



jConsultation Document on Listing Eligibility and Conservation Actions

***Phascogale calura* (red-tailed phascogale)**

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

- 1) the eligibility of *Phascogale calura* (red-tailed phascogale) for inclusion on the EPBC Act threatened species list; and
- 2) the necessary conservation actions for the above species.

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 either by email to:
species.consultation@environment.gov.au

or by mail to:

The Director
Marine and Freshwater 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 17 June 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 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.

Phascogale calura

red-tailed phascogale

Note: The information contained in this Conservation Advice was primarily sourced from 'The Action Plan for Australian Mammals 2012' (Woinarski et al., 2014) and the Western Australia Department of Parks and Wildlife (WA DPaW 2016a). . Any substantive additions obtained during the consultation on the draft will be cited within the advice. Readers may note that Conservation Advices resulting from the Action Plan for Australian Mammals show minor differences in formatting relative to other Conservation Advices. These reflect the desire to efficiently prepare a large number of advices by adopting the presentation approach of the Action Plan for Australian Mammals, and do not reflect any difference in the evidence used to develop the recommendation.

Taxonomy

Conventionally accepted as *Phascogale calura* (Gould 1844). Other common names include the red-tailed wambenger, and kenngoor (Noongar). No subspecies are recognised.

Species Information

Description

The red-tailed phascogale is a small, arboreal, carnivorous marsupial with ash-grey fur above and cream fur below. Its distinctive tail grows up to 14.5 cm long, with half (the portion nearer the body) colored reddish-brown, and the other half comprising a brush of long black hairs. It also has large, thin, reddish ears. This species is highly sexually dimorphic (Foster et al., 2006) with males growing to 12.2 cm long and weighing up to 68 grams, and females growing to 10.5 cm and weighing up to 48 grams (Bradley et al., 2008; Cronin 1991).

Distribution

The red-tailed phascogale once had a wide distribution in arid and semi-arid Australia, including the MacDonnell Ranges near Alice Springs, near Adelaide, near the junction of the Murray and Darling Rivers in New South Wales (Short & Hide 2012) and parts of the western deserts (Burbidge et al., 1988), with subfossil remains known from arid areas of South Australia (Short & Hide 2012). Burbidge et al. (2009), using modern, historical and subfossil data, found that the species formerly occurred in 24 of Australia's 85 bioregions and that it was extinct in 20 and declined or seriously declined in two.

It appears now to be confined to remnant vegetation in Western Australia's southern wheatbelt, less than one percent of its former range, where annual mean rainfall is between 400 and 600 mm (Short & Hide 2012). It occurs in numerous protected areas, and was reintroduced to Wadderin Sanctuary (near Narembreen) in 2009, and to an unfenced reserve of 389 ha controlled by Australian Bush Heritage at Kojonup in 2010 (Short & Stone 2009).

Relevant Biology/Ecology

The red-tailed phascogale is now largely confined to woodlands, particularly of old-growth Wandoo (*Eucalyptus wandoo*) and York gum (*E. loxophleba*), often with associated rock sheoak (*Allocasuarina huegeliana*), but has also been recorded in shrublands and various mosaics of woodland, shrubland, and scrub-heath. It is mainly nocturnal and largely arboreal, and can leap up to two metres in the canopy, but also feeds extensively on the ground. Home ranges vary from 1.5 ha to 8 ha, depending upon the breeding season. Recorded nesting sites include hollow logs, tree hollows (Kitchener 1981; Bradley 1997), and the skirts and stumps of grass trees (*Xanthorrhoea* spp.) (Maxwell et al., 1996).

It is an opportunistic feeder, taking a wide range of insects and spiders as well as small birds and mammals (Bradley et al., 2008). The best habitat has numerous tree hollows for shelter and a semi-continuous canopy—this probably provides some protection against predation by feral cats and foxes. In the western desert it occurred in sand dune country and sheltered in hollows in sand-dune bloodwood (*Corymbia chippendalei*) (Burbidge et al., 1988).

It has a semelparous breeding system where males die each year at the end of the breeding season (Bradley 1997). In addition, although females can breed in their second or third year, a substantial number die after weaning their first litter (Bradley 1987; Bradley et al., 2008). Friend and Scanlon (1996) found that only 14–30% of females in a wild population survived into their second year and 3–4% into their third season.

