



Consultation Document on Listing Eligibility and Conservation Actions

Dasycercus cristicauda (crest-tailed mulgara)

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

- 1) the eligibility of *Dasycercus cristicauda* (crest-tailed mulgara) for inclusion on the EPBC Act threatened species list; and
- 2) the necessary conservation actions for the above species.

Evidence provided by experts, stakeholders and the general public is 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
Wildlife, Heritage and Marine Division
Department of the Environment
PO Box 787
Canberra ACT 2601

Responses are required to be submitted by Friday 1 June 2018

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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/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.

Dasyercus cristicauda

crest-tailed mulgara

Note: The information contained in this Conservation Advice was primarily sourced from 'The Action Plan for Australian Mammals 2012' (Woinarski et al., 2014). Any substantive additions obtained during the consultation on the draft will be cited within the advice. Readers may note that Conservation Advices resulting from the Action Plan for Australian Mammals show minor differences in formatting relative to other Conservation Advices. These reflect the desire to efficiently prepare a large number of advices by adopting the presentation approach of the Action Plan for Australian Mammals, and do not reflect any difference in the evidence used to develop the recommendation.

Taxonomy

Conventionally accepted as *Dasyercus cristicauda* (Krefft, 1867). There are no known subspecies.

The taxonomy of *Dasyercus* has been confusing, but was considered resolved by Woolley (2005). Historically, three species, *D. cristicauda*, *D. hillieri* and *D. blythi*, have been described; were then synonymised (under *D. cristicauda*); and re-split (to mulgara *D. cristicauda* and ampurta *D. hillieri*). However, Woolley (2005) demonstrated that the correct names for the two species were crest-tailed mulgara *D. cristicauda* and brush-tailed mulgara *D. blythi*, and that there was no straightforward linkage between the previously applied ascription of names and the current classification (in many to most cases, what was referred to previously as *D. cristicauda* is now considered to be *D. blythi*, and what was previously referred to as *D. hillieri* is now *D. cristicauda*); with the issue further clouded by co-occurrence across some regions. Many observations or studies in which voucher specimens were not collected are now ambiguous; however Woolley (2006) provided interpretation of the currently-accepted nomenclature to names used in a series of previous studies.

This assessment uses the taxonomy presented by Woolley (2005). However, it is worth noting that this taxonomy is not universally accepted across the species range. In particular, the taxonomy of the species along the Canning Stock Route in Western Australia is considered controversial by some experts (DEWNR, pers. comm., 2018).

Species Information

Description

The crest-tailed mulgara, family Dasyuridae, is a carnivorous marsupial with a distinctive fin-like crest of black hairs on the tail. The coat is tan to ginger above and creamy white on the belly. Females have eight nipples in the pouch. The hind foot has long hair that folds over a third of the sole from the lateral side. Males are up to 230 mm long with a 125 mm long tail and weigh up to 185 g. Females are up to 170 mm long with a 110 mm long tail and weigh up to 120 g (Masters, 2008).

It can be distinguished from the brush-tailed mulgara by generally being more brightly coloured (fur tan to ginger above as opposed to light sandy brown in the brush-tailed mulgara) and larger, and by the form of its tail (Masters 2008). The brush-tailed mulgara's tail is short, generally fattened at the base and covered in black hairs for much of its length (Woolley 2008).

Distribution

Records since 1990 indicate that the crest-tailed mulgara has a more restricted contemporary range than previously thought, although a lack of survey effort in suitable habitat may be a factor (Woolley et al., 2013). The current range may be restricted to the southern parts of the Simpson

Desert where the borders of the Northern Territory (NT), Queensland (Qld) and South Australia (SA) converge, the Tirari and Strzelecki Deserts to the east of Lake Eyre, and the western Lake Eyre region (Masters 2008; Woolley et al., 2013; Woinarski et al., 2014); in addition to recent potential range expansions in the Strzelecki region of SA (Southgate 2015) and Sturt National Park in NSW (UNSW Sydney, 2017).

Systematic surveys have found evidence of the crest-tailed mulgara at 137 of 289 sites in the central portion of the Simpson Desert in south-west Qld and north-east SA (Foulkes & Canty 2000). The "mulgara" population studied at Ethabuka Station (Qld) may possibly be this species (Chen et al., 1998). Tracks of *Dasyercus*, most probably attributable to the crest-tailed mulgara, have been recorded near the western and eastern side of Lake Eyre (Southgate 2006) extending to the southern edge of Anna Creek and Etadunna Stations, or around 29° S; trapping in this region has confirmed the presence of the crest-tailed mulgara (Woinarski et al., 2014). Surveys conducted in 2015 also detected signs of the species at 23 of 77 sample plots in the Strzelecki region of South Australia (Southgate 2015). Conversely, Letnic et al. (2016) state that it is unclear whether their 2015 observations of the species in the Strzelecki region constitute an irruption of unknown refugial populations or a range expansion. Further signs of the species have also been recorded near Goyder Channel, SA, between Lake Eyre North and Lake Eyre South (Southgate & Moseby 2011). However, no signs of *Dasyercus* were recorded at over 100 plots sampled further south (Southgate pers. comm., cited in Woinarski et al., 2014).

