

Consultation Document on Listing Eligibility and Conservation Actions

Eucalyptus macarthurii (Camden woollybutt)

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

- 1) the eligibility of *Eucalyptus macarthurii* (Camden woollybutt) for inclusion on the EPBC Act threatened species list in the Endangered category; and
- 2) the necessary conservation actions for the above species.

Evidence provided by experts, stakeholders and the general public is 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.

Draft information for your consideration of the eligibility of this species for listing as Endangered starts at page 5 and information associated with potential conservation actions for this species starts at page 8. To assist with the Committee's assessment, the Committee has identified a series of specific questions on which it seeks your guidance at page 10.

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

or by mail to:

The Director
Terrestrial Species Conservation Section
Wildlife, Heritage and Marine Division
Department of the Environment
PO Box 787
Canberra ACT 2601

Responses are required to be submitted by 15 January 2016.

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General background information about listing threatened species

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

<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/biodiversity/threatened/pubs/guidelines-species.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>.

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 of 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.

Eucalyptus macarthurii

Camden woollybutt

Taxonomy

Conventionally accepted as *Eucalyptus macarthurii* H.Deane & Maiden (CHAH 2006).

Species/Sub-species Information

Description

The Camden woollybutt (family Myrtaceae) is a tree up to 40 m high, with grey-brown, shortly fibrous bark that persists on the trunk and larger branches and sheds in short ribbons (Hill, 2002). Juvenile leaves are dull green. Adult leaves are dull green, long and narrow, 8-16 cm long and 0.8-1.5 cm wide (Hill 2002). Buds are oval or spindle-shaped, 3-5 mm long and 2-3 mm wide. Fruit are hemispherical, conical or bell-shaped, 3-5 mm long, 3-6 mm in diameter (Hill 2002).

Distribution

The Camden woollybutt is indigenous to New South Wales, where it is recorded from two areas: (1) the Southern Highlands/Wingecarribee Shire, and (2) on the Boyd Plateau in the southern Blue Mountains area (NSW OEH 2014; Douglas 2011). The extent of occurrence of the Camden woollybutt in New South Wales is calculated to be 2535 km², using a minimum convex polygon method based on the IUCN Red List Guidelines 2014. The calculated total area of occupancy is 144 km², using a 2x2 km grid cell method around the locality records (Department of the Environment 2015).

In the Southern Highlands it occurs mainly on private agricultural land, often as isolated individuals in, or on the edges of, modified pastures. The species also occurs within Kanangra Boyd National Park (NSW OEH 2014), as well as in the highly modified Cecil Hoskins Nature Reserve (between Moss Vale and Bowral in the Southern Highlands), and in the Stingray Swamp Flora Reserve within Penrose State Forest (Douglas 2011). Hager & Benson (2010) and Benson & McDougall (1998) reported that this species is inadequately reserved. The Camden woollybutt occurs in grassy woodland on relatively fertile soils on broad, cold flats (Hill 2002) and near swamps and streams (Black 1982). This species grows at moderately high altitudes, between 700 and 1200m, and favours cold, wet locations with annual rainfall of 1000-1400 mm (Benson & McDougall 1998; Black 1982).

This species was also introduced to Victoria, where it is now naturalised at two localities in outer Melbourne: between Sunbury and Gisborne in the northwest, and between Belgrave and Gembrook in the east (VicFlora 2015). The extent of occurrence of the Camden woollybutt in Victoria is calculated to be 55 km² (minimum convex polygon) and the estimated total area of occupancy is 12 km², using the 2x2 km grid cell method (Department of the Environment 2015). However, the species did not occur naturally in Victoria (Douglas 2011). The Camden woollybutt has also been grown as part of revegetation projects around Canberra (Pickup et al., 2013).

The total extent of occurrence of the Camden woollybutt across New South Wales and Victoria is calculated to be 51 559 km² and the calculated total area of occupancy is 156 km².

Relevant Biology/Ecology

White flowers are produced in January-February, and the sticky pollen is collected by birds and insects (Benson & McDougall 1998). Seeds are dispersed locally by wind or gravity, and there is no mechanism for dormancy (Benson & McDougall 1998). The Camden woollybutt does not spread vegetatively, and longevity is likely to be greater than 100 years (Benson & McDougall 1998). The Camden woollybutt is fire tolerant to some degree as it is known to reprodut after fire (Pickup et al., 2013). Experiments investigating post-fire recovery of revegetated woodland communities demonstrated a high survival rate of burnt *E. macarthurii* nursery tubestock

seedling revegetation (74%) and directly seeded revegetation (88%) following the January 2003 bushfires around Canberra (Pickup et al., 2013).

