



Consultation Document on Listing Eligibility and Conservation Actions

***Antechinus arktos* (black-tailed antechinus)**

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

- 1) the eligibility of *Antechinus arktos* (black-tailed antechinus) 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 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 and Energy.

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 and Energy
PO Box 787
Canberra ACT 2601

Responses are required to be submitted by 28 July 2017.

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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 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.

Antechinus arktos

black-tailed antechinus

Taxonomy

Conventionally accepted as *Antechinus arktos* (Baker, Mutton, Hines & Van Dyck 2014).

Species/Sub-species Information

Description

The black-tailed antechinus is a small carnivorous marsupial (Gray et al. 2016). The species is large bodied with small ears. The head, neck and shoulders are greyish-brown, merging markedly to an orange-brown rump. The upper and lower eyelid, cheek and the front of the ears are orange-brown. The fore- and hind-feet are fuscous black. The body is covered in long guard hairs, giving the species a shaggy appearance. The tail is evenly black and thick based with short, dense fur (Baker et al. 2014).

The species is large for the genus and sexually dimorphic for size, with males heavier than females. Males weigh 60-120 g, while females weigh 44-59 g (Baker et al. 2014).

Distribution

The black-tailed antechinus is known from several proximate sites at the summit of the Tweed Shield Volcano caldera, at altitudes above 950 m asl, located on the border of south-east Queensland and north-east New South Wales. This area is made up of the Springbrook National Park and Lamington National Park (Gray et al. 2016).

At Springbrook National Park, the species has been recorded at two proximate sites, Best of all Lookout and Bilborough Lookout (Baker et al. 2014). The species has been recorded at one site at Lamington National Park, near Toolona lookout (A Baker, pers. comm. 2017).

Analysis of museum specimens demonstrates that the species previously inhabited a range of sites on the slopes of the Tweed Shield Volcano caldera at altitudes as low as 780 m asl (Gray et al. 2016; A. Baker *in litt.* May 2014, as cited in NSW Scientific Committee 2015), including the eastern section of the Border Ranges National Park (Baker et al. 2014). Targeted surveys for the black-tailed antechinus undertaken in the Border Ranges National Park have not detected the species (A Baker, pers. comm. 2017).

Relevant Biology/Ecology

The black-tailed antechinus occurs at high elevations in humid cool subtropical and cool temperate rainforests where rainfall is augmented by fog drip (Baker et al. 2014). In Springbrook National Park, the black-tailed antechinus occurs in complex notophyll vine forest, simple microphyll fern forest with *Nothofagus moorei* (Antarctic beech) and dense vine regrowth (Baker et al. 2014). The black-tailed antechinus is terrestrial, and is likely to utilise burrows and tree buttresses for denning and refuge habitat (A Baker, pers. comm. 2017).

The mating season for the species occurs over a 1-3 week period from July to early-August. Coinciding with the mating season, the species undergoes a synchronised annual male die-off, characteristic of *Antechinus*. A 28 day gestation period has been inferred for the species, with females giving birth to six young from August to early September (Baker et al. 2014; A Baker, pers. comm. 2017). Young attach to the nipples and are carried in the pouch of the female for approximately 60 days until October-early November. It is inferred that young are then left in the nest by the mother until 10 weeks old, becoming fully independent at 13 weeks. Juveniles disperse in late-November to early-December (Baker et al. 2014).

The species is nocturnal (NSW Scientific Committee 2015) and a generalist insectivore (Grey et al. 2016). Based on analysis of faecal pellets, the species commonly preys on fly larvae, spiders, land hoppers, millipedes and beetles, but also consumes a wide range of other insects and soft bodied prey such as earth worms (Grey et al. 2016).

Longevity for the species is unknown. However, males are likely to live for a maximum of one year, while females are likely to live for two years (NSW Scientific Committee 2015).

Threats

The black-tailed antechinus appears to be restricted to high altitude rainforest habitat. The key threatening process impacting the species is altitudinal shift of suitable habitat as a result of human induced climate change (Baker et al. 2014; Grey et al. 2016). The species is also suspected to be threatened by predation from invasive predators and may be threatened by future habitat disturbance (Grey et al. 2016; A Baker, pers. comm. 2017).

Table 1 – Threats impacting the black-tailed antechinus in approximate order of severity of risk, based on available evidence.

