

THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

The Minister approved this conservation advice and included this species in the Endangered category, effective from 11/05/2018.

Conservation Advice

Antechinus arktos

black-tailed antechinus

Taxonomy

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

The black-tailed antechinus was formally described as a new species in 2014, having previously been misidentified as a northern population of *Antechinus swainsonii mimetes* (dusky antechinus) (Baker et al. 2014).

Summary of assessment

Conservation status

Endangered: Criterion 2 B1ab(ii,iii,v)+2ab(ii,iii,v); 3 C2a(i)

The highest category for which *Antechinus arktos* is eligible to be listed is Endangered.

Antechinus arktos has been found to be eligible for listing under the following categories:

Criterion 2 B1ab(ii,iii,v)+2ab(ii,iii,v): Endangered

Criterion 3 C2a(i): Endangered

Criterion 4 D1 Vulnerable

Species can be listed as threatened under state and territory legislation. For information on the listing status of this species under relevant state or territory legislation, see

<http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

Reason for conservation assessment by the Threatened Species Scientific Committee

This advice follows assessment of information provided to the Threatened Species Scientific Committee (the Committee) to list *Antechinus arktos*.

Public consultation

Notice of the proposed amendment and a consultation document was made available for public comment for 30 business days between 6 June 2017 and 28 July 2017. Any comments received that were relevant to the survival of the species were considered by the Committee as part of the assessment process.

Species information

Description

The black-tailed antechinus is a small carnivorous marsupial (Gray et al. 2016) with a robust body and 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 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, 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 three isolated subpopulations (A Baker pers. comm. 2017d) located at the summit of the Tweed Shield Volcano caldera near the border of south-east Queensland and north-east New South Wales, at altitudes above 950 m asl (Gray et al. 2016). This area is part of the Springbrook National Park and Lamington National Park in Queensland, and the Border Ranges National Park in New South Wales.

At Springbrook National Park, the species has been recorded at two proximate sites, Best of All Lookout and Bilborough Lookout (Baker et al. 2014), at altitudes of approximately 950 m asl (Gray et al. 2016). At Lamington National Park, the species has been recorded at three proximate sites, near Toolona Lookout, near Mt Wanungara and at Mt Bithongabel (A Baker pers. comm. 2017a), at altitudes of approximately 1165-1200 m asl (Gray et al. 2016; Gray 2017). At Border Ranges National Park, the species has been recorded at one site on Bar Mountain, at an altitude of approximately 1250 m asl (A Baker pers. comm. 2017d).

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, using traditional trapping methods, white flash camera traps and dog detection, have been undertaken at historical sites in the Border Ranges National Park (A Baker pers. comm. 2017d). During these surveys, there was positive dog detection for black-tailed antechinus at one site, at the Helmholtzia Loop – Brindle Creek area (A Baker pers. comm. 2017c). However, the species has not been confirmed to occur at this site as traditional traps and camera traps have failed to capture the species (A Baker pers. comm. 2017d). The black-tailed antechinus was not detected at any other historic sites during targeted surveys in the Border Ranges National Park (A Baker pers. comm. 2017d).

Although the Springbrook National Park and Lamington National Park subpopulations are located less than ten kilometres apart, genetic analysis of mitochondrial DNA (mitochondrial cytochrome b) indicates that these subpopulations have been historically isolated from each other for some time with 0.8 percent divergence (A Baker pers. comm. 2017d, e).

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 species 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 likely to utilise burrows and tree buttresses for denning and refuge habitat (A Baker pers. comm. 2017a).

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

The species is nocturnal (NSW Scientific Committee 2015) and a generalist insectivore (Gray 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 (Gray 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

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

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 extreme events	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; Gray 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 fallen by 76 mm between 1950 and 2003 (Hennessy et al. 2004). Decline in the distribution of the black-tailed antechinus is suspected to be a result of the species withdrawing from lower altitude habitat as it became unsuitable (Baker et al. 2014).</p> <p>It is projected with very high confidence that average temperatures will continue to substantially increase across all seasons in the coastal region of the Queensland – New South Wales border. In addition, the intensity, frequency and duration of extreme weather events are projected to increase with high confidence (CSIRO & BoM 2017).</p> <p>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).</p> <p>The black-tailed antechinus is additionally 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; Gray et al. 2016).</p>
Invasive species		
Predation by cats (<i>Felis catus</i>)	suspected current	<p>Cats occur in Springbrook National Park and Lamington National Park (DEHP 2017a, b) and have been observed during surveys near the Best of all Lookout site (A Baker pers. comm. 2017a), the Toolona Lookout site and in the Border Ranges National Park (A Baker pers. comm. 2017d). Cats are considered likely to prey on black-tailed antechinus (Gray et al. 2016; A Baker pers. comm. 2017a). However, the threat of cat predation on the species has not been demonstrated.</p>

Predation by foxes (<i>Vulpes vulpes</i>)	potential current	Foxes occur in Springbrook National Park and Lamington National Park (DEHP 2017a, b). Foxes may prey on black-tailed antechinus (Gray et al. 2016). However, the threat of fox predation on the species has not been demonstrated. Foxes may not occur at the high altitude sites where black-tailed antechinus occur in Lamington National Park (I Gynther pers. comm. 2017).
Habitat loss, disturbance and modifications		
Habitat disturbance from recreational infrastructure upgrades	potential future	As the species occurs within 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. 2017a).

