



Consultation Document on Listing Eligibility

Conilurus capricornensis (Capricorn Rabbit-rat)

You are invited to provide your views and supporting reasons related to the eligibility of *Conilurus capricornensis* (Capricorn Rabbit-rat) for inclusion on the EPBC Act threatened species list in the **Extinct** category.

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
Biodiversity Conservation Division
Department of Agriculture, Water and the Environment
PO Box 787
Canberra ACT 2601

Responses are required to be submitted by 11 September 2020.

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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/system/files/pages/d72dfd1a-f0d8-4699-8d43-5d95bbb02428/files/tssc-guidelines-assessing-species-2018.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>.

Privacy notice

The Department will collect, use, store and disclose the personal information you provide in a manner consistent with the Department's obligations under the Privacy Act 1988 (Cth) and the Department's Privacy Policy.

Any personal information that you provide within, or in addition to, your comments in the threatened species assessment process may be used by the Department for the purposes of its functions relating to threatened species assessments, including contacting you if we have any questions about your comments in the future.

Further, the Commonwealth, State and Territory governments have agreed to share threatened species assessment documentation (including comments) to ensure that all States and Territories have access to the same documentation when making a decision on the status of a potentially threatened species. This is also known as the '[common assessment method](#)'. As a result, any personal information that you have provided in connection with your comments may be shared between Commonwealth, State or Territory government entities to assist with their assessment processes.

The Department's Privacy Policy contains details about how respondents may access and make corrections to personal information that the Department holds about the respondent, how respondents may make a complaint about a breach of an Australian Privacy Principle, and how

the Department will deal with that complaint. A copy of the Department's Privacy Policy is available at: <http://environment.gov.au/privacy-policy> .

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.

Conilurus capricornensis

Capricorn Rabbit-rat

Taxonomy

Conventionally accepted as *Conilurus capricornensis* Cramb & Hocknull, 2010.

Species/Sub-species Information

Description

Conilurus capricornensis (Capricorn Rabbit-rat) is known only from skull and dental fragments unearthed at four sites in eastern Queensland (Woinarski et al. 2014a). No physical description is available for the Capricorn Rabbit-rat, but by comparing the remains with other species in the genus, it is believed to have been larger but otherwise morphologically similar to the extant *C. penicillatus* (Brush-tailed Rabbit-rat) (Cramb & Hocknull 2010). The Brush-tailed Rabbit-rat is a small-medium sized rodent (100–250 g), with a thickset body and long tail (100–240 mm) and long ears (Woinarski & Hill 2012). The only other species in the genus, *C. albipes* (White-footed Rabbit-rat), is thought to have gone extinct in the 1860s (Woinarski et al. 2014b).

Distribution

No historical distribution has been assigned to the Capricorn Rabbit-rat (Woinarski et al. 2014a). Remains have been recorded at four sites: two inland from Townsville, north-east Queensland, and two close to Rockhampton, mid-east Queensland. The dominant floristic composition around these sites today is dry rainforest patches (deciduous and semi-evergreen vine thicket) within a matrix of savanna sclerophyll woodland and grassland (Hansman 2001; Cramb & Hocknull 2010).

Extinction date

The extinction date of the Capricorn Rabbit-rat is unknown. Dating of some of the remains suggests that extinction occurred post-European settlement in Australia (Woinarski et al. 2014a).

Relevant Biology/Ecology

Little is known about the biology of the Capricorn Rabbit-rat. However, the morphological similarities between the Capricorn Rabbit-rat and the Brush-tailed Rabbit-rat (in particular the noted similarity in dentition between the two species) suggests that they may also have had a similar ecology (Cramb & Hocknull 2010). The Brush-tailed Rabbit-rat is distributed across the tropical woodlands and open forests of northern Australia in a semi-arboreal habitat, feeding on the ground, whilst roosting in tree hollows and hollow logs. The diet consists mostly of seeds and other plant materials collected during night-time forages (Firth et al. 2010).

Likely Causes of Decline and Extinction

Likely causes of decline and extinction are surmised from threats known to have occurred from the 19th century and an assumption that the threats that affect many large rodents (particularly the Brush-tailed Rabbit-rat) would also impact on the Capricorn Rabbit-rat.