Threat factor	Threat type and status	Evidence base
Climate change		
Altitudinal shift from rising temperatures and decreasing rainfall	suspected current	<p>Comparison of historical and recent records indicates that the range of the black-tailed antechinus has contracted upwards into cool rainforest habitat above 950 m asl (Baker et al. 2014; Grey et al. 2016). Baker et al. (2014) state that the species' range contraction may be a result of climate change.</p> <p>In the region of the Tweed Shield Volcano caldera, mean annual maximum temperatures have increased by 1 °C and total rainfall has dropped by 76 mm between 1950 and 2003 (Hennessy et al. 2004). Declines in the distribution of the black-tailed antechinus is suspected to be a result of the species withdrawing from lower altitude habitat to match the upward altitudinal shift of suitable habitat (Baker et al. 2014).</p> <p>The warming and drying trend is expected to continue, and the average altitude of cloud formation is predicted to rise within the range of the species, reducing the availability and consistency of moisture to montane vegetation communities, particularly notophyll vine forest and microphyll fern forest (ANU 2009). Cold adapted plant species such as Antarctic beech are also predicted to be affected by climate change (Taylor et al. 2005).</p> <p>The black-tailed antechinus is particularly vulnerable to climate change as the synchrony between the breeding season (including female lactation) and peak insect availability may be altered (Hagger et al. 2013; Grey et al. 2016).</p>
Invasive species		
Predation by cats (<i>Felis catus</i>)	suspected current	<p>Cats are known to occur in Springbrook National Park and Lamington National Park (DEHP 2017a, b). Cats have been observed at the Best of all Lookout site (A Baker, pers. comm. 2017) and are likely to prey on black-tailed antechinus (Grey et al. 2016; A Baker, pers. comm. 2017). However, the threat of cat predation on the species has not been demonstrated.</p>

Predation by foxes (<i>Vulpes vulpes</i>)	potential current	Foxes are known to occur in Springbrook National Park and Lamington National Park (DEHP 2017a, b). Foxes may prey on black-tailed antechinus (Grey et al. 2016). However, the threat of fox predation on the species has not been demonstrated.
Habitat loss, disturbance and modifications		
Habitat disturbance from recreational infrastructure upgrades	potential future	As the species occurs in national park, habitat disturbance is currently considered a minor threat. However, potential future upgrades to recreational infrastructure (e.g. walking tracks and lookouts) may threaten the black-tailed antechinus given its proximity to tourist attractions, such as Best of all Lookout (A Baker, pers. comm. 2017).

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) 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><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:

The black-tailed antechinus population is suspected to have declined due to an observed contraction in its distribution (based on comparison between recent and historic trapping data (Baker et al. 2014). The suspected cause of population decline is climate change which has not ceased and is not reversible. Given the species was only described in 2013, there is not enough population data to determine a population size reduction over a period of ten years.

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 (EOO) is estimated at 60 km², and the area of occupancy (AOO) is estimated at 20 km². These figures are based on the mapping of point records from 1997 to 2017, obtained from state and Commonwealth agencies, museums and non-government organisations. The EOO was calculated using a minimum convex hull, and the AOO calculated using a 2x2 km grid cell method, based on the IUCN Red List Guidelines 2014 (DoEE 2017).

The species occurs in two subpopulations, making its geographic distribution restricted. The population appears to be declining due to an observed contraction in its distribution (based on comparison between recent and historic trapping data) (Baker et al. 2014). The species undergoes population fluctuations in the number of mature individuals, with the population effectively halving each year as a result of post-reproductive male die-off (NSW Scientific Committee 2015). However, the species is not considered to undergo extreme fluctuations as the population is unlikely to experience a tenfold increase or decrease in numbers **over ??**.

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:			
(a) (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:

The species is likely to be low in abundance (Baker et al. 2014) with an estimated total population size of less than 500 individuals (A. Baker in litt. May 2014, as cited in NSW Scientific Committee 2015). The number of mature individuals following annual male die off is estimated to be very low (less than 250) based on the low number of recent capture records across the species distribution (A Baker, pers. comm. 2017).

The population appears to be in continual decline based on an observed altitudinal contraction in its distribution (Baker et al. 2014; A Baker, pers. comm. 2017). The species occurs in two subpopulations, with less than 250 mature individuals in each subpopulation.

