbury Sandstone (Bannerman and Hazelton 1990). However, part of the Glenorie population grows in a deeper (~30–40 cm) duplex soil that may be derived from a shallow capping of Triassic Mittagong Formation over Hawkesbury Sandstone (Douglas 2020).

Pollination ecology

Acacia gordonii flowers from August to September and produces fruit from October to February (OEH 2019). Pollination of the flowers likely occurs primarily via insects. The most important pollinators for acacias are usually social and solitary bees (including the widely distributed European honeybee (*Apis mellifera*)) and *Apoidea* wasps, followed by flies, beetles and nectar-feeding birds in some cases (Stone et al. 2003). *Acacia* flower visitors can be divided into three trophic groups; specialist pollen and flower feeders (bees, beetles, many true flies), specialist nectar feeders (birds, butterflies and *Bombyliidae* sp. (bee flies)), and opportunist foragers (flies, ants and wasps) (Stone et al. 2003). Species that secrete nectar attract more species-rich assemblages of visitors, though many of these species are likely not important as pollinators (Stone et al. 2003). For many acacias, pollen release occurs in the middle of the day to attract the most insects, as pollination is usually completed by diurnal species and nocturnal visitors are likely not useful as pollinators (Stone et al. 2003).

Seed dispersal

Acacia gordonii fruits are flat, oblong pods containing hard-coated seeds (DoE 2014). Seed

dispersal in acacias often occurs through passive methods via water and gravity, though some species also have adaptations for dispersal by birds and/or ants (Gibson et al. 2011). This is because the small seeds possess an oil-rich elaiosome, which makes them palatable to both birds and ants once the seed pod has opened. Aside from dispersal, birds and ants also assist with germination. Scarification of the hard seed coat occurs in the bird gut, and ants bury seeds in subterranean nests where the seed will stay until ideal conditions (heat and moisture) are met for germination (Gibson et al. 2011). In *A. gordonii*, interactions with ants are yet to be documented (Douglas 2020).

Douglas (2020) notes that long-distance dispersal of *A. gordonii* seeds by mammals and birds is feasible and suggests that *Dromaius novaehollandiae* (emu) may have been a long-distance vector that could explain distribution patterns of many acacia species. Emus are known to be excellent long-distance dispersers, and the emu's generalist diet (Dunstan et al. 2013) makes it an ideal general seed disperser, and likely contributes to the demography of many species (Nield et al. 2015). Tame et al. (2001) suggests that emus are known dispersers of *Acacia* seed. The local extinction of emus in the Sydney and Blue Mountains area may have led to loss of an important mechanism of genetic exchange, potentially increasing isolation of subpopulations (Douglas 2020), though further research is required on this topic.

Germination and resprouting

In 1995 and 1996, *A. gordonii* was observed to both resprout from adult plants and germinate from a soil-stored seed bank after a bushfire at Faulconbridge Point (Benson & McDougall 1996). Post-fire resprouting and seed germination were confirmed in 2019; the ratio of resprouting to seeding varied with fire severity and temperature at or below soil level, as well as with fuel load and type (Douglas 2020). Sites that appeared to have burnt more intensely at ground level tended to yield more seedlings and fewer resprouts. It is likely that the species' ability to resprout following fire varies, as variation in fire response is not unusual for Fabaceae (Auld et al. 1991; OEH 2019). The ratio of seeding and resprouting may also be affected by soil moisture, as wetter sites appear to have more resprouting due to lower mortality of living adult plants, whilst drier sites produce more seedlings proportionally, due to higher adult mortality (Douglas 2020).

The hard seed coat of many Acacias allows for long periods of dormancy and persistence in the soil stored seed bank (OEH 2019). The seedbank longevity of *A. gordonii* is unknown, though is thought to be several decades (Douglas 2020). A 2004 study found that 5-year-old *A. gordonii* seed had close to 100 percent germination, and 17-year-old seed had approximately 82 percent germination (Offord et al. 2004).

The seeds of *A. gordonii* require heat shock to break seed dormancy (Bradstock & Auld 1995; Auld & Denham 2006). The rate of fire-induced germination depends on seed depth in the soil and fire intensity (Auld & Denham 2006). Hot fires may stimulate germination of deep seeds (15cm) (Auld & Denham 2006; Wright et al. 2016), though it is notable that seeds below 5–6cm may not successfully germinate. In a study on *Acacia suaveolens*, it was found that significantly more residual seeds were found at depths of >5cm compared to <5cm after a fire occurred, suggesting that seeds found in shallow soil germinated more readily (Auld & Denham 2006). However, as is typical of acacias, fewer seeds at depths of 0–1 cm germinated relative to 1–4cm (Bradstock & Auld 1995; Tozer 1998; Bradstock & Denham 2006), likely due to heat death of seeds in the top 1cm of soil and seedling desiccation during early stages of root development (Tozer 1998).

Temperatures greater than 120°C may be lethal to *Acacia* seeds (Auld & O'Connell 1991;), though some species such as *Acacia myrtifolia* (myrtle wattle) have germinated following exposure to temperatures of 120°C (Auld & O'Connell 1991) and others (e.g., *Acacia falcata*; sickle wattle) are killed at temperatures that are optimal for most other acacias. However, for most acacias, a common range of fire temperatures and duration will promote germination (Auld & O'Connell 1991).

It is unclear how soon after fire the *A. gordonii* flowers from both resprouts and seedlings, and it is also unknown how long the species takes for a recruit to be able to survive fire and resprout. These factors are likely important determinants of the optimal fire regime for the species.

Physical disturbance of the soil can stimulate acacia germination in some species (Spooner 2005), though this is not known for *A. gordonii*. However, Benson & McDougall (1996) suggest that the species requires fire, and it is likely that resprouting and germination of the soil stored seedbank will not occur in the absence of fire.

Longevity and age of maturity

The longevity of *A. gordonii* is not known, though it is likely to be at least 22 years, based on observations of the subpopulation at Faulconbridge Point where the fire history is known, assuming that the oldest plants at that site are seedlings recruited from a 1994 fire and not resprouts (Douglas 2020). Prior to a prescribed burn in 2018, the oldest plants at this site were reproducing but were arguably senescent, and a small number of plants had died or were apparently dying, possibly due to age (Douglas 2020). However, the area was experiencing a long and severe drought, which may have increased the rate of senescence. The species' ability to resprout suggests that longevity may be decades in ideal conditions, with mature plants potentially able to survive and resprout from multiple lower severity fires (Douglas 2020). Further research is required to accurately determine the longevity of the species, though it is estimated at 25–30 years (S Douglas 2021. pers comm 14 October).