Juveniles breed in their first year. Longevity is three years (Jones et al., 2009) and captive males can survive up to five years (Bradley et al., 2008). However, most breeding adults are one year old or slightly less (Bradley et al., 2008) and generation length is assumed to be one year.

Threats

Threats to the red-tailed phascogale are outlined in the table below (Woinarski et al., 2014).

Threat factor	Consequence rating	Extent over which threat may operate	Evidence base
Predation by feral cats	Severe	Entire	Feral cats are abundant within the known range and many museum specimens of red-tailed phascogales were obtained from domestic cats. Feral cats are known to predate <i>P. calura</i> in Western Australia (Short & Hide 2012) and <i>P. tapoatafa</i> in eastern Australia (Soderquist 1994), but the population level impact is unknown.
Habitat loss and fragmentation	Severe	Entire	Extensive land clearing in the southern wheatbelt has left few woodland remnants. While land clearing has ceased, degradation of remnants and the linkages between them continues (Short et al. 2011). The semelparous breeding system and significant female die off increase susceptibility to local extinction (Bradley 1987, 1997).
Climate change	Severe	Entire	The red-tailed phascogale is known to be vulnerable to drought and there has been a significant trend to lower rainfall in south west Australia since the mid-1970s (3–4% per decade) with a further decline expected in coming years. Despite its original distribution in the arid zone, most sites from which it has disappeared in recent decades have an annual mean rainfall of <400 mm (Short & Hide 2012). It experiences fluctuations due to climatic conditions and life history characteristics (annual male die-off).

			As such, if recruitment fails in any one year due to climatic conditions, it can have a large impact on the population. With the populations being relatively isolated, re-colonisation of sites could be challenging (WA DPaW 2016a).
Frequent, intense fires	Moderate	Entire	Many nest sites are fire prone; if an entire remnant patch is burnt the species may become locally extinct. Frequent, hot fires can destroy nesting hollows and protective canopy, but fire is infrequent in wheatbelt remnants (Friend & Scanlon 1996).
Predation by foxes	Minor-moderate	Entire	Foxes are abundant within the range; however, the species' semi-arboreal behaviour probably makes them less vulnerable to foxes. Friend and Scanlon (1996) found that the effects of fox predation were less than those of drought, and fox reduction experiments resulted in only a minor increase in phascogale numbers.

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%
<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) <i>cannot be used for A3</i>]</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><i>based on any of the following</i></p> <p>(a) direct observation [except A3]</p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</p>	

Evidence:

Although the red-tailed phascogale has suffered a major decline, that decline largely ceased more than 10 years ago. New information shows that it occurs at many more locations than previously thought: it has been recorded in 142 locations since 1990 (Short & Hide 2012). However, re-trapping of some of these has failed to locate it and not all current locations are known.

The Fitzgerald River National Park subpopulation is considered to be locally extinct (J.Short, pers.comm., cited in WA DPaW 2016a). However, the survey effort may be too small to confirm this and sites have not been revisited since 1990 (T. Friend, pers.comm., cited in WA DPaW 2016a).

There has been no robust estimate of population size. Numbers fluctuate greatly with rainfall (Friend & Scanlon 1996) and remnant, isolated subpopulations are vulnerable to drought and a run of low rainfall years. However, semi-regular monitoring on nine wheatbelt sites widely distributed across the current range (Table 1), as part of a project to determine the effect of fox control on populations, shows fluctuations in numbers but not major and consistent decline; all have retained their populations since the early 1990s despite some being in small isolated reserves (T. Friend pers. comm., cited in WA DPaW 2016a).

Table 1. Latest subpopulation information for 9 wheatbelt sites, obtained via targeted surveys (WA DPaW 2016a).

Location	No. of mature individuals trapped		Condition
	2003	2012	
Dryandra State Forest	1	3	Numbers are always low on these monitoring grids.
Tutanning Nature Reserve	19	4	Currently doing well.
Boyagin	7	8	Stable despite extensive wind damage to one of the two grids
Jaloran	16	5	Senescing. Fox control ceased since 2003. Open vegetation community.
Dongolocking	15	12	Unknown. Fox control ceased since 2003.
Pingeculling	9	14	Unknown. Fox control ceased since 2003.
East Yomaning	26	17	Unknown. Fox control ceased since 2003
West Ashyby	30	5	Site always subject to large fluctuations, with no obvious change in vegetation (unbaited).
Boundain	17	27	Unknown. Unbaited.
TOTAL	140	95	

The data presented above appear to demonstrate the species is not eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

Criterion 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 is estimated to be 50 500 km², calculated using a minimum convex polygon around post-2004 database records (WA DPaW 2016a). The area of occupancy is estimated at 244–260 km² using 2x2 km grids on post-2004 record points (WA DPaW 2016a). Woinarski et al. (2014), which estimated the AOO at 280 km², considered this to be a significant underestimate due to limited sampling across the occupied range, and that the AOO was likely to be greater than 2000 km².