Threats

Known threats

Land clearing. This is a known threat, and its effects are: direct destruction of trees, and removal and fragmentation of habitat with associated degradation and prevention or suppression of recruitment, (Douglas 2011). Land clearing also facilitates invasion by weeds. Impacts have been greatest in the Southern Highlands. Logging is no longer a threat within the Kanangra Boyd National Park, but Stingray Swamp Flora Reserve is surrounded by State Forest pine plantations which are logged, threatening the reserve by invasion of pine trees, sedimentation and changed hydrology (Douglas 2015). Approximately 95% of the Southern Highlands Shale Woodlands, the primary habitat for this species, has been cleared, and most of the remnants are less than 5 ha in size and severely fragmented (Douglas 2011). The Camden woollybutt is part of the Southern Highlands Shale Forest and Woodland Ecological Community, an area that has been intensively cleared, where much of the native vegetation that remains occurs amongst a heavily modified landscape (TSSC 2015). The patches that remain are typically small, highly fragmented and have been disturbed to some extent (TSSC 2015).

Most of the continuing land clearing has been for pastoralism, primarily of cattle, and other impacts include the sowing and maintenance of non-native pasture, often entailing fertiliser application that can disadvantage native species (Douglas 2011). There is a low level or absence of recruitment across much of the remaining habitat, and much of the current cohort is mature to senescent and not being replaced. Land use is intensifying in the Southern Highlands area, which is part of the Sydney-Canberra development corridor (Douglas 2011). Existing levels of fragmentation are such that further habitat decline and degradation is highly likely unless a large-scale project to protect and reconnect remnants is implemented (Douglas 2011). The species is also present in several Council-managed public reserves that range from mown parklands, to substantial areas of bushland (Douglas 2015). Weeds remain a major problem in those areas, partly because most of the habitat is riparian or floodplain. Mowing prevents recruitment (Douglas 2015).

Weed invasion. Invasion by weeds can inhibit or prevent recruitment, and in some instances can kill or at least contribute to the death of adult trees. This is particularly the case for introduced climbers and vines such as English ivy (*Hedera helix*) (Douglas 2011). Weed invasion is a severe concern in Cecil Hoskins Nature Reserve. Invasion by pines (*Pinus radiata*) blackberry (*Rubus* spp.), and Japanese honeysuckle (*Lonicera japonica*) is a serious concern in habitat in the Penrose State Forest/Stingray Swamp Flora Reserve (Douglas 2011). Weed invasion is likely to increase in severity, as there are minimal controls on the introduction of known or potentially invasive plants to the area. Intensification of land use may also increase urban and rural runoff and nutrient loads, potentially worsening riparian weed infestations (Douglas 2011).

Grazing. Although large mature trees exist, grazing and trampling as well as other forms of disturbance preclude establishment of seedlings in many locations, so that the current mature cohort of individuals is unlikely to be replaced unless protective measures are implemented (NSW OEH 2014).

Impacts of all known threats are most pronounced in the Southern Highlands, where much of the area has been cleared (Benson & McDougall 1998). The Camden woollybutt has been assigned to the 'site-managed species' management stream under the 'Saving our Species' programme (NSW OEH 2014).

Potential threats

Land subsidence and alteration of surface and subsurface hydrology, caused by longwall coal mining and coal seam gas extraction. At the time the nomination was submitted, only exploration

for mining had commenced (Douglas 2011). Further potential impacts include changes to hydrology and escape of coal seam gas leading to poisoning of soil and vegetation, and further land clearing/fragmentation to accommodate mining-related infrastructure (Douglas 2011). Changed hydrology is a secondary impact from logging, and currently a potential threat to Camden woollybutt in Stingray Swamp Flora Reserve (Douglas 2015).

Plant disease. In South Africa, the Camden woollybutt has been shown to be susceptible to infection by *Phytophthora nicotianae* (Maseko et al., 2001), and *P. nicotianae* is present in Australia (e.g. Davison & Shearer 1989). Symptoms of infection include wilting and collapse of infected plants (WA DAF 2014).