In a review of the reproductive biology of 13 invasive *Acacia* species, ten matured in less than two years (77 percent), whereas in non-invasive *Acacia* species, only seven out of 26 matured at ages less than two years (Gibson et al. 2011). Given that *A. gordonii* is found only in relatively low numbers, does not occupy all areas of seemingly suitable habitat, and occurs in isolated areas, the species is clearly non-invasive, so likely takes more than two years to reach reproductive maturity. The time to first reproduction is more than two years, and likely less than five with high uncertainty (S Douglas 2021. pers comm 14 October).

Commensal species

In 2012, Powell et al. found that *A. gordonii* has a host-specific psyllid (plant louse), *Acizzia* sp. 39, that is only present when the species is flowering. As it is dependent on *A. gordonii*, this psyllid may be threatened with co-extinction at the level of the host species (Powell et al. 2012). It is suggested that prescribed burns may need to target individual host plants, leaving other host plants as a source for psyllid re-colonization, to conserve both specialist psyllids and threatened plants in the long term (Powell et al. 2012).

Habitat critical to the survival

Acacia gordonii occurs on shallow, skeletal loamy sands in heath on the margins of scrub, and in

adjacent heathy low open dry sclerophyll forest and woodland. It is usually found on rock platforms and large ridgetop rock outcrops and spurs (Douglas 2020).

Habitat critical to the survival of the species includes the area of occupancy of extant subpopulations; areas of similar habitat surrounding these subpopulations that provide potential habitat for natural range extension and are necessary to provide habitat for pollinators; and additional occurrences of similar habitat in the known distribution of the species that may contain the species or be suitable sites for future translocations.

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.

All known populations are critical to the survival of the species.

Threats

The main threats to *A. gordonii* include inappropriate fire regimes, habitat loss and destruction, weed invasion and climate change. Fire frequency and drought interact to influence recovery potential of fire impacted populations and weed invasion may also be facilitated by fires. Table 2 Threats

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

Threat	Status ^a	Evidence
Habitat loss, disturbance and modification		
Inappropriate fire regimes	<ul style="list-style-type: none"> • Timing: current/future • Confidence: observed • Consequence: major • Trend: unknown • Extent: across the entire range 	<p><i>Acacia gordonii</i> resprouts and germinates from soil-stored seed after fires (Benson & McDougall 1996; OEH 2019; Douglas 2020). It requires an appropriate interval between fires to reach reproductive maturity and produce sufficient seed for the next generation whilst not senescing or being outcompeted (tolerable fire interval). Keith (1996) identified several fire driven mechanisms of plant population decline and extinction for obligate seeding shrubs. These mechanisms included death of standing plants and seeds, failure of seed release and/or germination, failure of seedling establishment, interruption of maturation or developmental growth, and failure of seed production. Keith (1996) also identified fire regimes associated with multiple mechanisms of plant population decline and extinction, including both high frequency and low frequency fires. For <i>A. gordonii</i>, there is considered to be a risk of population decline if fires occur more than once every seven years (NSW RFS 2013) and less than once every 20 years (OEH 2019).</p> <p><i>Too-infrequent fire</i></p> <p>Currently, some <i>A. gordonii</i> subpopulations may be threatened by too infrequent fire regime that allows living plants to senesce and other shrubs and trees to outcompete the species (Douglas 2020). Areas with a prolonged absence of fire experience increased tree and/or large shrub cover, reducing resources, especially light, and leading to faster senescence and perhaps</p>

Threat	Status ^a	Evidence
		<p>increased mortality (Douglas 2020). <i>Acacia gordonii</i> may require relatively frequent (7 – 10 years) and severe fire to suppress these competing larger shrubs. However, as the seed bank is long-lived (i.e., 100% germination in 1 year old seed; 82% at 17 years), this implies that a 50% chance of germination may extend beyond a 50-year fire-free interval. Therefore, subpopulations could be renewed by appropriate fire conditions over a longer period, though this does not secure mature individuals.</p> <p><i>Banksia ericifolia</i> (heath-leaved banksia) appears to be an especially important competing species, as it is large and shades out <i>A. gordonii</i> shrubs in the long-absence of fire. Encroachment of <i>Allocasuarina</i> spp. (sheoak) overstorey may also be a threat through allelopathy, and dense litter of <i>allocasuarina</i> ‘needles’ has been noted in parts of the Faulconbridge Point site before and after fires. This may be limiting germination of the <i>A. gordonii</i> seed bank (Douglas 2020). However, the impact of these competing species may simply be part of the ecology of <i>A. gordonii</i>, whereby the seedbank remains after death of plants to recruit after the competitive release from over-topping vegetation after fire.</p> <p><i>Too-frequent fire</i></p> <p>Too-frequent fire regimes are often recognised as a threat to fire-dependent species, especially as climate change accelerates (Ooi et al. 2006; Cheal 2010; Enright et al. 2015; Gallagher et al. 2021). Bradstock et al. (1998) found that extinction probabilities in obligate seeding shrubs increased with fire frequency and scale, indicating that too-frequent fire is responsible for extinction more often than too-infrequent fire. For <i>A. gordonii</i>, a high frequency, low severity fire regime may be most threatening. The reoccurrence of low severity fires that do not clear out ground vegetation or exceed the heat-shock threshold for the seed coat to be broken may expose the species to gradual attrition over time by failing to stimulate recruitment or conditions that allow the subspecies to grow. These fires may kill mature plants, but not stimulate germination. However, high frequency fires have not previously been a threat to the species, and it is currently unknown how long the species’ seeds remain viable in the soil, and how quickly seedbank attrition may occur (though 82% germination was observed in seed which was 17 years old: Offord 2004). Small patchy fires are also not as beneficial as larger widespread fires that cause mass germination due to the increased herbivory and other impacts on the low number of seedlings recruited from smaller fires.</p> <p><i>Fire history</i></p> <p>During the summer of 2019-20, severe fires burnt over an anomalously large area of eastern Australia. As part of this event, the Gospers Mountain bushfire burnt large areas of forest in the Blue Mountains (Douglas 2020). Gallagher (2020) estimates approximately 50% of the species’ modelled range was burnt by the 2019–20 fires, and DPIE (2020a) suggests that 33% of records were in the fire-affected area.</p> <p><i>Acacia gordonii</i> subpopulations that were burnt during 2019–20 appear to have undergone substantial recruitment, though remain threatened by fire events which occur at too shorter a fire interval for maturation of the current cohort of seedlings. If fires reoccur before</p>