Table 1: Probable causes of decline towards extinction for the Capricorn Rabbit-rat in approximate order of impact, based on available evidence.

Threat factor	Threat status and severity*	Evidence base
Introduced predators		
Predation by feral cats (<i>Felis catus</i>)	<ul style="list-style-type: none"> – Status: Historical – Confidence: Suspected – Consequence: Severe – Extent: Across the entire range 	<p>Feral cats are thought to have been present throughout the majority of eastern Queensland by the mid-19th century (Abbott 2008).</p> <p>The presumed extinction date of the Capricorn Rabbit-rat pre-dates the arrival of the feral cat in Queensland. However, if remnant populations were still extant, the presence of the feral cat would have impacted their survival (Woinarski et al. 2014a).</p> <p>Predation by feral cats has been implicated in the extinction and ongoing decline of many terrestrial, non-volant, mammal species (Dickman 1993; Smith & Quin 1996; Woinarski et al. 2014d; Hardman et al. 2016; Davies et al. 2017; Radford et al. 2018; Woolley et al. 2019), with vertebrate prey up to four kg taken (DoE 2015). Woinarski et al. (2014d) considered predation by feral cats to be the most critical factor in the decline and extirpation of Australia's mammal fauna.</p> <p>Fire and stock grazing can amplify the impacts of predation on small mammals by reducing ground cover, particularly following high-intensity burns (Smith & Quinn 1996; Leahy et al. 2015). The number of predators attracted to the burnt area (Hradsky et al. 2017), individual predator activity (Leahy et al. 2015), and hunting success (McGregor et al. 2015) have all been observed to increase where habitat has been modified through frequent burning. Therefore, threats from predation would have increased as European settlement spread throughout the accepted distribution range.</p>
Predation by European red fox (<i>Vulpes vulpes</i>)	<ul style="list-style-type: none"> – Status: Historical – Confidence: Suspected – Consequence: Severe – Extent: Across the entire range 	<p>The European red fox arrived in Queensland around 1907–1910 (Gentle 2006).</p> <p>The presumed extinction date of the Capricorn Rabbit-rat pre-dates the arrival of the red fox in Queensland. However, if remnant populations were still extant, the presence of foxes would have impacted their survival (Woinarski et al. 2014a).</p> <p>Predation by the red fox has been implicated in the extinction and decline of many terrestrial, non-volant mammal species in Australia (Richards 2004; DEWHA 2008; Woinarski et al.</p>

		<p>2014d; Radford et al. 2018) and was identified by Smith & Quin (1996) as having a significant impact on small isolated populations of threatened species, being able to eliminate them even at low densities.</p> <p>As identified above, fire can amplify the impacts of predation on small and medium-sized mammals (Leahy et al. 2015; McGregor et al. 2015; Hradsky et al. 2017).</p>
Fire		
Change in fire regime	<ul style="list-style-type: none"> – Status: Historical – Confidence: Suspected – Consequence: Severe – Extent: Across the entire range 	<p>The presumed extinction date of the Capricorn Rabbit-rat pre-dates extensive change to fire regimes in Queensland. However, if remnant populations were still extant, environmental changes associated with the loss of Indigenous fire management practices would have impacted their survival.</p> <p>After European settlement, fires lit were larger and more intense. These burns homogenised the understorey vegetation, reduced food variety and availability, destroyed log and tree hollow den sites (Firth et al. 2010) and increased predator activity (Smith & Quinn 1996; Johnson 2006; Fitzsimons et al. 2010; Leahy et al. 2015; McGregor et al. 2015; Hradsky et al. 2017).</p> <p>The degree to which a change in fire regime impacted the Capricorn Rabbit-rat is unknown. However, large, high intensity burns are believed to be a prime cause of small mammal decline in northern Australia (Woinarski et al. 2001) and are identified as the major cause of decline of the Brush-tailed Rabbit-rat (Firth et al. (2010).</p>
Habitat loss and fragmentation		
Habitat degradation and resource depletion by livestock	<ul style="list-style-type: none"> – Status: Historical – Confidence: Suspected – Consequence: Severe – Extent: Across the entire range 	<p>By the mid-19th century nearly all of the areas suitable for rangeland pastoralism in eastern Queensland were settled (Fensham 2008), with grazing rising to a peak in 1894 (Irvin 2016).</p> <p>The presumed extinction date of the Capricorn Rabbit-rat pre-dates the arrival of stock. However, if remnant populations were still extant, the presence of stock would have impacted their survival (Woinarski et al. 2014a).</p> <p>Grazing by stock removes shrub cover (Dennis 2001; McDowell et al. 2015) and the green stems, leaves and seeds that likely comprised the bulk of the Capricorn Rabbit-rat's diet and may have degraded or destroyed potential refuges during times of drought (Richards 2004; Tunbridge 1993;</p>