Historically, the species was known from the Canning Stock Route and near Rawlinna on the Nullarbor Plain in WA, Ooldea on the eastern edge of the Nullarbor Plain and the Musgrave Ranges in SA, and Sandringham Station in Qld (Woolley et al., 2013). The species was last recorded in Sandringham Station (Qld) in 1968, and subsequent surveys in 1971 and the 1990s were unsuccessful in finding any individuals (Woolley 1990; Masters 2012). Confusion over the full distribution of the brush-tailed mulgara has also occurred as it has been misidentified as the crest-tailed mulgara in the Little Sandy Desert (Start et al., 2013, cited in Woolley et al., 2013) and the Pilbara (Thompson & Thompson, 2008, cited in Woolley et al., 2013). The crest-tailed mulgara has been presumed extinct in NSW for more than a century, however recent scientific monitoring discovered the species in the deserts of Sturt National Park (UNSW Sydney, 2017).

The crest-tailed mulgara occurs within the Simpson Strzelecki Dunefields and Channel Country IBRA Bioregions, and within the South Australian Arid Lands, Desert Channels Queensland and Northern Territory Natural Resource Management (NRM) Regions. The distribution of this species is not known to overlap with any EPBC Act-listed threatened ecological community.

The Department of the Environment has prepared survey guidelines for *Dasyercus cristicauda*. At the time of preparation of the guidelines, the species was known as *Dasyercus hillieri* and relevant information for *D. cristicauda* is under that section of the guidelines. The survey guidelines are intended to provide guidance for stakeholders on the effort and methods considered appropriate when conducting a presence/absence survey for species listed as threatened under the EPBC Act. <http://www.environment.gov.au/epbc/publications/threatened-mammals.html>.

Cultural Significance

The brush-tailed mulgara and the crest-tailed mulgara are an Indigenous food resource (Burbidge et al., 1988; Woolley et al., 2013). There are more than 50 recorded Indigenous names for the crest-tailed mulgara, distributed across 15 Indigenous languages in the Northern Territory, Western Australia and South Australia (Burbidge et al., 1988). Indigenous people from these areas also acquired ecological knowledge of the species, such as preferred habitat, shelter and diet (Burbidge et al., 1988).

Relevant Biology/Ecology

The crest-tailed mulgara is a mostly nocturnal marsupial, with a diet comprising a broad range of invertebrates and small vertebrates (Masters 2008). During the day it shelters in complicated, extensive burrow systems with multiple entrances (Woolley 1990). The burrows are typically located at the base of grass clumps or bushes (Woolley 1990), predominantly on the eastern side of dunes (Foulkes & Canty 2000). Latrines are commonly located near the burrow entrance, with scats being up to 90 mm long and 6 mm wide (Masters 2012).

The species is mostly found on sand dunes with a sparse cover of vegetation (such as cane grass *Zygochloa paradoxa*), or in herblands and sparse grasslands bordering salt lakes with nitre bush *Nitraria billardieri* (Masters 2008; Pavey et al., 2011). This contrasts with the habitat of the brush-tailed mulgara, which is generally *Triodia* spp. (spinifex) grasslands with medium to dense cover (Masters 2008). The two mulgara species generally occupy distinct habitats; in an area of sympatry the brush-tailed mulgara was recorded to occupy sand plains and gibber plains, while the crest-tailed mulgara occupied sand ridges with tussock grasses (Woolley 2005; Pavey et al. 2011).

The crest-tailed mulgara occurs sparsely but is widespread within its distribution. It occurs in higher densities in the central part of the Simpson Desert, where vegetation cover is low and surface water is scarce, compared with surrounding pastoral properties on the fringes of the Simpson Desert (Masters 2012). Population densities fluctuate seasonally and populations may persist at locations at very low densities during periods of depressed resource availability. Movement patterns are poorly known but it is probably sedentary (Masters 1998).

The crest-tailed mulgara has a lifespan in captivity of five years, but under natural conditions it is likely to live for only 2-3 years. Based on knowledge of the brush-tailed mulgara, females probably mature in their first year but produce litters of up to eight, rather than the maximum of six recorded for the brush-tailed mulgara (Masters 2012). It is a seasonal annual breeder, producing one litter of two to eight in early winter to early spring (Woolley 1990; Masters 2008). At Uluru, brush-tailed mulgara pouch young (mean litter size 5.1, mode = 6, n = 9) were recorded in August and September and juveniles were captured from August to December (Masters 1998). Generation length is taken here to be 2 years.

