

NSW SCIENTIFIC COMMITTEE

Final Determination

The Scientific Committee, established by the *Threatened Species Conservation Act 1995* (the Act), has made a Final Determination to list the Black-tailed Antechinus, *Antechinus arktos* Baker, Mutton, Hines & Van Dyck, 2014, as an ENDANGERED SPECIES under Part 1 of Schedule 1 of the Act. Listing of Endangered species is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. The Black-tailed Antechinus *Antechinus arktos* Baker, Mutton, Hines & Van Dyck, 2014 (family Dasyuridae) is a large (60–120 g) antechinus with a greyish-brown head, orange-brown rump, fuscous black on the upper surface of the hindfoot and dense, short fur on the evenly black tail (Baker *et al.* 2014). Further, the Black-tailed Antechinus has distinctly marked orange-brown fur on the upper and lower eyelid, cheek and in front of the ear and very long guard hairs all over the body; these characters are more subtle in the related Dusky Antechinus, *A. swainsonii mimetes* (Baker *et al.* 2014).
2. The Black-tailed Antechinus was recently described by Baker *et al.* (2014), having previously been considered a northern outlier of the widespread Dusky Antechinus *A. swainsonii*. Baker *et al.* (2014) found clear genetic and morphological differences between the two species. Black-tailed Antechinus skulls are different to all subspecies of the Dusky Antechinus. In addition, Black-tailed Antechinus are markedly larger than *A. s. mimetes* (Dusky Antechinus eastern mainland) and *A. s. swainsonii* (Dusky Antechinus, Tasmania) (Baker *et al.* 2014).
3. The Black-tailed Antechinus is a small, nocturnal, insectivorous marsupial. The reproductive biology of this species is virtually unstudied. Baker *et al.* (2014) predict, based on other antechinus species, that “females give birth around August to early September, with young in the pouch until about October – early November, and a dispersal of fully mobile young in late November – early December.” This species in all likelihood undergoes annual population fluctuations as a result of post-reproductive male die-off, where the population effectively halves briefly each year, a pattern observed in all other antechinus species (Tyndale-Biscoe and Renfree 1987). Seasonal changes in resource availability have been demonstrated to lead to between-year population fluctuations of similar species (e.g. Recher *et al.* 2009) and between-year fluctuations are expected also to occur in this species. Longevity in the wild or captivity is unknown but likely to be around two years for females and one year for males (Maser *et al.* 2008).
4. The Black-tailed Antechinus is known only from far north-eastern New South Wales and adjacent southeastern Queensland, at high elevation (>780 m a.s.l.) on the Tweed Shield Caldera (Baker *et al.* 2014). Most of this landscape type occurs within conservation reserves. Annual rainfall of over 3000 mm has been reported from the highest points of the Tweed Shield Caldera (Springbrook and Lamington Plateaus and the Tweed and Nightcap Ranges) although precipitation decreases with altitude (DECCW 2010). Fog drip at high elevations contributes to the high precipitation (e.g. McJannet *et al.* 2007) and fog drip and high rainfall is likely to be a feature of the habitat for this species (Baker *et al.* 2014). The Tweed Shield Caldera supports the World Heritage listed Gondwanan Rainforests that provide habitat for the Black-tailed Antechinus. Due to the low number of records, little is known about the habitat preferences of

NSW SCIENTIFIC COMMITTEE

the species. At sites where this species is found, vegetation is primarily cool temperate rainforest with lesser tracts of subtropical rainforest extending up escarpment gullies to around 900 m (Keith 2004). Soil derived from basalt or similar mafic rocks are characteristic of most known sites (Baker *et al.* 2014). The Black-tailed Antechinus has also been collected in northern montane heaths on skeletal soil on isolated peaks within the rainforest, cleared areas and rainforest with wet sclerophyll forest elements (Keith 2004; DECCW 2010; Baker *et al.* 2014). Baker *et al.* (2014) gives a more detailed description of vegetation at sites where the species has been found in New South Wales and Queensland.