Threat	Status ^a	Evidence
		resprouts and seedlings can mature and produce a sufficient seed bank, standing plants may die with limited subsequent resprouting and germination. For <i>A. gordonii</i> , this may occur if fires affect plants more frequently than once every seven years (NSW RFS 2013; OEH 2019), and thus subpopulations burnt during the 2019–20 fires should not be burnt until at least 2027. This threat is especially important at the Wollemi NP site, where a hazard reduction fire occurred ~2 years before the high severity bushfires of 2019–20. This meant the soil-stored seed bank at this site was already partially exhausted, and there may be insufficient seeds to survive another fire.
Habitat loss and disturbance by road maintenance clearing, and development	<ul style="list-style-type: none"> • Timing: current • Confidence: suspected • Consequence: major • Trend: unknown • Extent: across part of its range 	<p>Though nearly all the Blue Mountains records are protected by conservation estates, plants on the western Hornsby Plateau are found on council road reserves, privately-owned freehold rural and rural-residential tenure, and on former vacant Crown land that has since been granted to the Deerubbin Local Aboriginal Land Council (Douglas 2020). The current status of these subpopulations is unknown, though it is thought that these subpopulations are under threat from habitat loss and destruction through recreational vehicle misuse and land clearing (Douglas 2020). For example, the unreserved <i>A. gordonii</i> records on private land and former Crown land are threatened by habitat loss through land clearing and development for rural and residential property. Land north-west of Sydney and near Bilpin was historically cleared for orchards and pasture, and some <i>A. gordonii</i> plants have likely already been destroyed through associated clearing. Future clearing and development in the region would threaten extant individuals through mortality of living plants with little subsequent recruitment.</p> <p>Many <i>A. gordonii</i> records on the western Hornsby Plateau are found along road or tracksides that may be subject to regular vehicle use and maintenance (DPIE 2021a), which would likely lead to mortality of some plants. Although frequent and intensive soil disturbance associated with vehicles, roadworks and clearing may favour some facultative resprouting acacias, obligate seeders do not undergo substantial recruitment after road grading and may be eliminated from road-side environments (Spooner 2004a, b).</p> <p>Fragmentation and habitat loss for fire trails has caused some losses of mature individuals historically, but this fragmentation effect may not be significant (S Douglas 2021. pers comm 12 October)</p>
Accidental or intentional damage by recreation	<ul style="list-style-type: none"> • Timing: current/future • Confidence: suspected • Consequence: minor • Trend: static • Extent: across part of its range 	<p>Many <i>A. gordonii</i> records in the Blue Mountains occur along pathways and walking tracks that are used for bushwalking, hiking and other recreational outdoor activities. This frequent foot traffic may degrade the species' rocky outcrop habitat, especially if members of the public leave paths and walk on the rocky platforms. According to the NSW Saving our Species profile for <i>A. gordonii</i>, this is considered a threat to both the western Hornsby Plateau subpopulations and Blue Mountains subpopulations (OEH n.d). However, it appears to be more likely a threat to the Blue Mountains subpopulations, as recreational activities are more common in these areas. Part of the Saving Our Species management priorities includes installing signs, bollards, gates and barriers to prevent access to the rock platform</p>

Threat	Status ^a	Evidence
		habitat and to direct the public onto main trails (OEH n.d).
Invasive species		
Invasion by African lovegrass (<i>Eragrostis curvula</i>)	<ul style="list-style-type: none"> • Timing: current • Confidence: observed • Consequence: minor • Trend: unknown • Extent: across part of its range 	<p>Some sites in Blue Mountains NP are subject to weed invasion by African lovegrass (OEH n.d; Douglas 2020), a rapid spreading introduced perennial tussock grass (Sanders et al. 2016). It is considered a local priority weed in the Blue Mountains, and it is suggested plants should be continuously and fully suppressed and removed to prevent spread (Blue Mountains city council n, d).</p> <p>African Lovegrass is widespread in NSW, takes over disturbed areas easily, and is often found on or adjacent to roadsides and grazing land (DPI 2018). It is considered to be a direct threat to lowland grassy woodlands through alteration of ecosystem composition and function (Crosthwaite & Dorrough 2014), and easily forms monocultures in woodland ecosystems (Sanders et al. 2016). Swards that grow up to 1m are dense and outcompete small natives trying to emerge. It also competes with native species during post-fire regeneration and resprouting, as it rapidly regenerates after fires (Sanders et al. 2016). As a post-disturbance recruiter, <i>A. gordonii</i> is likely also exposed to competition during early life stages, and fast recruiting weedy species may lower the recruitment success in weed prone areas.</p> <p>Targeted control of African lovegrass is included in the NSW Saving Our Species plan for <i>A. gordonii</i>, including the use of slashing, hand-pulling and spot spraying techniques (OEH n.d.) Infested sites are recommended to be regularly checked and resprayed to ensure weeds do not recolonise from adjacent disturbed areas (OEH n.d). Douglas (2020) states that the species has been eliminated at Faulconbridge Point and will be monitored to prevent recurrence.</p>
Invasion by Whisky Grass (<i>Andropogon virginicus</i>)	<ul style="list-style-type: none"> • Timing: current • Confidence: observed • Consequence: minor • Trend: unknown • Extent: across part of its range 	<p>Whisky Grass has been seen at Wollemi NP plot 1 and has the potential to invade other nearby occurrences of <i>A. gordonii</i>, especially during post-fire recovery. The species could reach Brown's Ridge Rd sites, as they are likely to receive wind-dispersed seed (S Douglas 2021. pers comm 4 November). Whisky grass is native to North America and is reported to compete with other species via allelopathy through the release of herbicidal chemicals from decaying leaves and other tissues (Rice 1984). It colonises disturbed areas (e.g., pastures) easily and has a high germination and seedling survival rate (Agriculture Victoria 2020). It is tolerant to fire and regrows quickly after fire events (D'Antonio et al. 2000).</p>
Climate Change		
Increased temperatures and altered precipitation patterns	<ul style="list-style-type: none"> • Timing: current • Confidence: observed • Consequence: major • Trend: increasing • Extent: across the entire range 	<p>The CSIRO & Bureau of Meteorology (2015) predict that the eastern coast of Australia will be exposed to increased average temperatures and increased frequency of droughts due to climate change. These climatic changes were evidenced by the severe drought conditions in eastern Australia from early 2017 to late 2019 (BOM 2021). In the Sydney metropolitan area (which includes the Blue Mountains), maximum temperatures are projected to increase by 0.3°C–1.0°C by 2030 and 1.6°C – 2.5°C by 2070 (OEH 2014).</p>