Threats

The main identified threats to the crest-tailed mulgara are predation by feral cats (*Felis catus*) and foxes (*Vulpes vulpes*) (Masters 2012); grazing and habitat degradation by livestock, rabbits (*Oryctolagus cuniculus*) and camels (*Camelus dromedarius*) (Masters 2012); and changed fire regimes (Woolley et al., 2013). Predation pressure is probably greatest a few years after heavy summer rainfall when predators have increased in numbers and rodent populations begin to crash (Masters 2012). The species' strict annual breeding cycle and sedentary habit make it sensitive to the impacts of annual climate variance, fire and disturbance on habitat quality and food availability (Masters 1998).

Threats to the crest-tailed mulgara, and their impact on the species, are outlined in the table below (Woinarski et al., 2014).

Threat factor	Consequence rating	Extent over which threat may operate	Evidence base
Predation by feral cats and foxes	Moderate	Entire	<p>Predation by feral cats and foxes has been implicated in the extinction of several mammal species in arid regions of Australia (Johnson 2006). Pavey et al. (2011) suggest that both the brush-tailed mulgara and the crest-tailed mulgara may be at risk from cat and fox predation due to their low overall abundance. Furthermore, analysis of predator scats has indicated that the brush-tailed mulgara is a known prey item for feral cats (Paltridge, 2002).</p>
Habitat change due to livestock and introduced herbivores	Severe	Large	<p>There is some direct and correlative evidence of habitat change caused by introduced herbivores negatively impacting small desert mammals, including correlative responses between increases in crest-tailed mulgara numbers and reductions in rabbit abundance (Pedler et al., 2016). Abundance of the crest-tailed mulgara has also been recorded to decline as that of the camel increases (Reid et al., 1993), however there is insufficient evidence to determine a direct causal relationship.</p> <p>Cattle damage dunes and vegetation, which may cause detrimental habitat change (Masters 2012). A site's cumulative grazing history has been observed to alter flora composition within arid dune systems (Frank et al., 2013).</p>

Threat factor	Consequence rating	Extent over which threat may operate	Evidence base
Changed fire regimes	Moderate	Large	<p>Responses to fire are not well defined. Wildfire is rare to infrequent throughout most of crest-tailed mulgara distribution, however, when fires happen they can operate over a large extent. For example, much of the Simpson Desert burnt in 2011. Areas of the species former range in the Great Sandy Desert/Canning Stock Route are also subject to large scale wildfire on a more frequent basis. While fire may not pose a significant threat across a lot of the species range, in less arid areas (such as the Great Sandy Desert) it may be an issue when rapid plant growth follows monsoonal rains, and where local Indigenous communities maintain burning practices (DEWNR, pers comm. 2018).</p> <p>Furthermore, there is a growing evidence base for interaction between predation and reduced ground cover caused by fire and grazing.</p>
Climate change	Catastrophic	Entire (potential)	Climate change is projected to cause higher mean temperatures, a decrease in overall rainfall and increase in occurrence of extreme weather (e.g. severe storms and potential flood and/or drought events), which may affect breeding success due to a decline in habitat and lack of prey (Masters 2012).
Poisoning by baits used for feral predators	Minor	Minor	Incidence unknown

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%
A1	Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.		(a) direct observation [except A3]
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) cannot be used for A3]		(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

based on any of the following

Evidence:

There are no reliable estimates of population trends for the crest-tailed mulgara, however population densities may fluctuate seasonally and populations may persist at locations at very low densities during periods of depressed resource availability (DotE 2015). Some decline in population size may have occurred as a result of predation by foxes and feral cats, however there is no direct evidence to support this for the crest-tailed mulgara. Woinarski et al. (2014) also suggest that the population size fluctuates with rainfall conditions, however they inferred (at the time) that the species was likely to be undergoing continuing decline at a rate that was less than 10 percent in 10 years. Thus, based on the assessment conducted by Woinarski et al (2014), the species is not likely to experience/have experienced any substantial reductions (i.e. ≥30 %) in population size in any ten year period (past, current or future).

Both historic and recent information about crest-tailed mulgara populations are largely anecdotal and inferred population trends vary significantly. Finlayson (1961) noted that between the 1930s and 1960s mulgaras (including this species, in part) were ‘everywhere much reduced’ across large segments of central Australia. Similarly, on the basis of documentation of Aboriginal knowledge across central Australia in the decades leading to the 1980s, Burbidge et al. (1988) noted that ‘most people said it had disappeared, while some said it was still around and relatively common in certain areas’. Masters (2008) considered it to be ‘sparse’. Conversely, in at least the north of South Australia, Pedler et al (2016) state that the distribution of the species has increased substantially in association with a decline in European rabbit (*Oryctolagus cuniculus*) numbers due to the spread of rabbit calicivirus, which has in turn reduced the abundance of foxes and feral cats.

