



Consultation Document on Listing Eligibility

Bettongia pusilla (Nullarbor Dwarf Bettong)

You are invited to provide your views and supporting reasons related to the eligibility of *Bettongia pusilla* (Nullarbor Dwarf Bettong) 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 advice and where required, recovery plans are made or adopted in accordance with Part 13 of the EPBC Act. Conservation advice provides 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.

Bettongia pusilla

Nullarbor Dwarf Bettong

Taxonomy

Conventionally accepted as *Bettongia pusilla* McNamara, 1997.

Species/Sub-species Information

Description

Bettongia pusilla (Nullarbor Dwarf Bettong) has never been recorded alive and is known only from subfossil jaw material (Burbidge et al. 2008). From the jaw material, McNamara (1997) describes the species as having been a small bettong with a jaw and tooth size similar to *Potorous platyops* (Broad-faced Potoroo). The size of the smallest extant bettong, *B. tropica* (Northern Bettong), is around 1.2 kg (Dennis 2001) and the extinct Broad-faced Potoroo is estimated to have weighed 800 g.

Distribution

The Nullarbor Dwarf Bettong is believed to have been historically distributed throughout the Nullarbor region, with subfossil material found predominantly in the Western Australia (WA) portion (Woinarski et al. 2014a). The name Nullarbor means 'treeless' and the area is one of the largest desert karsts in the world (McKenzie et al. 1989; Gillieson et al. 1996). The soils on the Nullarbor are shallow with an average depth of less than one metre (Gillieson et al. 1996). The coastal belt is semi-arid whilst the remainder of the inland region is arid, with seasonally uniform but spatially unreliable rainfall. The plain is surrounded by low open woodlands except in the south where areas of woodland and eucalyptus shrubs occur (McKenzie et al. 1989).

Extinction date

The extinction date of the Nullarbor Dwarf Bettong is unknown. However, Burbidge et al. (2008) put the likely date at the start of European settlement.

Relevant Biology/Ecology

Almost nothing is known about the biology of the Nullarbor Dwarf Bettong (Burbidge et al. 2009). Like other bettongs, it may have sheltered in underground warrens or in nests under shrubs, before emerging at night to excavate much of its food, consisting of underground fungi, tubers, roots, bulbs, fruit, seeds and arthropods (Dennis 2001; McDowell et al. 2015).

Likely Causes of Decline and Extinction

Likely causes of decline and extinction are surmised from threats known to have occurred shortly after European settlement in Australia and an assumption that the threats that affect many bettong species would also have impacted on the Nullarbor Dwarf Bettong.

Table 1: Probable causes of decline towards extinction for the Nullarbor Dwarf Bettong 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	Feral cats are thought to have been present throughout the Nullarbor region by 1890–1900 (Tunbridge 1993; Abbott 2008), with cats found to be widespread and common in later surveys (McKenzie & Robinson 1987).

		<p>The presumed extinction date of the Nullarbor Dwarf Bettong pre-dates the arrival of the feral cat in the Nullarbor. 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. 2014b; Hardman et al. 2016; Davies et al. 2017; Radford et al. 2018; Woolley et al. 2019), particularly in arid and semi-arid habitats (Christensen & Burrows 1994; Moseby et al. 2011; Davies et al. 2018; Woolley et al. 2019), with vertebrate prey up to four kg taken (DoE 2015). Woinarski et al. (2014b) 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>
<p>Predation by European red fox (<i>Vulpes vulpes</i>)</p>	<ul style="list-style-type: none"> – Status: Historical – Confidence: Suspected – Consequence: Severe – Extent: Across the entire range 	<p>The European red fox first arrived in the Nullarbor around 1915, with early settlers observing it 'killing most of the marsupials' (Richards & Short 1996). Red foxes were found to be widespread and common in later surveys (McKenzie & Robinson 1987).</p> <p>The presumed extinction date of the Nullarbor Dwarf Bettong pre-dates the arrival of the red fox in the Nullarbor. However, if remnant populations were still extant, the presence of foxes would have impacted their survival (Woinarski et al. 2014a).</p> <p>Predation by foxes has been implicated in the extinction and decline of many terrestrial, non-volant, mammal species in Australia (Woinarski et al. 2014b; Radford et al. 2018) and its spread across Australia is identified as the primary reason for the demise of bettongs across much of the mainland in the early to mid-20th century (Short 1998). The impact from foxes has</p>