Climate change. Climate change is reported to be a potential threat (Douglas 2011). Continued clearing, degradation, and fragmentation may limit the ability of species in the Southern Highlands Shale Forest and Woodland Ecological Community to adapt and/or migrate in response to climate change (TSSC 2015).

Assessment of available information in relation to the EPBC Act Criteria and Regulations

Criterion 1. Population size reduction (reduction in total numbers)			
Population reduction (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%
<div> <div> A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased. A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible. A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(a) cannot be used for A3] A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible. </div> <div> based on any of the following </div> <div> (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 </div> </div>			

Evidence:

Note: the listing guidelines for this criterion consider decline over the longer of 10 years or three generation lengths. The average generation length of the Camden woollybutt is unknown but likely to be more than 10 years, pending feedback during public consultation.

There is no detailed information regarding the historical distribution of the Camden woollybutt. Benson & McDougall (1998) reported that this species has been extensively cleared on the Southern Highlands. The Camden woollybutt is part of the Southern Highlands Shale Forest and Woodland Ecological Community, which has been subject to extensive clearing and degradation and now exists in a highly fragmented state. It has undergone a decline estimated between 75-90% of its original pre-European extent, with less than 6000 ha remaining (TSSC 2015). However, there is no information on the size of population reduction over any part of the natural distribution of this species.

The data presented above appear to be insufficient to demonstrate if the species 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 indicating distribution is precarious for survival:			
(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			

Evidence:

The extent of occurrence of the Camden woollybutt in New South Wales was calculated to be 2535 km², using a minimum convex polygon method based on the *IUCN Red List Guidelines 2014* (Department of the Environment, 2015). Observation data were based on 178 post-1980 records from the Species Profile and Threats Database and the Atlas of Living Australia.

The area of occupancy of the Camden woollybutt in New South Wales was calculated to be 144 km², based on a 2x2 km grid cell method based according to the *IUCN Red List Guidelines 2014* (Department of the Environment 2015).

The two main locations of this species in New South Wales are severely fragmented, and populations/sites within each location are also fragmented.

Given the threats that affect Camden woollybutt there is a projected continuing decline in the area, extent and quality of its habitat and the number of sites due to land clearing. Given the lack of recruitment at many sites, particularly in the Southern Highlands, there is also a projected decline in the number of mature individuals as they are not being replaced.

Extreme fluctuation in the extent of occurrence, area of occupancy, number of locations or populations has not been demonstrated.

The Committee therefore considers that the species' extent of occurrence and area of occupancy are restricted, the geographic distribution severely fragmented with decline in the area, extent and quality of its habitats, and likely decline in the number of locations and number of mature individuals.

The data presented above appear to demonstrate that the species is **eligible for listing as Endangered** 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 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			

Evidence:

There is no information regarding the total number of mature individuals of the Camden woollybutt, and there is insufficient information to estimate the number of mature individuals in each population, or to predict the rate of decline.

The data presented above are insufficient at this stage to demonstrate that the species 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 4. Number of mature individuals			
	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low
Number of mature individuals	< 50	< 250	< 1,000

Evidence:

At this stage, there is no information regarding the total number of mature individuals of the Camden woollybutt.

The data presented above are insufficient to demonstrate that the species 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 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

Evidence:

Population viability analysis appears not to have been undertaken, and there are insufficient data to demonstrate if the species 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.

Conservation Actions

Recovery Plan

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.

Conservation and Management Actions

Habitat loss disturbance and modifications

- Investigate formal conservation arrangements, management agreements and covenants on private land, and for crown and private land investigate and/or secure inclusion in reserve tenure if possible. Seek to increase the level of legislative protection for localities where this species occurs.
- If maintenance activities occur in the area (e.g. roadside maintenance, mowing, spraying, slashing etc.), ensure land owners/managers use an appropriate management regime that does not detrimentally affect this species and will allow regeneration from seedlings.
- Investigate options for linking and enhancing existing populations, and establishing additional populations.
- Manage the population to maintain genetic diversity. Consider the removal of any hybrids in the context of maintaining evolutionary potential and reducing risk of species loss through hybridisation.
- In collaboration with the Australian Seed Bank Partnership, use known protocols to establish ex-situ seed collections that capture genetic representation of the remaining populations as an insurance policy, to aid in re-establishing populations if needed in the future and to bolster stands where regeneration is not occurring.
- Continue to undertake translocations, using the Australian Network for Plant Conservation (ANPC) guidelines to augment small stands identified as being at significant risk from hybridisation.
- Consider work with local groups to ensure the ANPC guidelines are followed when undertaking revegetation work using Camden woollybutt.