How judged by the Committee 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%
A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.	<i>based on any of the following:</i>	(a) direct observation [<i>except A3</i>]	
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.		(b) an index of abundance appropriate to the taxon	
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>]		(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat	
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.		(d) actual or potential levels of exploitation	
		(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites	

Evidence:

Insufficient data to determine eligibility

The black-tailed antechinus population is suspected to have declined due to an observed upwards range contraction in its distribution, based on comparison between recent and historic trapping data (Baker et al. 2014). Climate change is suspected to be the driver behind the range contraction. However, due to insufficient survey effort, there is currently no estimate of population size reduction over the last ten years for the species.

The Committee considers that there is insufficient information to determine the eligibility of the species for listing in any category under this criterion. Additional population data over a longer time period are required to assess the population trend of the species.

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

Evidence:

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

The extent of occurrence (EOO) is estimated at 252 km², and the area of occupancy (AOO) is estimated at 24 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 black-tailed antechinus occurs in an ecologically distinct area in which all subpopulations are threatened by climate change. As such, the species is considered to occur in a single location, making its geographic distribution very restricted. The population, area of occupancy and area, extent and quality of habitat for the species all appear to be declining due to an observed altitudinal contraction in its distribution (Baker et al. 2014). The altitudinal contraction is thought to be a result of climate change (A Baker pers. comm. 2017d).

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.

The Committee considers that the species' extent of occurrence and area of occupancy are restricted. The geographic distribution is precarious for the survival of the species because it occurs at a very restricted number of locations, and decline in area of occupancy, extent and quality of habitat and number of mature individuals has been observed and is projected. Therefore, the species has met the relevant elements of Criterion 2 to make it eligible for listing as Endangered.

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:

Eligible under Criterion 3 C2a(i) for listing as Endangered

The black-tailed antechinus is likely to be low in abundance (Baker et al. 2014) with an estimated population size of fewer than 500 mature individuals (A Baker pers. comm. 2017d). It is estimated that there are fewer than 50 mature individuals at the Bar Mountain site and at the Bilborough Lookout site, less than 100 mature individuals at the Best of All Lookout site and fewer than 250 mature individuals at the Lamington National Park sites (A Baker pers. comm. 2017d).

The black-tailed antechinus population appears to be in decline based on an observed altitudinal contraction in its distribution and consistently low trapping records (Baker et al. 2014; A Baker pers. comm. 2017a, d). However, there is currently no estimate of the extent of the population reduction for the species.

The total number of mature individuals in the silver-headed antechinus population is considered to be low (< 2500), the population appears to be declining and there is a low number of mature individuals in each subpopulation (< 250). Therefore, the species has met the relevant elements of Criterion 3 to make it eligible for listing as Endangered.

Criterion 4. Number of mature individuals			
	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low
D Number of mature individuals	< 50	< 250	D1. < 1,000

Evidence:

Eligible under Criterion 4 D1 for listing as Vulnerable

The total number of mature individuals in the black-tailed antechinus population is estimated to be fewer than 500 (A Baker pers. comm. 2017d).

The Committee considers that the total number of mature individuals is less than 1000 which is low. Therefore, the species has met the relevant elements of Criterion 4 to make it eligible for listing as Vulnerable.

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:

Insufficient data to determine eligibility

Population viability analysis has not been undertaken for the species.

Conservation actions

Recovery plan

The Committee recommends that there should not be a recovery plan for the black-tailed antechinus, as an approved Conservation Advice provides sufficient direction to implement priority actions and mitigate against key threats.

Primary conservation actions

The primary conservation action for the black-tailed antechinus is to maintain high value breeding and foraging habitat by undertaking active predator control at all locations.

Conservation and management priorities

Invasive species

- Undertake control programs to reduce the number of cats and foxes within black-tailed antechinus habitat to reduce the impact of predation on the species.

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 further decline in the wild.

Stakeholder Engagement

- Liaise with organisations who are undertaking research on black-tailed antechinus to ensure up-to-date population information informs the implementation of conservation actions.
- Liaise with applicable Queensland Government and New South Wales Government agencies to ensure appropriate management activities/programs are undertaken at all known locations 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 of the species.
- 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 supporting gene flow and enhancing current black-tailed antechinus subpopulations, and options for establishing additional subpopulations.
- Continue to investigate the ecological requirements of black-tailed antechinus, and undertake habitat modelling, to improve understanding about the species' susceptibility to climate change.

Recommendations

- (i) The Committee recommends that the list referred to in section 178 of the EPBC Act be amended by **including** in the list in the Endangered category:

Antechinus arktos

AND

- (ii) The Committee recommends that there not be a recovery plan for this species.

Threatened Species Scientific Committee

21 November 2017

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