		<p>been most severe on species in open habitats, such as much of arid and semi-arid Australia, and the red fox has been observed to preferentially target bettongs (<i>B. lesueur</i> (Boodie)) despite the presence of European rabbits (<i>Oryctolagus cuniculus</i>) (Short et al. 2002).</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>
Habitat loss and fragmentation		
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 were first release in 1859, and by 1900 they were recorded throughout the Nullarbor region (Gillieson et al. 1996; Richards & Short 1996; Fenner 2010).</p> <p>The presumed extinction date of the Nullarbor Dwarf Bettong pre-dates the arrival of the rabbit in the Nullarbor. However, if remnant populations were still extant, the presence of the rabbit would have impacted their survival (Woinarski et al. 2014a).</p> <p>Gillieson et al. (1996) observed that the major land degradation of the Nullarbor had occurred by the beginning of the 20th century, with rabbits held to be the principal cause of accelerated soil loss on pastoral lands. Richards & Short (1996) recorded early settler observations of the impact of rabbits to the habitat, including intensive grazing on native vegetation and ring-barking trees. In large numbers, rabbits turn areas of productive, well vegetated country into a virtual desert, greatly impacting sympatric mammals (Johnson 2006).</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> <p>Despite these suspected impacts, Robley et al. (2002) suggest rabbit abundance may not have been an important factor in the decline of bettongs. They observed a reintroduced population of Boodies co-existing with rabbits and able to maintain their population numbers despite variation in rabbit abundance.</p>

<p>Habitat degradation and resource depletion by livestock</p>	<ul style="list-style-type: none"> – Status: Historical – Confidence: Suspected – Consequence: Severe – Extent: Across the entire range 	<p>Only a small area of the Nullarbor has historically been occupied by pastoral leases, with the first stations established in the South Australia portion by the 1850s, whilst the WA portion was largely untouched before 1955. However, where pastoral leases ran stock, mismanagement led to over-grazing in many parts (McKenzie & Robinson 1987).</p> <p>The presumed extinction date of the Nullarbor Dwarf Bettong pre-dates the arrival of stock in the Nullarbor. However, if remnant populations were still extant, the presence of stock would have impacted their survival.</p> <p>Grazing by stock removes both shelter and the flora that likely comprised part of the Nullarbor Dwarf Bettong's diet (Dennis 2001; McDowell et al. 2015) and degrades or destroys potential refuges for native species during times of drought in arid and semi-arid habitats (Tunbridge 1993; Morton et al. 1995).</p> <p>Trampling by stock both compacts and powders topsoil, destroying burrows and surface runways, and renders soil too loose for digging (Dickman 1993). It is unknown whether the Nullarbor Dwarf Bettong was a sub-surface burrower, but it likely excavated much of its food, which would have been more difficult following the arrival of stock.</p>
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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 Nullarbor Dwarf Bettong has never been recorded alive and is known only from subfossil jaw material collected in the Nullarbor, predominantly in the WA portion (Woinarski et al. 2014). So little information is available that the decade of extinction cannot be readily estimated (Woinarski et al. 2014, 2018). However, Burbidge et al. (2008) put the likely date as the onset of European settlement.

The Nullarbor Dwarf Bettong is listed Extinct under the *WA Biodiversity Conservation Act 2016* and Not Listed under the *South Australia National Parks and Wildlife Act 1972*. The Nullarbor Dwarf Bettong is listed Extinct under the IUCN Red List (Burbidge & Woinarski 2016) and in the Action Plan for Australian Mammals (Woinarski et al. 2014).

Most of the biological knowledge of the Nullarbor has been obtained from collections or observations taken at particular localities, with biological surveys only conducted towards the end of the 20th century (McKenzie & Robinson 1987). However, the Nullarbor Dwarf Bettong has not been recorded through any of these means.

Bettongs were once broadly distributed across Australia but since European settlement all of the known species have been extirpated from much of their former range or gone extinct (McDowell

et al. 2015). In particular, the arid zone of WA has suffered a severe decline in native fauna. Burbidge & McKenzie (1989) reported that since the mid-20th century almost 90 percent of medium sized arid zone mammals in the critical weight range (35–5500 g) have declined or gone extinct from this region.

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?

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