		Morton et al. 1995).
Habitat degradation and resource depletion by introduced European rabbits (<i>Oryctolagus cuniculus</i>)	<ul style="list-style-type: none"> – Status: Historical – Confidence: Suspected – Consequence: Severe – Extent: Across the entire range 	<p>European rabbits had spread throughout much of Queensland by 1920 (Stodart & Parer 1988).</p> <p>The presumed extinction date of the Capricorn Rabbit-rat pre-dates the arrival of the rabbit. However, if remnant populations were still extant, the presence of the rabbit would have impacted their survival (Woinarski et al. 2014a).</p> <p>Rabbits compete with native fauna for food and degrade the habitat by intensively grazing on native vegetation and ringbarking trees (Richards 2004). In large numbers, rabbits turn areas of productive, well-vegetated country into a virtual desert, greatly impacting sympatric mammals (Johnson 2006). Where rabbits are found in abundance, conilurine rodents experience significantly greater reductions in population than in areas which have fewer rabbits (Smith & Quin 1996).</p> <p>Rabbits, with high standing biomass and high rate of increase, provide abundant prey for predators as native species decline. Therefore, rabbit presence supports elevated predator populations and predation pressures on native mammalian species. Native species are also easier to catch, being without the behavioural or morphological defences to avoid detection or capture (Richards 2004; Pedler et al. 2016; Radford et al. 2018).</p>

Status: “historical/ current/ future” – identify the temporal nature of the threat

Confidence: “suspected/ inferred/ known” – identify the extent to which we have confidence about that threat

Consequence: “severe/ moderate/ low/ unknown” – identify the severity of that threat

Trend: “decreasing/ static / increasing / unknown” – identify the extent to which it will continue to operate on the species

Extent: “across the entire range/across part of its range / unknown.” – identify its spatial context

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

The Capricorn Rabbit-rat is known only from skull and dental fragments unearthed at four sites in eastern Queensland. The species was first recognised in 2010 (Cramb & Hocknull 2010) and so little information is available that the decade of extinction cannot be readily estimated. However, dating of some of the remains suggests that extinction occurred post-European settlement (Woinarski et al. 2014a).

The Capricorn Rabbit-rat is listed Extinct under the IUCN Red List (Woinarski & Burbidge 2016) and the Action Plan for Australian Mammals (Woinarski et al. 2014a). The species is not listed under the Queensland *Nature Conservation Act 1992* (DES 2018), the only state in which the species remains have been recorded. Cramb & Hocknull (2010) contend that there is some doubt as to whether the species has gone extinct, noting that some of the unearthed material appeared “fresh” and this may indicate its persistence. However, they acknowledge it is most likely extinct.

No historical distribution has been assigned to the Capricorn Rabbit-rat (Woinarski et al. 2014a). However, biological surveys for rodents conducted in Queensland have not recorded the species. Dickman et al. (2000) reviewed the status on native rodents in Queensland using locality records (including surveys, literature and museum records, and unpublished field reports, theses, and other survey information). Of the original 41 native rodents to Queensland identified (not including the Capricorn Rabbit-rat) eight were found to be extinct and no record of the Capricorn Rabbit-rat was recorded. Since this review, an additional species native to Queensland (*Melomys rubicola* (Bramble Cay Melomys)) has been listed Extinct under the EPBC Act. In addition, out of the three recognised *Conilurus* species, only the Brush-tailed Rabbit-rat is still extant (listed Vulnerable under the EPBC Act).