Threat	Status ^a	Evidence
		<p>Such changes in climate are likely to cause forest decline, with drought stress leading to plant mortality, particularly where fire and drought co-occur (Burgman & Lamont 1992, Choat et al. 2012). Douglas (2020) suggests that climate change is a potential threat through increased heat/moisture stress on adults and recruits. Many acacias are physiologically adapted to low moisture conditions, though mature plants of other <i>Acacia</i> species have been observed to perish potentially as a result of drought (Richards 2018). Increased heat and moisture stress will therefore likely lead to adverse impacts on adult plant growth and reproductive capability. Climate change is also likely to lead to compromised seedling emergence and vigour through shifts to critical drivers of seed initiation such as temperature and water supply (Walck et al. 2010). Specifically, predicted changes to temperature and precipitation will impact seed longevity, dormancy, release and germination as a result of altered soil moisture (Walck et al. 2010). In a review of the susceptibility of many plant species to climate change (Butt & Gallagher 2018), <i>A. gordonii</i> was in the highest category of vulnerability to climate change based on functional traits and range characteristics.</p> <p>Climate change is also leading to changes to fire regimes and conditions, as evidenced by the catastrophic bushfires of 2019–20 (DPIE 2020a). These bushfires were caused by the extensive and severe 2017–2019 drought conditions, which resulted in low fuel moisture content, leaf senescence and shedding, and lack of moist impediments to fire spread (Nolan et al. 2020). The Sydney metropolitan area is expected to undergo an increase in severe and average Forest Fire Danger Index values in the future. Climate change may also lead to out of season fires, which may disrupt the phenological processes of <i>A. gordonii</i> and impact the long-term survival of plants through mortality of adults, the availability of propagules, post-fire establishment of seedlings (Miller et al. 2019), and dispersal of plant propagules (Keith et al. 2020). In temperate regions, spring fires may also expose emerging seedlings to summer droughts, which may cause high mortality and limit population recovery (Miller et al. 2019).</p> <p>Climate change may also impact <i>A. gordonii</i> through intense rainfall events that can wash seeds off rocky platforms where the species grows and into marginal or unsuitable forested habitat. Such rains may also remove or diminish soil in heath pockets, as the species lives in very shallow to skeletal soils that readily dry and can erode easily (Douglas 2020). Heavy rain events are generally projected to become more intense in the future across most of Australia (Evans et al. 2014)</p>

Each threat has been described in Table 2 in terms of the extent that it is operating on the species. The risk matrix (**Error! Reference source not found.**) 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 experts and using available literature.

Table 3 Risk Matrix for *A. gordonii*

Likelihood	Consequences				
	Not significant	Minor	Moderate	Major	Catastrophic
Almost certain	Low risk	Moderate risk Invasion by African lovegrass Invasion by whisky grass	Very high risk	Very high risk Inappropriate fire regimes Habitat loss and disturbance by road maintenance clearing, and development	Very high risk
Likely	Low risk	Moderate risk Accidental or intentional damage by recreation	High risk	Very high risk Increased temperatures and altered precipitation patterns	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	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’ (red shading) or ‘high’ (yellow shading). For those threats with an unknown or low risk outcome (green and blue shading) it may be more appropriate to identify further research or maintain a watching brief.

Conservation and recovery actions

Primary conservation objective

Within the next three generations, the population of *A. gordonii* will have increased in abundance and viable subpopulations are sustained in habitats where threats are managed effectively.

Conservation and management priorities

Fire

- Implement a fire management strategy that protects all subpopulations burnt during the 2019–20 bushfires from further fire until seedlings mature, and the soil-stored seed bank is replenished.
- Fires must be managed to ensure that prevailing fire regimes do not disrupt the life cycle of *A. gordonii*, that they support rather than degrade the habitat necessary to the subspecies, that they do not promote invasion of exotic species.
- If research and monitoring of subpopulations indicates shading out by native shrubs/ trees is threatening the species, investigate the possibility for prescribed burns or biomass removal of competing native vegetation when demonstrated to be necessary and critical for the survival of the species. Control exotic species in recently burnt habitat, potentially through weed management actions.
- Limit physical damage to the habitat of *A. gordonii* and living plants during and after fire operations.
- Fire management authorities and land management agencies should use suitable maps and install field markers to avoid damage to *A. gordonii* during operations.

Habitat loss, disturbance and modification

- Identify where habitat disturbance and modifications (e.g., road and track maintenance, clearing and development, fire, intentional and accidental damage) are occurring on the various tenures and protected areas where *A. gordonii* is found. Mitigate future damage to standing plants.
- Ensure that the locations of all subpopulations are recorded on relevant State databases, including those used by land management and fire response agencies.
- Investigate formal conservation arrangements, management agreements and covenants on private land on which *A. gordonii* occurs, and for Crown and private land, investigate inclusion in reserve tenure if possible.
- Protect subpopulations and rock platform habitat near tracks from trampling and accidental damage using signage, track markers, fencing, bollards, and barriers. Consider the implementation of remote cameras to protect adult plants from intentional and accidental damage in areas of high use.
- Consider trials to test the impact of mechanical intervention on overstorey at sites where the species is outcompeted, with the aim it to reinstate the maintain heathland structure

and to reduce excess competition from large shrubs. This may involve cutting the overstorey, allowing it to dry, then burning it.

Climate change

- Map the exposure of the species to climate change using distribution modelling and climate change projections, to locate existing habitat patches and identify future habitat that would be suitable for the species.
- Undertake vulnerability assessments of the species sensitivity and adaptive capacity to changing climate conditions which draw from genetic, physiological or ecological evidence.

Invasive species (including threats from grazing and trampling)

- Implement and maintain site-based weed control using appropriate methods to ensure that there is no impact on *A. gordonii* individuals or other co-occurring native species. This includes the use of slashing, hand-pulling and spot spraying techniques.
- Regularly check and respray herbicides to ensure weeds do not recolonise from adjacent disturbed areas.