The numbers of locations and subpopulations are difficult to delineate. However, there are approximately 100 known locations and the distribution is not severely fragmented (WA DPaW 2016a). There is a continuing decline in the quality of habitat, degradation of the bushland remnants and linkages between (satisfying criterion (b)(iii)). The number of mature individuals fluctuates in response rainfall, and due to annual male die-off and varying annual juvenile recruitment (satisfying criterion (c)(iv)).

The data presented above appear to demonstrate that the species is not eligible for listing under this criterion, as the AOO is probably greater than 2000 km². 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:			
(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b)	Extreme fluctuations in the number of mature individuals			

Evidence:

There are currently no population estimates for this species. Woinarski et al. (2014) consider that the number of mature individuals is 'possibly' fewer than 10 000 but greater than 1000. However, there are no data that can be used to estimate total numbers (WA DPaW 2016a), and these fluctuate greatly mainly in response to rainfall (Friend & Scanlon 1996).

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 4. Number of mature individuals			
	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low
Number of mature individuals	< 50	< 250	< 1,000

Evidence:

There are currently no population estimates for this species. Woinarski et al. (2014) consider that the number of mature individuals is 'possibly' fewer than 10 000 but greater than 1000. However, there are no data that can be used to estimate total numbers (WA DPaW 2016a), and these fluctuate greatly mainly in response to rainfall (Friend & Scanlon 1996).

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 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, 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.

Consideration for delisting

The red-tailed phascogale is currently listed as Endangered under the EPBC Act. The assessment presented in this Consultation Document suggests the species may no longer be eligible to be listed under the EPBC Act as it may not satisfy the listing criteria in any category.

Further surveys have increased the known AOO and EOO of the species, which is now found in a well-defined but large part of the Upper Great Southern part of Western Australia. Many protected areas overlap its distribution: post-2004 records occur within 1 km of 33 areas of conservation estate, of which there is one national park, 14 nature reserves, two areas of state forest and one unnamed reserve (WA DPaW 2016a). Its distribution appears to be relatively stable, although it may have limited ability to recolonise sites where it has suffered local extinction (T Friend, pers. comm. 2015, cited in WA DPaW 2016a).

While subpopulations appear to have recovered, this is dependent on ongoing management programs. DPaW has recommended that the species be listed as Conservation Dependent. To be eligible to be included in the Conservation Dependent category under the EPBC Act, it must be “the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered.” The red-tailed phascogale is a target species for protection under the Western Shield program, which is aimed at controlling introduced predators such as feral cats and foxes (WA DPaW 2016b).

If listed as Conservation Dependent, the red-tailed phascogale will still be included in the list of threatened species under the EPBC Act, but will no longer be considered a Matter of National Environmental Significance; as such it will no longer be considered during the assessment of project referrals under the Act. However, significant impacts from developments are unlikely as the species has a stable distribution and land clearing within its distribution has largely ceased. Clearing of native vegetation must also be assessed under the *Environmental Protection Act 1986* (WA) which includes the consideration of impacts on fauna. Despite some ongoing declines in habitat quality and remnant vegetation, delisting the species is not expected to negatively impact on its survival.

Conservation Actions

Recovery Plan

In 2007 the Minister decided that a recovery plan should be developed for this species. However, no recovery plan is currently in place.

The decision about whether there should be a recovery plan for this species may be reviewed, particularly if the species’ listing status is changed. The purpose of this consultation document is to elicit additional information to help inform this decision.

Primary Conservation Actions

1. Maintain ongoing feral cat and fox control across the species’ distribution.
2. Manage and rehabilitate woodlands within remnant vegetation.
3. Develop woodland corridors between small remnants.
4. Encourage participation by local landholders in programs to re-establish woodland linkages, establish nest boxes at sites where suitable nesting hollows are lacking, and to control feral cats and foxes.