5. The distribution of the Black-tailed Antechinus within New South Wales is uncertain. Within New South Wales the only confirmed records of the Black-tailed Antechinus are specimens collected in the late 1980s from Brindle Creek in the Border Ranges National Park (Baker *et al.* 2014). Records exist of Dusky Antechinus in Mount Warning National Park (see Baker *et al.* 2014) but these are unvouchered and so it cannot be confirmed if they are Dusky or Black-tailed Antechinus. Records of the Dusky Antechinus are relatively uncommon in northern New South Wales. The restricted distribution of the Black-tailed Antechinus is unlikely to be an artefact of its recent recognition nor a lack of survey effort as suitable habitat for this species is apparently naturally limited. Erosion of the caldera rim over geological timescales has resulted in three disjunct geological remnants (i.e. Border Ranges to the north and west, Nightcap Range to the south and Mt Warning in the centre). Clearing of native vegetation at low elevations has now effectively isolated these remnants. At a landscape scale the habitats in which the Black-tailed Antechinus has been found are rare and occur in distinct patches. The nearest similar habitats within New South Wales are at Ebor, some 250 km south of the Tweed Shield Caldera (Baker *et al.* 2014). Given the large distance between these two sites, it is considered likely that the Black-tailed Antechinus is restricted to the Tweed Shield Caldera.
6. Lack of recent reliable records or systematic survey across the predicted range of the Black-tailed Antechinus in north-eastern New South Wales makes estimation of extent of occurrence (EOO) and area of occupancy (AOO) for the species problematic. However, given the narrow habitat preferences exhibited by this species (see Baker *et al.* 2014), it is possible to estimate EOO based on potentially suitable habitat. Selecting areas in New South Wales which are greater than 750 m a.s.l., mapped as rainforest (DECCW 2010) and contiguous with historic records, the EOO is estimated at 430 km². If the disjunct Nightcap Range and Mt Warning (which contain potential habitat but have no confirmed records) are included, the estimate increases to 848 km². The EOO is based on a minimum convex polygon enclosing all predicted habitat of the species, the method of assessment recommended by IUCN (2014). Recent surveys have not been able to locate this species within New South Wales, or at elevations below 950 m a.s.l. in Queensland (A. Baker *in litt.* June 2014) so these figures are likely to overestimate EOO. The number of sub-populations is unknown, although it is probable that Black-tailed Antechinus occurs in a small number of isolated highpoints within New South Wales. Very few regions in the Border Ranges/Tweed Shield Caldera have a combination of very high elevation rainforest and rainfall conditions, so the distribution of the species is most likely limited to small, potentially isolated pockets within the eroded peaks of the Tweed Central Volcano (A. Baker *in litt.* June 2014). Therefore the distribution of the Black-tailed Antechinus is inferred to be highly restricted.

NSW SCIENTIFIC COMMITTEE

7. The Black-tailed Antechinus appears to be in decline (Baker *et al.* 2014). The evidence of decline is based on an apparent contraction of the range of this species. The contraction is inferred from the location and collection date of museum specimens now identified as *A. arktos* and a review of survey effort in the area (Baker *et al.* 2014). Baker *et al.* (2014) state that “Since 1989, there have been thousands of Elliott trap/nights in the eastern section of the Border Ranges, including in areas where *A. arktos* was previously collected, as well as other parts of the Tweed Caldera”. In Queensland at sites (Binna Burra and O’Reilly’s areas) where this species was trapped historically in non-targeted surveys, no animals have been recorded since 1989 despite ongoing and more recently targeted surveys (Baker *et al.* 2014). In New South Wales, limited (but targeted) surveys of 2,125 trap nights at Brindle Creek (a site with historic records) and in adjacent sites with suitable habitat within Border Ranges National Park in 2013 and 2014 also yielded no animals (A. Baker *in litt.* June 2014). In the same survey three animals (two males and one female) were captured in Queensland, in 3,600 trap nights (A. Baker June *in litt.* 2014). Recent records have all been above 950 m a.s.l. (with historical records as low as 780 m a.s.l.) (A. Baker *in litt.* May 2014). Baker *et al.* (2014) speculated that the lack of recent records, particularly at known sites at lower elevations (780–950 m a.s.l.), may be a result of climate change. Under a changing climate, declines could be caused by upwards altitudinal shifting of suitable climatic conditions for the species. Similar shifts in available suitable habitat have been predicted in other systems for other species with narrow climatic preferences (Williams *et al.* 2003; Auld and Hutton 2004; Raxworthy *et al.* 2008; Laidlaw *et al.* 2011). If this trend continues, suitable habitat may contract further upslope, becoming increasingly isolated and may ultimately disappear altogether. ‘Anthropogenic climate change’ is listed as a Key Threatening Process under the Act.
8. The total population size of the Black-tailed Antechinus in New South Wales is unknown. The total global population size is estimated to be approximately 500 animals, some of which are in Queensland (A. Baker *in litt.* May 2014). The population is expected to halve briefly each year following male die-off.
9. The Black-tailed Antechinus was assessed as Endangered at the national scale by Woinarski *et al.* (2014) and is listed as Endangered in Queensland (*Nature Conservation Act 1992*).
10. The Black-tailed Antechinus *Antechinus arktos* Baker, Mutton, Hines & Van Dyck, 2014, is not eligible to be listed as a Critically Endangered species.
11. The Black-tailed Antechinus *Antechinus arktos* Baker, Mutton, Hines & Van Dyck, 2014 is eligible to be listed as an Endangered species as, in the opinion of the Scientific Committee, it is facing a very high risk of extinction in New South Wales in the near future as determined in accordance with the following criteria as prescribed by the *Threatened Species Conservation Regulation 2010*:

NSW SCIENTIFIC COMMITTEE

Clause 7 Restricted geographic distribution and other conditions

The geographic distribution of the species is estimated or inferred to be:

(b) highly restricted,

and either:

- (d) a projected or continuing decline is observed, estimated or inferred in either of the key indicators:
 - (a) an index of abundance appropriate to the taxon, or
 - (b) the geographic distribution, habitat quality or diversity, or genetic diversity; or
- (e) at least two of the following three conditions apply:
 - (i) the population or habitat is observed or inferred to be severely fragmented;
 - (ii) all or nearly all mature individuals are observed or inferred to occur within a small number of populations or locations,
 - (iii) extreme fluctuations are observed or inferred to occur in either of the key indicators:
 - (a) an index of abundance appropriate to the taxon, or
 - (b) the geographic distribution, habitat quality or diversity, or genetic diversity.

Dr Mark Eldridge
Chairperson
NSW Scientific Committee

Exhibition period: 04/12/15 – 29/01/16

Proposed Gazettal date: 04/12/15

References:

Auld TD, Hutton I (2004) Conservation issues for the vascular flora of Lord Howe Island. *Cunninghamia* **8**, 490–500.

Baker A, Mutton T, Hines H, Van Dyck S (2014) The Black-tailed Antechinus, *Antechinus arktos* sp. nov. a new species of carnivorous marsupial from montane regions of the Tweed Volcano caldera, eastern Australia. *Zootaxa* **3765**, 101–133.

Department of Environment, Climate Change and Water New South Wales (2010) Border Ranges Rainforest Biodiversity Management Plan - New South Wales & Queensland, Department of Environment, Climate Change and Water New South Wales, Sydney.

IUCN Standards and Petitions Subcommittee (2014) Guidelines for Using the IUCN Red List Categories and Criteria. Version 11. Prepared by the Standards and Petitions Subcommittee. <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>.

Keith DA (2004) 'Ocean shores to desert dunes: the native vegetation of New South Wales and the ACT.' (New South Wales Department of Environment and Conservation: Sydney)

NSW SCIENTIFIC COMMITTEE

- Laidlaw MJ, McDonald WJF, Hunter J, Putland DA, Kitching RL (2011) The potential impacts of climate change on Australian subtropical rainforest. *Australian Journal of Botany* **59**, 440–449.
- Maser C, Claridge AW, Trappe JM (2008) ‘Trees, truffles, and beasts: How forests function.’ (Rutgers University Press: New Brunswick)
- McJannet D, Wallace J, Reddell P (2007) Precipitation interception in Australian tropical rainforests: II. Altitudinal gradients of cloud interception, stemflow, throughfall and interception. *Hydrological Processes* **21**, 1703–1718.
- Raxworthy CJ, Pearson RG, Rabibisoa N, Rakotondrazafy A, Ramanamanjato J, Raselimanana A, Wu S, Nussbaum R, Stone D (2008) Extinction vulnerability of tropical montane endemism from warming and upslope displacement: a preliminary appraisal for the highest massif in Madagascar. *Global Change Biology* **14**, 1703–1720.
- Recher HF, Lunney D, Matthews A (2009) Small mammal populations in a eucalypt forest affected by fire and drought. I. Long-term patterns in an era of climate change. *Wildlife Research* **36**, 143–158.
- Tyndale-Biscoe CH, Renfree MB (1987) ‘Reproductive physiology of marsupials.’ (Cambridge University Press: Cambridge, UK)
- Williams SE, Bolitho EE, Fox S (2003) Climate change in Australian tropical rainforests: an impending environmental catastrophe. *Proceedings of the Royal Society. Biological Sciences* **270**, 1887–1892.
- Woinarski JCZ, Burbidge AA, Harrison PL (2014) ‘The Action Plan for Australian mammals 2012.’ (CSIRO Publishing: Melbourne)
[http://members.iinet.net.au/~amburbidge@westnet.com.au/
images/Conservation%20Summaries%20for%20newly-described%20taxa.pdf](http://members.iinet.net.au/~amburbidge@westnet.com.au/images/Conservation%20Summaries%20for%20newly-described%20taxa.pdf)
(accessed September 2015)