Ex situ conservation

- Continue to collect and manage seed from extant subpopulations to store in long-term custodial collections until no longer needed. Adhere to best practice seed storage guidelines and procedures to maximise seed viability and germinability and ensure that storage conditions are optimal for longevity of the stored seed.
- Investigate the requirements of the species for ex situ recovery, including the establishment of a seed orchard if current seed collections are limited.
- Investigate the role of nitrogen fixing bacteria, particularly the specificity and abundance necessary to support the species in propagation and translocation programs.
- Investigate options and suitable locations for translocation should existing subpopulations become non-viable. Plan for ex-situ recovery actions (planting from seed stock, protection of extant seedlings) if post-fire recruitment fails, or if frequent and intense fires remove standing population of adult plants. Currently, it is planned that new subpopulations should be established at higher elevation at sites with greater prospects of stable annual rainfall (Douglas 2020).
- If appropriate, undertake ex situ propagation and translocations and monitor all translocated individuals to maturity 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 the consultation with Indigenous Australians regarding the use of Indigenous fire management practices and other survey, monitoring and management actions.
- Liaise with relevant land managers to ensure that subpopulations are not accidentally damaged or destroyed. The approval and assistance of land managers should also be sought to implement recovery actions, and recent population data should inform management.

- Coordinate protection and recovery actions with non-government stakeholders (e.g., Landcare and bush regeneration groups, landowners and managers) as well as with Local and State government environmental field and extension officers.
- Alert landowners of the species occurrence on their property and provide guidance on how to protect standing plants and mitigate site-specific threats.
- Promote public awareness of biodiversity conservation and protection through dissemination of information through print and digital media.

Survey and monitoring priorities

- Maintain a monitoring program to:
 - monitor species recruitment and plant health after fire events (including the 2019–20 bushfires);
 - determine trends in population size and response to precipitation;
 - document population trends over time at sites with different fire frequencies;
 - determine threats and their impacts, and;
 - monitor the effectiveness of management actions and the need to adapt them if necessary.
- Survey suitable habitat for new subpopulations and to locate suitable sites for translocations.
- Integrate new knowledge on the biology and ecology of the species into management plans as it becomes available and share this with stakeholders

Information and research priorities

- Develop an adequate biological and ecological understanding of the species to determine key attributes for management and recovery and enable the identification of important populations and habitats critical to survival.
 - Key attributes should include (but are not limited to): population structure, size, demographics, habitat requirements, soil-seed bank dynamics and longevity, seed and plant longevity, pollination biology, and germination biology and requirements.
 - Key processes should include (but are not limited to): response to disturbance of different intensities (land clearing, development and maintenance, vehicle usage weeds, fire, drought), pollination ecology and dispersal.
- Determine the genetic variability between Blue Mountains and western Hornsby Plateau subpopulations.
- Understand the potential influence of climate change on the long-term survival prospects of the species, due to altered temperatures, rainfall patterns, bushfires, and environmental stressors.
- Investigate the impact of drought on *A. gordonii* survival, recruitment and seedling growth.
- Ascertain the cultural significance of *A. gordonii*.
- Determine habitat critical to the survival of *A. gordonii*.

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

[NSW Government. A strategic approach to managing fire in parks and reserves](#)

[NSW Government. *A. gordonii* \(*Acacia gordonii*\) saving our species strategy.](#)

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

Attachment A: Listing Assessment for *Acacia gordonii*

Reason for assessment

This assessment follows prioritisation of a nomination from the TSSC

Assessment of eligibility for listing

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

Key assessment parameters

Table 4 includes the key assessment parameters used in the assessment of eligibility for listing against the criteria.

Table 4 Key assessment parameters

Metric	Estimate used in the assessment	Minimum plausible value	Maximum plausible value	Justification
Number of mature individuals	>2750	2500	unknown	<p>The number of mature individuals of <i>A. gordonii</i> has not been counted or estimated across all known sites. Prior to the 2019–20 bushfires, it appeared that DPIE considered the total number of mature individuals to be <2000 (Douglas 2020). However, on the basis of research undertaken between 2016 and 2019, the total population of mature individuals prior to the 2019–20 bushfires were estimated by Douglas (2020) to be <1500 (likely range 500–1500).</p> <p>The 2019–20 bushfires appear to have stimulated large-scale recruitment at sites that have been surveyed post-fire and surveys of unburnt sites (Liden Ridge and Dawes Ridge) found thousands of mature plants (Mickaill 2021). Based on the most recent estimates, it appears there are 1852 documented mature individuals in plots, with an estimate of 2750 mature individuals across all surveyed sites (DPIE 2020b, 2021b; Mickaill 2021). The vast majority (2500+) of these are at the long unburnt Linden and Dawes Ridge sites. There are also around 2150 estimated seedlings across all sites (around 930 in plots), as well as 50 resprouts (Table 1; DPIE 2021b). The number of mature individuals in the unreserved western Hornsby Plateau subpopulations is unknown.</p>
Trend	static			<p>Though it appears the population has increased since the 2019–20 bushfires, there is a high degree of variability in the number of living mature individuals due to the importance of fire history, and many currently extant plants may die before reaching maturity. It is unsurprising that current population counts have increased as the 2019–20 fires occurred relatively recently. Given this, and that the number of mature individuals had not changed substantially since 1997 (aside from the discovery of new plants that do not represent a true increase), the population is considered to be static.</p>
Generation time (years)	14–18 years	14 years	18 years	<p>The species is likely to have a generation time of approximately 14–18 years (see Criterion 1).</p>