Conservation and Management Priorities

The species is a target species for protection under the Western Shield program, which is aimed at controlling introduced predators such as feral cats and foxes (WA DPaW 2016b). Protected areas are also managed to limit the impacts of fire. Some farming communities are developing programs to establish nest boxes for the red-tailed phascogale in areas where old-growth eucalypts are in short supply from past selective clearing of woodland. In areas where phascogales are known to occur, there is a developing program to encourage local rural shires to trap feral cats at their rubbish tips in an attempt to reduce cat numbers. There have been two re-introductions to the Western Australian wheatbelt, one to a cat- and fox- free area and one to an area with fox control (Short & Stone 2009). The long-term outcome of these is yet to be determined.

Recommended management actions are outlined in the table below (Woinarski et al., 2014).

Theme	Specific actions	Priority
Active mitigation of threats	Manage fire in protected areas to maintain old growth Wandoo and York gum woodlands.	High
	Implement broad-scale predator control, and/or high intensity control at okimportant subpopulations.	Medium-high
	Restore habitat connectivity.	Medium
Captive breeding	N/a	
Quarantining isolated populations	N/a	
Translocation	Reintroduce to large woodland protected areas combined with cat control.	Low
Monitoring	Monitor representative subpopulations in protected areas.	Medium
Community engagement	Involve local communities in managing remnant vegetation and phascogales.	Medium
	Seek conservation covenants on private or leasehold lands holding important subpopulations.	Medium

Survey and Monitoring priorities

Theme	Specific actions	Priority
Survey to better define distribution	More precisely delineate subpopulations, and estimate their population sizes.	Medium
Establish or enhance monitoring program	Design a monitoring system that is representative of the species' range and habitat variation.	Medium

Information and Research priorities

Theme	Specific actions	Priority
Assess impacts of threats on species	Assess impacts of a range of fire regimes, and identify an optimal regime.	Medium
	Assess population-level impacts of cat predation.	Medium
	Assess population-level impacts of fox predation.	Medium
	Assess use of and viability in fragments of varying sizes, and identify threshold sizes for population viability.	Medium
Assess effectiveness of threat mitigation options	Assess responses to fire and predator management.	High
Resolve taxonomic uncertainties	N/a	
Assess habitat requirements	N/a	
Assess diet, life history	N/a	

Undertake research to develop new or enhance existing management mechanisms	Develop broad-scale, targeted feral cat eradication technology.	High
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Consultation questions

1. Do you agree with the current taxonomic position of the Australian Faunal Directory for this taxon (as identified in the draft conservation advice)?
2. Can you provide any additional references, information or estimates on longevity, age of maturity, average life span and generation length?
3. Has the survey effort for this taxon been adequate to determine its national distribution and adult population size?
4. Do you accept the estimate provided in the nomination for the current population size of the taxon?
5. For any population with which you are familiar, do you agree with the population estimate provided? If not, are you able to provide a plausible estimate based on your own knowledge? If so, please provide in the form:
Lower bound (estimated minimum):
Upper bound (estimated maximum):
Best Estimate:
Estimated level of Confidence: %
6. Can you provide any additional data, not contained in the current nomination, on declines in population numbers over the past or next 10 years or 3 generations, whichever is the longer?
7. Is the distribution as described in the nomination valid? Can you provide an estimate of the current geographic distribution (extent of occurrence or area of occupancy in km²) of this taxon?
8. Has this geographic distribution declined and if so by how much and over what period of time?
9. Do you agree that the taxon is eligible for inclusion on the threatened species list, in the category listed in the nomination?
10. Do you agree that the threats listed are correct and that their effects on the taxon are significant?
11. To what degree are the identified threats likely to impact on the taxon in the future?

12. Can you provide additional or alternative information on threats, past, current or potential that may adversely affect this taxon at any stage of its life cycle?
13. In seeking to facilitate the recovery of this taxon, can you provide management advice for the following:
- What individuals or organisations are currently, or need to be, involved in planning to abate threats and any other relevant planning issues?
 - What threats are impacting on different populations, how variable are the threats and what is the relative importance of the different populations?
 - What recovery actions are currently in place, and can you suggest other actions that would help recover the taxon? Please provide evidence and background information.
14. Can you provide additional data or information relevant to this assessment?
15. Can you advise as to whether this species is of cultural significance to Indigenous Australians?