- In the event of mining in the area, ensure the appropriate management of stream flows, water quality and riparian environments throughout catchments of existing and potential sites.

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

- Manage sites to identify, control and reduce the spread of invasive weeds.
- Avoid the use of fertilisers in or around stands of Camden woollybutt where weeds may flourish.

Disease

- Monitor the Camden woollybutt and other nearby members of the Myrtaceae for the presence of *Phytophthora nicotianae* and other *Phytophthora* species. If detected, minimise the spread by implementing appropriate vehicle and footwear hygiene protocols where possible, and mitigate impacts with phosphite treatments, fumigants, specific vegetation destruction, and containment barriers (Department of the Environment 2014).

Impacts of domestic species

- If livestock grazing occurs in the area, ensure land owners/managers use an appropriate management regime and density that does not detrimentally affect this species and allows regeneration from seedlings. Manage total grazing pressure at important sites through exclusion fencing or other barriers.

Fire

- This species resprouts after fire. Implement an appropriate fire management regime for protecting key habitat, ensuring buffers are created to prevent wildfire. Ensure there is a sound scientific basis for any proposed prescribed fire for managing this species.

Stakeholder Engagement

- Advise landholders of the presence of this species, and encourage and support appropriate conservation practices.
- Encourage NRM and environmental groups to become involved with appropriate conservation management activities.

Survey and monitoring priorities

- Design and implement a monitoring program to monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
- Undertake survey to more precisely assess population size, distribution, ecological requirements and the relative impacts of threatening processes.

Information and research priorities

- Undertake genetic analyses to:
 - assess current gene flow (using markers and analyses capable of distinguishing population divergence on an evolutionary timescale, from that which might be due to more recent impacts); and

- identify populations with low genetic diversity that might benefit from artificial introduction of genetic material from other populations from which they have relatively recently diverged.
- identify stands where high levels of hybridisation are occurring that might benefit from artificial introduction of genetic material from other populations.
- Undertake research to identify the constraints to regeneration (vegetative regrowth, seedling growth and/or seed germination), which may include optimal fire regimes.
- Conduct research to more precisely determine the impacts of *Phytophthora* species.

Collective list of questions – your views

(Note: the listing guidelines for this assessment consider decline over the longer of 10 years or three generation lengths. The average generation length of the Camden woollybutt is unknown but likely to be more than 10 years, pending feedback during public consultation).

Biological information

1. Can you provide any additional or alternative references, information or estimates on the biology and life history of the Camden woollybutt, such as average life span, reproductive age and generation length?
2. The populations in Victoria are apparently naturalised. Do you have any information regarding the conditions facilitating recruitment of this species?

Population size

3. Has the survey effort for this species been adequate to determine its national adult population size? If not, please provide justification for your response.
4. Can you provide an estimate of the current population size of mature adults of this species (national extent)? Please provide supporting justification or other information.

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

Number of mature individuals is estimated to be in the range of:				
<input type="checkbox"/> 1–50	<input type="checkbox"/> 51–250	<input type="checkbox"/> 251–1000	<input type="checkbox"/> >1000	<input type="checkbox"/> >10 000
Level of your confidence in this estimate:				
<input type="checkbox"/> 0–30% - low level of certainty/ a bit of a guess/ not much information to go on				
<input type="checkbox"/> 31–50% - more than a guess, some level of supporting evidence				
<input type="checkbox"/> 51–95% - reasonably certain, information suggests this range				
<input type="checkbox"/> 95–100% -high level of certainty, information indicates quantity within this range				
<input type="checkbox"/> 99–100% - very high level of certainty, data are accurate within this range				

Evidence of total population size change

5. Are you able to provide an estimate of the total population size at or soon after the start of a three generation period? Please provide justification for your response.