Metric	Estimate used in the assessment	Minimum plausible value	Maximum plausible value	Justification
Extent of occurrence (EOO)	416 km ²	409 km ²	416 km ²	<p>EOO is estimated at 416 km². This figure is based on the mapping of point records from a 20-year period (2002-2021) obtained from the NSW state government. The EOO was calculated using a minimum convex hull, based on the IUCN Red List Guidelines (IUCN 2019).</p> <p>The minimum plausible value is the EOO value calculated by Douglas (2020).</p>
Trend	static			No subpopulations are known to have been lost or discovered within the last 20 years.
Area of Occupancy (AOO)	64 km ²	56 km ²	64 km ²	<p>The AOO is estimated at 64 km². This figure is based on the mapping of point records from 20 years (2002–2021) obtained from the NSW state government. The AOO is calculated using a 2x2 km grid cell method, based on the IUCN Red List Guidelines (IUCN 2019).</p> <p>The minimum plausible value was obtained from Douglas (2020).</p>
Trend	static			No subpopulations are known to have been lost or discovered within the last 20 years.
Number of subpopulations	>9	9	unknown	<p>The number of subpopulations is estimated at >9.</p> <p>Known subpopulations in the Blue Mountains include Wollemi NP, Brown's Ridge Rd north, Brown's Ridge Rd South, Bilpin south, Linden Ridge, Dawes Ridge, Faulconbridge Point and Paterson Range. Given the dispersal mechanism of the species is not known, it is unclear if these sites are undergoing genetic exchange. However, separate subpopulation monitoring plots are established for most of these sites, and they sites are separated by barriers (e.g., Bells Line of Road) and distances of >2km. It is therefore plausible to suggest they are not undergoing genetic exchange and are five distinct subpopulations.</p> <p>All western Hornsby Plateau records are treated as one subpopulation due to the lack of information about the species in this area, though there is likely more than one in the region.</p> <p>The maximum plausible number of subpopulations is unknown, as there are likely unknown sites extant due to species' habitat requirements and fragmented distribution.</p>

Metric	Estimate used in the assessment	Minimum plausible value	Maximum plausible value	Justification
Trend	Stable			No subpopulations have been lost or discovered within the last 20 years.
Basis of assessment of subpopulation number	See above.			
No. locations	2	2	3	<p><i>A. gordonii</i> occurs in two locations: mid-altitude Blue Mountains; and lower altitude western Hornsby Plateau (Douglas 2020). These are separated by distance (c. 45km) and unsuitable habitat, though undocumented subpopulations are feasible further north.</p> <p>These locations are defined based on fire as a plausible threat (See <i>Criterion 2</i>). Approximately 50% of the species' range was burnt by the Gaspers Mountain bushfire, and DPIE (2020a) suggests that 33% of records were in the 2019–20 fire-affected area. It is suggested that the component records of each location are close together and in fire-prone habitat, and fire could threaten their viability in cases where it occurs twice within the fire-free interval (7-years). Given that bushfires are becoming larger and more common, it is plausible that a fire will occur at the same locations twice in seven years within one generation length (14–18 years).</p>
Trend	Stable			There is currently no evidence to suggest that the number of locations is either increasing or decreasing.
Basis of assessment of location number	See above.			
Fragmentation	To be considered severely fragmented, over 50% of the AOO must be in small and isolated patches that cannot support a minimum viable population (IUCN 2019). Given that many of the known sites are in large areas of native vegetation and habitat Wollemi NP and Blue Mountains NP, it is unlikely that 50% of the AOO is in patches that cannot support a viable population.			
Fluctuations	Though subpopulations of <i>A. gordonii</i> do undergo fluctuations through fire events, there is no evidence to suggest that these fluctuations exceed one order of magnitude. Furthermore, in order for plants that germinate from soil-stored seed to experience extreme fluctuations under IUCN criteria, stored seed must be exhaustible in a single event (IUCN 2019). It has been observed that <i>A. gordonii</i> seeds were not exhausted by one fire, so this does not appear to be plausible.			

Criterion 1 Population size reduction

Reduction in total numbers (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered Very severe reduction	Endangered Severe reduction	Vulnerable Substantial reduction
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%
<p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.</p> <p>A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(a) cannot be used for A3]</p> <p>A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.</p> <p>Based on any of the following</p> <ul style="list-style-type: none"> (a) direct observation [except A3] (b) an index of abundance appropriate to the taxon (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat (d) actual or potential levels of exploitation (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites 			

Criterion 1 evidence

Insufficient data to determine eligibility

Generation time

Observations of *A. gordonii* suggest that plants can live at for least 22 years (Douglas 2020), though given that it resprouts, the longevity of the species is likely longer and is estimated at 25–30 years (S Douglas 2021. pers comm 14 October).

There is no data available on the juvenile length of the species, though it is tentatively estimated at 3–5 years with high uncertainty.

Generation time = age of first reproduction + $[0.5 * (\text{length of reproductive period})]$

The minimum generation length calculated as: Generation time = $3 + [0.5 * (25 - 3)] = 14$ years

The maximum generation length is calculated as: Generation time = $5 + [0.5 * (30 - 5)] = 18$ years

The generation time of *A. gordonii* was estimated at 14–18 years. This gives an estimated three-generation period of approximately 42–54 years.

Prior to the 2019–20 bushfires

There is limited information on subpopulation sizes and trends across the species range, especially at the western Hornsby Plateau sites, and subpopulation sizes are highly variable according to fire history. Estimates of the species' population size remained relatively static from 1997 (<1500 individuals; NSW scientific committee) to 2019 (<2000 according to DPIE,

<1500 according to Douglas (2020). This suggests there was no long-term decline in the number of mature individuals prior to the 2019–20 bushfires. However, plots at Faulconbridge Point have undergone some loss of mature individuals after prescribed burn in 2018, totalling around 35 plants (Table 1). Losses of some recruited seedlings have also occurred, potentially due to dry conditions and erosion (S Douglas 2021. pers comm 4 November).

The status of the western Hornsby Plateau subpopulations is entirely unknown, and these subpopulations may have undergone substantial decline that has not yet been recorded.

After the 2019–20 bushfires

During the summer of 2019–20, the Gaspers Mountain bushfire was estimated to have burnt 50 percent of the modelled distribution of the species (Gallagher 2020) and 33 percent of known records (DPIE 2020a). Two plots in Wollemi NP were burnt, as well as two plots south of Bilpin, near Brown's Ridge rd. As of surveys during mid-2021, there are 700 observed seedlings across both Wollemi NP plots and 1000+ seedlings at burnt and unburnt sites outside of the plots (DPIE 2021b; Table 1). Thirty mature plants were lost at Plot 1, whilst the trend at Plot 2 is unknown as it was established after the fires. Post-fire surveys at Brown's Ridge Rd near Bilpin revealed that subpopulations in this area did not undergo the same level of recruitment (~300 seedlings across plots and unplotted areas), potentially due to lower severity burns (DPIE 2021b; Table 1). A total of 70 plants appear to have been lost at these sites.

Surveys of the unburnt Linden Ridge and Dawes Ridge in September 2021 found 1791 mature individuals across two plots, the vast majority of which had not previously been identified. It is estimated that there are at least 2500 plants in this area (Table 1). This is unrelated to the 2019–20 bushfires and appears to be the first time these plants have been documented.