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

Collective list of questions – your views

Information to aid listing assessment

1. Do you have further information on past or potential searches or research activities for the species?
2. Can you provide information on specimen records, including collection location and date?
3. Can you provide additional information on the range or location of populations, or a historic range (national extent)?
4. Do you have any additional information in regard to the ecology or biology of the species?
5. Do you further information on the historic threats that faced the species?
6. Are you aware of other knowledge (e.g. indigenous ecological knowledge) that may help better understand the species?
7. Are you aware of any cultural importance or use that the species had?

Any other information

8. Do you have comments on any other matters relevant to the assessment of this species?

References cited in the advice

- Abbott I (2008). The spread of the cat, *Felis catus*, in Australia: re-examination of the current conceptual model with additional information. *Conservation Science Western Australia* 7(1), 1–17.
- Coman BJ (1973). The diet of red foxes, *Vulpes vulpes*, in Victoria. *The Australian Journal of Zoology* 21, 391–401.
- Cramb J & Hocknull S (2010). New Quaternary records of *Conilurus* (Rodentia: Muridae) from eastern and northern Australia with the description of a new species. *Zootaxa* 2645, 41–56.

- Davies HF, McCarthy MA, Firth RSC, Woinarski JCZ, Gillespie GR, Andersen AN, Geyle HM, Nicholson E, & Murphy BP (2017). Top-down control of species distributions: feral cats driving the regional extinction of a threatened rodent in northern Australia. *Diversity and Distributions* 23, 272-283.
- Dickman CR (1993). *The biology and management of native rodents of the arid zone in NSW*. Species management report 12. NSW National Parks and Wildlife Service, Hurstville.
- Dickman CR (1996). Overview of the impacts of feral cats on Australian native fauna. Australian Nature Conservation Agency.
- Dickman CR, Leung LKP & Van Dyck SM (2000). Status, ecological attributes and conservation of native rodents in Queensland. *Wildlife Research* 27, 333–346.
- Fensham RJ (1996). Land clearance and conservation of inland dry rainforest in north Queensland, Australia. *Biological Conservation* 75, 289-298.
- Firth RSC, Brook BW, Woinarski JCZ, Fordham DA (2010). Decline and likely extinction of a northern Australian native rodent, the brush-tailed rabbit-rat, *Conilurus penicillatus*. *Biological Conservation* 143(5), 1193–1201.
- Hansman DJ (2001). Floral biology of dry rainforest in north Queensland and a comparison with adjacent savanna woodland. *Australian Journal of Botany* 49, 137-153.
- Hardman B, Moro D, & Calver M (2016). Direct evidence implicates feral cat predation as the primary cause of failure of a mammal reintroduction programme. *Ecological Management & Restoration* 17(2), 152-158.
- Hradsky BA, Mildwaters C, Ritchie EG, Christie F, & Di Stefano J (2017). Responses of invasive predators and native prey to prescribed forest fire. *Journal of Mammalogy* 98(3), 835-847.
- Irvine SA (2016). Mapping historical livestock grazing pressure in Queensland. *Proceedings of the Royal Society of Queensland* 121, 23-37.
- Johnson C (2006). *Australia's Mammal Extinctions: A 50 000 year history*. Cambridge University Press.
- Leahy L, Legge SM, Tuft K, McGregor HW, Barmuta LA, Jones ME, & Johnson CN (2015). Amplified predation after fire suppresses rodent populations in Australia's tropical savannas. *Wildlife Research* 42, 705-716.
- McGregor H, Legge S, Jones ME, & Johnson CN (2015) Feral cats are better killers in open habitats, revealed by animal-borne video. *PLoS ONE* 10, e0133915.
- Morton SR, Stafford Smith DM, Friedel MH, Griffin GF & Pickup G (1995). The Stewardship of arid Australia: ecology and land management. *Journal of Environmental Management* 43, 195–217.