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

Number of mature individuals is estimated to be in the range of: <input type="checkbox"/> 1–50 <input type="checkbox"/> 51–250 <input type="checkbox"/> 251–1000 <input type="checkbox"/> >1000 <input type="checkbox"/> >10 000
Level of your confidence in this estimate: <input type="checkbox"/> 0–30% - low level of certainty/ a bit of a guess/ not much information to go on <input type="checkbox"/> 31–50% - more than a guess, some level of supporting evidence <input type="checkbox"/> 51–95% - reasonably certain, information suggests this range <input type="checkbox"/> 95–100% -high level of certainty, information indicates quantity within this range <input type="checkbox"/> 99–100% - very high level of certainty, data are accurate within this range

6. Are you able to comment on the extent of decline in the species' total population size over the last approximately 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: <input type="checkbox"/> 1–30% <input type="checkbox"/> 31–50% <input type="checkbox"/> 51–80% <input type="checkbox"/> 81–100% <input type="checkbox"/> 90–100%
Level of your confidence in this estimated decline: <input type="checkbox"/> 0–30% - low level of certainty/ a bit of a guess/ not much information to go on <input type="checkbox"/> 31–50% - more than a guess, some level of supporting evidence <input type="checkbox"/> 51–95% - reasonably certain, suggests this range of decline <input type="checkbox"/> 95–100% -high level of certainty, information indicates a decline within this range <input type="checkbox"/> 99–100% - very high level of certainty, data are accurate within this range

7. Please provide (if known) any additional evidence which shows the one or more populations is/are stable, increasing or declining.

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

8. Has the survey effort for this species been adequate to determine its national distribution? If not, please provide justification for your response.
9. Do you agree that the way the current extent of occurrence and/or area of occupancy has been estimated is appropriate? Please provide justification for your response.

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.

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.

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

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

10. Can you provide 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: <input type="checkbox"/> <100 km ² <input type="checkbox"/> 100 – 5 000 km ² <input type="checkbox"/> 5 001 – 20 000 km ² <input type="checkbox"/> >20 000 km ²
Level of your confidence in this estimated extent of occurrence <input type="checkbox"/> 0–30% - low level of certainty/ a bit of a guess/ not much data to go on <input type="checkbox"/> 31–50% - more than a guess, some level of supporting evidence <input type="checkbox"/> 51–95% - reasonably certain, data suggests this range of decline <input type="checkbox"/> 95–100% -high level of certainty, data indicates a decline within this range <input type="checkbox"/> 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: <input type="checkbox"/> <10 km ² <input type="checkbox"/> 11 – 500 km ² <input type="checkbox"/> 501 – 2000 km ² <input type="checkbox"/> >2000 km ²
Level of your confidence in this estimated extent of occurrence: <input type="checkbox"/> 0–30% - low level of certainty/ a bit of a guess/ not much data to go on <input type="checkbox"/> 31–50% - more than a guess, some level of supporting evidence <input type="checkbox"/> 51–95% - reasonably certain, data suggests this range of decline <input type="checkbox"/> 95–100% -high level of certainty, data indicates a decline within this range <input type="checkbox"/> 99–100% - very high level of certainty, data is accurate within this range

Change in status/rate of change

11. Is the information used to identify the nationally threatened status of the species robust? Have all the underlying assumptions been made explicit? Please provide justification for your response.

12. Can you provide any additional data or information regarding the extent and/or the rate of change at any locality or national extent?

General

13. Can you provide any information regarding when and why this species was introduced to Victoria?
14. Can you provide any other information regarding the introduction of this species to Victoria, such as the source for the introduction? What is the status of the Victorian populations?
15. Do you know if this species is in cultivation? If so, can you provide any further information?
16. Can you provide additional data or information relevant to this assessment?
17. Have you been involved in developing this nomination? If so, in what capacity?

Threats

18. Do you agree that the threats listed are correct and that their effect on the species is significant?
19. To what degree are the identified threats likely to impact on the species in the future?
20. What threats are impacting on different populations, how variable are the threats and what is the relative importance of the different populations?
21. Can you provide additional or alternative information on threats, past, current or potential that may adversely affect this species at any stage of its life cycle?
22. Is hybridisation a threat to this species? Please provide justification for your response.
23. Can you provide supporting data/justification or other information for your responses to these questions about threats?

Management

24. What planning, management and recovery actions are currently in place supporting protection and recovery of the species? To what extent have they been effective?
 25. Can you recommend any additional or alternative specific threat abatement or conservation actions that would aid the protection and recovery of the species?
 26. What individuals or organisations are currently, or potentially could be, involved in management and recovery of the species?
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