Based on these recent surveys, it appears there are 1852 documented mature individuals in plots, with a rough estimate of 2750 mature individuals across all surveyed sites. The vast majority (2500+) of these are at the long unburnt Linden and Dawes Ridge sites. There are also around 2150 estimated seedlings across all sites (around 930 in plots), as well as 50 resprouts (DPIE 2021b; Table 1). It remains unknown how many individuals are present at subpopulations in the Western Hornsby Plateau.

Projection of seedling survival

To appropriately estimate population reductions caused by the 2019–20 fires, the proportion of extant seedlings that are likely to survive to a similar life stage as the burnt plants must be estimated, based on seedling survival rates of adult senescence. Competition amongst the densely packed seedlings has likely already reduced their numbers substantially. Indeed, 50 percent mortality of seedlings was observed at Faulconbridge Point between the first post-fire monitoring (2019) and follow-up surveys in 2020 (S Douglas 2021. pers comm 4 November). However, given that seedlings that were recruited by the fires germinated in late 2019 – early 2020, this high first-year mortality has likely already occurred, perhaps to a greater extent due to the higher density of seedlings.

There is limited information on expected seedling mortality after the first year of life due to lack of bushfire history, though high mortality at sites burnt by the 2019–20 bushfires is expected within the next 2–5 years (S Douglas 2021. pers comm 4 November). Assuming 2150 seedlings were extant around 1.5 years after the fires event (mid 2021), and seedling mortality is static at 50 percent each year prior to maturity, the total number of seedlings reaching maturity is

estimated at around 800 for a juvenile period of three years and 200 for a juvenile period of five years (plausible range, see above). Of these, around 85–335 are in plots.

It is difficult to estimate how many of these mature plants will die before reaching the age of the plants that died in the fires, as the rate of senescence for this species is unknown. This is an important metric to estimate the number of mature individuals that were lost, as the plants that died in the fires were likely old and senescing. In the absence of such data, the aforementioned estimates of seedlings that are likely to reach maturity can be treated the maximum number of individuals that could reach a similar life stage as the dead plants, noting that the number of mature individuals reaching a similar life stage will likely be smaller in reality.

Comparing mortality and recruitment

Between all fire-affected subpopulations, around 105 plants are documented to have been lost. However, these are only the plants documented in plots that died due to the fires, and it is likely many more undocumented plants were killed. Therefore, it is reasonable to compare the number of plants that germinated in plots that are estimated to reach maturity (85–335) with the number of plants that are recorded dead, to provide a comparison of germination and mortality that can then be extrapolated to unplotted areas where recruitment is occurring. Based on these estimates and noting that some plants will die after reaching maturity, it appears that the 2019–20 bushfires may slightly increase the number of mature individuals at affected subpopulations, though this conclusion is based on a number of assumptions and should be treated as an indication only.

Future decline

The species is vulnerable to future threats from land clearing and vehicle use, inappropriate fire regimes and climate change, across a three-generation period (see Table 4 for details on these threats). However, aside from the aforementioned impacts of fire, there is no evidence with which to estimate the impact of many of these threats on the species, and thus it is unclear whether they will generate population reduction of over 30 percent. It is possible that fires will reoccur in burnt subpopulations within the required fire-free interval. However, it is difficult to predict this with any certainty, and it is not reasonable to infer population decline based on this possibility. It is also plausible that a large proportion of plants at Linden Ridge and Dawes Ridge will senesce and die in the near future, prior to a fire occurring. However, even if many of the currently extant plants are dead, a fire would still likely lead to substantial recruitment at these sites. The number of mature individuals of *A. gordonii* in each subpopulation and the total population is highly dependent on fire events and will undergo fluctuations throughout the next three generation period.

Conclusion

The total number of known *A. gordonii* individuals has grown from <1500 to 2750 from 2020–2021 (within the past three generations), though this is based on the discovery of more plants and does not represent an increasing population trajectory. However, there is also no evidence to suggest that the population has undergone a decline of over 30 percent in the past three generations. There appears to be no evidence for substantial population decline prior to the 2019–20 fires, and there has been an increase in the number of immature individuals since 2019–20 due to post-fire recruitment. This recruitment may lead to fire-affected sites increasing slightly in number or remaining static, though it is difficult to estimate the number of mature individuals due to lack of data on seedling survival and rate of senescence. Future population

decline over the next three generations is plausible, though there is insufficient evidence to conclude that it will be over 30 percent. The status of the western Hornsby Plateau subpopulations remains unknown, and these subpopulations may have undergone substantial. Given the above evidence, it is considered that there is insufficient evidence to list the species under Criterion 1.

There are insufficient data to demonstrate if the subspecies is 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 2 Geographic distribution as indicators for either extent of occurrence AND/OR area of occupancy

	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Criterion 2 evidence

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

EOO and AOO

The EOO of known *A. gordonii* sites is estimated at 416 km² and the AOO of known sites is 64 km². The figures for EOO and AOO are based on the mapping of point records from 2002-2021, obtained from state governments, museums, and CSIRO. The EOO was calculated using a minimum convex hull, as outlined in the IUCN Guidelines (IUCN 2019). The AOO was calculated using the 2x2 km grid cell method as outlined in the IUCN Guidelines (IUCN 2019).

Given that the AOO is less than 500 km² and EOO is less than 5000 km², the species meets the threshold for listing as Endangered under and sub-criterion B1 and sub-criterion B2.

Severely fragmented

"A taxon can be considered to be severely fragmented if most (>50%) of its total area of occupancy is in habitat patches that are (1) smaller than would be required to support a viable population, and (2) separated from other habitat patches by a large distance" (IUCN 2019).

Given that many of the known sites are in large areas of native vegetation and habitat Wollemi NP and Blue Mountains NP, it is unlikely that 50% of the AOO is in patches that cannot support a viable population. Therefore, the species is not considered to be severely fragmented.

Number of locations

“The term ‘location’ defines a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the taxon present. The size of the location depends on the area covered by the threatening event and may include part of one or many subpopulations. Where a taxon is affected by more than one threatening event, location should be defined by considering the most serious plausible threat” (IUCN 2019).