- Pedler RD, Brandle R, Read JL, Southgate R, Bird P, & Moseby KE (2016). Rabbit biocontrol and landscape-scale recovery of threatened desert mammals. *Conservation Biology* 30(4), 774-482.
- Radford JQ, Woinarski JCZ, Legge S, Baseler M, Bentley J, Burbidge AA, Bode M, Copley P, Dexter N, Dickman CR, Gillespie G, Hill B, Johnson CN, Kanowski J, Latch P, Letnic M, Manning A, Menkhorst P, Mitchell N, Morris K, Moseby K, Page M, & Ringma J (2018). Degrees of population-level susceptibility of Australian terrestrial non-volant mammal species to predation by the introduced red fox (*Vulpes vulpes*) and feral cat (*Felis cats*). *Wildlife Research* 45, 645-657.
- Short J (1998). The extinction of rat-kangaroos (Marsupialia: Potoroidae) in New South Wales, Australia. *Biological Conservation* 89, 365-377.
- Short J, Kinnear JE, & Robley A. (2002). Surplus killing by introduced predators in Australia evidence for ineffective anti-predator adaptations in native prey species? *Biological Conservation* 103, 283–301.
- Smith AP & Quin DG (1996). Patterns and causes of extinction and decline in Australian conilurine rodents. *Biological Conservation* 77, 243-267.
- Stodart E & Parer I (1988). Colonisation of Australia by the Rabbit (*Oryctolagus Cuniculus*). CSIRO Australia
- Tunbridge D (1993). *The story of the Flinders Ranges Mammals*. Kangaroo Press Pty Ltd, Kenthurst NSW.
- Woinarski JCZ, Burbidge AA & Harrison PL (2014a). Capricorn Rabbit-rat in *The action plan for Australian Mammals 2012*, CSIRO publishing, Collingwood. pp 568–569.
- Woinarski JCZ, Burbidge AA & Harrison PL (2014b). White-footed Rabbit-rat in *The action plan for Australian Mammals 2012*, CSIRO publishing, Collingwood. pp 567–568.
- Woinarski JCZ, Burbidge AA & Harrison PL (2014c). Brush-tailed Rabbit-rat in *The action plan for Australian Mammals 2012*, CSIRO publishing, Collingwood. pp 569–573.
- Woinarski JCZ, Burbidge AA & Harrison PL (2014d). Threats in *The action plan for Australian Mammals 2012*, CSIRO publishing, Collingwood. pp 867–879.
- Woinarski, J. & Hill, B. (2012). Threatened Species of the Northern Territory Fact Sheet Brush-tailed Rabbit-rat *Conilurus penicillatus* Department of Land Resource Management. Darwin.
- Woinarski JCZ, Milne DJ, Wanganeen G (2001). Changes in mammal populations in relatively intact landscapes of Kakadu National Park, Northern Territory, Australia. *Austral Ecology* 26, 360-370.
- Woolley LA, Geyle HM, Murphy BP, Legge SM, Palmer R, Dickman CR, Augusteyne J, Comer S, Doherty TS, Eager C, Edwards G, Harley D, Leiper I, McDonald PJ, McGregor H,

Moseby K, Myers C, Read J, Stokeld D, & Woinarski JCZ (2019). Introduced cats (*Felis catus*) eating a continental fauna: inventory and traits of Australian mammal species killed. Mammal Review In press.

Other sources cited in the advice

DES (QLD Department of Environment & Science) (2018). Threatened Species. Viewed: 7 August 2019 Available at: https://environment.des.qld.gov.au/wildlife/threatened-species/endangered/#mammals_15_species

DoE (Commonwealth Department of the Environment) (2015). Threat abatement plan for predation by Feral Cats, Commonwealth of Australia, Canberra. Viewed: 31 May 2019 Available at: <http://www.environment.gov.au/biodiversity/threatened/publications/tap/threat-abatement-plan-feral-cats>

Gentle M (2006). Red fox pest status review. Department of Natural Resource and Water 2006. Viewed: 9 August 2019 Available at: https://www.daf.qld.gov.au/_data/assets/pdf_file/0007/71836/IPA-RedFox-PSA-CompleteReview.pdf

Woinarski J & Burbidge AA (2016). *Conilurus capricornensis*. *The IUCN Red List of Threatened Species*. Viewed: 9 August 2019 Available at: <https://www.iucnredlist.org/species/75927841/75927844> Accessed 9 August 2019