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

Evidence:

The number of mature individuals following annual male die off is estimated to be very low (less than 250), based on the low number of recent capture records (A Baker, pers. comm. 2017).

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 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 has not been undertaken for the species. 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.

Primary Conservation Actions

- Ensure there is no decrease in population size or area of occupancy for the black-tailed antechinus.

Conservation and Management Priorities

Breeding, propagation and other ex situ recovery action

- Develop a plan for establishing and resourcing a captive breeding program to maintain an insurance population in the event of a decline or extinction in the wild.

Invasive species

- Undertake control programs to eradicate cats and foxes from black-tailed antechinus habitat to reduce the impact of predation on the species. Control programs should be intensified immediately following fire events.

Habitat loss, disturbance and modifications

- Prevent habitat disturbance. Any actions undertaken in black-tailed antechinus habitat, such as recreational infrastructure upgrades, should implement a risk management plan to ensure all risks posed by the action to the species are adequately managed.

Stakeholder Engagement

- Liaise with organisations which are undertaking research for black-tailed antechinus to ensure up-to-date population information informs conservation actions.
- Liaise with applicable Queensland Government agencies to ensure appropriate management activities/programs are undertaken in Springbrook National Park and Lamington National Park to manage threats to black-tailed antechinus.

Survey and Monitoring priorities

- Regularly monitor known subpopulations to more precisely assess population size, distribution and population trends.
- Undertake surveys in suitable habitat to locate any additional occurrences.
- Monitor the progress of conservation actions, including the effectiveness of management actions, and adapt them if necessary.

Information and Research priorities

- Investigate trapping methods and species specific lures to improve capture rates of black-tailed antechinus during surveys and monitoring.
- Continue to investigate the use of specially trained detection dogs to improve species detectability during surveys and monitoring.
- Investigate options for linking and enhancing current black-tailed antechinus subpopulations, and options for establishing additional subpopulations.
- Continue to investigate the ecological requirements of black-tailed antechinus to improve understanding about the species' susceptibility to threatening processes, including climate change.

Collective list of questions – your views

1. Is the information used to assess the nationally threatened status of the species robust? Have all the underlying assumptions been made explicit?
2. Can you provide additional data or information relevant to this assessment?
3. Can you provide any additional or alternative references, information or estimates on longevity, average life span and generation length?
4. Do you have any additional information in the ecology or biology of the species not in the current advice?
5. Has the survey effort for this species been adequate to determine its national adult population size? If not, please provide justification for your response.
6. Do you consider the way the population size has been derived to be appropriate? Are there any assumptions and unquantified biases in the estimates? Did the estimates measure relative or absolute abundance? Do you accept the estimate of the total population size of the species? If not, please provide justification for your response.
7. Are you able to comment on the extent of decline in the species/subspecies' total population size over the last 10 years? Please provide justification for your response.
8. Please provide (if known) any additional evidence which shows the population is stable, increasing or declining.
9. Does the assessment consider the entire geographic extent and national extent of the species? If not, please provide justification for your response.
10. Has the survey effort for this species been adequate to determine its national distribution? If not, please provide justification for your response.
11. Is the distribution described in the assessment accurate? If not, please provide justification for your response and provide alternate information.
12. 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.
13. Can you provide estimates (or if you disagree with the estimates provided, alternative estimates) of the extent of occurrence and/or area of occupancy.
14. Do you consider that the way the historic distribution has been estimated is appropriate? Please provide justification for your response.
15. 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.
16. Do you consider that all major threats have been identified and described adequately?
17. To what degree are the identified threats likely to impact on the species in the future?
18. Are the threats impacting on different populations equally, or do the threats vary across different populations?
19. Can you provide additional or alternative information on past, current or potential threats that may adversely affect the species at any stage of its life cycle?

20. What planning, management and recovery actions are currently in place supporting protection and recovery of the species? To what extent have they been effective?
21. Can you recommend any additional or alternative specific threat abatement or conservation actions that would aid the protection and recovery of the species?
22. Would you recommend translocation (outside of the species' historic range) as a viable option as a conservation actions for this species?
23. What individuals or organisations are currently, or potentially could be, involved in management and recovery of the species?
24. Do you have comments on any other matters relevant to the assessment of this species?

References cited in the advice

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