The number of locations is estimated at two, following Douglas (2020), who suggests the species’ subpopulations can be divided into the mid-altitude Blue Mountains and lower altitude western Hornsby Plateau. These locations are defined based on the fire regime as a plausible threat, as all components records of each location are considered to plausibly be able to be impacted by the same fire and high frequency fires are increasingly likely under climate change. Half the range (much of mid-altitude Blue Mountains location) was burnt during the 2019–20 bushfires, and therefore a similar proportion of habitat may burn again. If this occurs within seven years, as is increasingly likely to happen under climate change, all individuals can plausibly be rapidly affected.

Location 1: Mid-Altitude Blue mountains

All Blue Mountains subpopulations are considered to be one location, based on the assumption that one fire event can plausibly impact all sites. During the 2019–20 bushfires, it was estimated that 50 percent of the species’ modelled range was burnt, and likely included many of the Blue Mountains sites. It is inferred that all records in the area can be plausibly considered one location, as they may be affected by a single fire which threatens already burnt subpopulations.

Location 2: Western Hornby Plateau

The eastern location in north-west Sydney occurs near the western edge of the Hornsby Plateau and consists of scattered subpopulations in the localities of Glenorie, Hillside and south of Forest Glen. This location has not recently been burnt, so currently, one future fire likely cannot lead to population reduction due to post-fire recruitment. However, the Sydney metropolitan area is expected to undergo an increase in the frequency and severity of fires (OEH 2014) and such changes to fire conditions will likely increase the probability of high severity bushfires impacting *A. gordonii* regularly and unseasonably into the future. Therefore, it is feasible that a fire may occur within one generation (14–18 years) that would lead to all subpopulations being threatened by a subsequent fire event that also occurs within one generation. Therefore, this high frequency or unseasonal fire regime may be treated as a threatening event that can rapidly affect all individuals of the taxon on the Western Hornsby Plateau.

Continuing decline

Several (sometimes interacting) threats have been reported for *A. gordonii* (Table 2). There is limited information on the historic impact of many of these identified threats, though observational evidence suggests that too-infrequent fire regimes have led to senescence and competition with co-occurring species which encroach on the habitat of *A. gordonii* when fires occur infrequently (Table 2; Douglas 2020). Though the trajectory of the western Hornsby Plateau subpopulations is unknown, it is considered likely that these sites are under threat of

continuing decline through land clearing and development, track and road maintenance, and vehicle use destroying *A. gordonii* habitat and associated species (Table 2). All subpopulations are also threatened by climate change, which may generate extreme rainfall events that wash away the skeletal topsoil from rocky outcrops and away from *A. gordonii* habitat. Some Blue Mountains sites are being invaded by African lovegrass and some by whisky grass (Table 2). All of these factors may lead to declines in the quality of *A. gordonii* habitat.

Based on the above information, there is insufficient evidence to determine if there is any continuing decline in (i) extent of occurrence, (ii) area of occupancy, (iv) number of locations or subpopulations, or (v) number of mature individuals. However, given the above threats, known habitat within the range of the species is being impacted by habitat degradation and loss through land clearing and development, track and road maintenance, vehicle use encroachment of other native species, potential loss of topsoil and weed invasion. These factors are therefore inferred to cause a continuing decline in the (iii) area, extent and/or quality of habitat of *A. gordonii*.

Extreme fluctuations

Though population size of *A. gordonii* does undergo fluctuations through fire events, there is no evidence to suggest that these fluctuations exceed one order of magnitude. Furthermore, under IUCN criteria in order for plants that germinate from soil-stored seed to experience extreme fluctuations, stored seed must be exhaustible in a single event (IUCN 2019). It has been observed that *A. gordonii* seeds were not exhausted by one fire (Douglas 2020).

The species does not appear to meet the extreme fluctuations requirement for listing under this criterion.

Conclusion

Following assessment of the information available, the Committee has determined that the geographic distribution is restricted and there are threats operating that would make the subspecies' geographic distribution precarious for its survival. 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 subspecies 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. of this criterion.

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) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(a) (ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals			

Criterion 3 evidence

Not Eligible under Criterion 2

The number of mature individuals of *A. gordonii* has not been counted or estimated across all known sites, though partial counts and estimates for Blue Mountains sites are available (see *Subpopulations* and Criterion 1). Population size is highly dependent on when sampling occurs relative to fire events, as the species occurs in low abundance at relatively long-unburnt sites but becomes abundant after fires (Douglas 2020).

In October 2019, prior to the 2019–20 bushfires, it appeared that DPIE considered the total number of mature individuals to be <2000 (Douglas 2020). However, on the basis of research undertaken between 2016 and 2019, the total population of mature individuals prior to the 2019–20 bushfires were estimated by Douglas (2020) to be <1500 (likely range 500–1500).

The 2019–20 bushfires appear to have stimulated large-scale recruitment at sites that have been surveyed post-fire. Based on the most recent estimates, it appears there are 1852 documented mature individuals in plots, with a rough estimate of 2750 mature individuals across all surveyed sites. The vast majority (2500+) of these are at the long unburnt Linden and Dawes Ridge sites. There are also around 2150 estimated seedlings across all sites (around 930 in plots), as well as 50 resprouts (DPIE 2021; Mickaill 2021; Table 1). Many of these seedlings and resprouts, will die before reaching maturity. It is estimated that 200–800 plants will reach maturity (Criterion 1). It remains unknown how many individuals are present at subpopulations

in the Western Hornsby Plateau, though it is unlikely that the mature individuals at these sites would bring the total number to over 10,000.

Continuing decline

As described under Criterion 1 continuing decline over the next one–three generations is plausible, though there is insufficient evidence to conclude that it will be over 10 percent.

As described under Criterion 2, a continuing decline in area, extent and/or quality of habitat is inferred.

Precarious geographic distribution and extreme fluctuations

The species does not have a precarious distribution. After the 2019–20 bushfires, there were more than 1000 mature individuals known from some subpopulations (e.g., Linden Ridge). 100 percent of mature individuals are not found within one subpopulation, and there are no extreme fluctuations in the number of mature individuals (see Criterion 2)

Conclusion

The species appears not to have met the requirements for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the subspecies 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 km ² or number of locations ≤ 5

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

Criterion 4 evidence

Not eligible

Based on the above population estimates (see Criterion 3), there are likely >2750 mature individuals in the population.

Species cannot be listed under Criterion D2 (see ¹). However, the species meets the requirements for the Vulnerable category under D2, given the number of locations is two (see Criterion 2).

Conclusion

The species does not appear to have met the for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the subspecies 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 has been considered adequate and there is sufficient scientific evidence to support the assessment.

Listing and Recovery Plan Recommendations

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

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