The data presented above appear to demonstrate the species is not 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 is estimated at 249 908 km², and the area of occupancy estimated at 988 km². These figures are based on the mapping of point records from 1997 to 2017, obtained from state governments, museums and CSIRO. 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 (DotEE 2017). This calculation differs from Woinarski et al. (2014) who estimated the EOO at 156 717 km² and the AOO at 840 km², however they considered this a significant underestimate due to limited sampling across the occupied range and proposed AOO was likely to be 'substantially >2000 km²'. Furthermore, recent surveys in South Australia suggest the species increased significantly following releases of the Rabbit Haemorrhagic Disease Virus, with EOO in that state increasing from 1 442 km² to 133 312 km² between 1995 and 2014 (Pedler et al., 2016). This assessment uses the first figures presented, calculated by the Department of the Environment and Energy based on the most recent dataset.

The *Action Plan for Australian Mammals 2012* estimated that the crest-tailed mulgara is present at ten locations (Woinarski et al., 2014). However, this estimate does not account for the potential additional location represented by the rediscovery of the species in Sturt National Park in New South Wales. Furthermore, the Woinarski estimate was also derived prior to a 2015 survey for the crest-tailed mulgara in the Strzelecki region of SA, which extended the distribution of the species by approximately 180km and may constitute an additional location (Pedler et al., 2016). According to IUCN guidelines "The term 'location' defines a geographically or ecological distinct area in which a single threatening event can rapidly affect all individuals of the taxon present" (IUCN 2012). Woinarski et al. (2014) state in the *Action Plan for Australian Mammals 2012* that their assessments adhere to the IUCN definition of a 'location'. In the case of the crest-tailed mulgara, the two threats that are likely to effect the species across its entire range are predation by feral cats and foxes, and climate change, and neither of these threats are likely to occur as a single threatening process which could rapidly affect all individuals.

Woinarski et al. (2014) inferred that the crest-tailed mulgara was undergoing continuing population decline at a rate that was less than 10 percent in 10 years, however this inference was derived prior to documented range expansions in SA and rediscovery of the species in NSW. Furthermore, while the species AOO is estimated to be <2,000 km² and there has been an inferred continuing decline in mature individuals, new distribution records suggest the species may occur at >10 locations.

The data presented above appear to demonstrate the species is not 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 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:			
(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:

There is no reliable estimate of population size. The only recent published estimate of population size available is from Woinarski et al. (2014), who provide a low reliability estimate of 20 000 mature individuals.

Dedicated monitoring for this species has been largely limited to: a 39 month study in the Simpson Desert, which resulted in the capture of only 23 individuals (on 20 monitoring plots and 49 survey sites) across five habitat types in a 700 000 ha area (Pavey et al., 2011); a monitoring survey on the western and eastern side of Lake Eyre which found *Dasyercus* signs on 36 (29%) of 126 track-based 2 ha monitoring plots sampled (such track-based monitoring cannot distinguish between the mulgara species but trapping in this region has confirmed the presence of the crest-tailed mulgara) (Woinarski et al., 2014); small mammal and reptile monitoring undertaken since 2009 at Kalamurina Wildlife Sanctuary, a 667 000 ha area in north-eastern South Australia, which has resulted in low annual trapping rates (0.03–0.14 per 100 trap nights) but track, scat and burrow evidence (recorded on 11–44% of monitoring sites annually) that suggests the species is more widely distributed than trapping results indicate (AWC, pers. comm., 2016); and recent sampling in the Montara sand dune system at Sandringham Station in Queensland, where the species was recorded in the 1970s, which failed to record any animals (C. Dickman pers. comm., cited in Woinarski et al., 2014).

Woinarski et al. (2014) suspected that there were ‘probably not substantially >10 000 individuals during low rainfall years’ and that the largest subpopulation ‘may have <1000 individuals’, however no direct evidence was provided to support these estimates. Conversely, estimates provided by the Northern Territory Department of Environment and Natural Resources indicate that the Simpson Desert subpopulation alone may support between 12 670 and 63 351 mature individuals: providing a best estimate of 25 340 individuals, based on 1 mulgara per 5km² across a 126 702 km² area, with an estimated level of confidence of 50% (Ward, pers comm., 2018). Woinarski et al. (2014) surmised that the population size fluctuated with rainfall conditions but did not consider fluctuations to be ‘extreme’. They did however infer that the species was undergoing continuing decline at a rate that was less than 10 percent in 10 years (Woinarski et al., 2014).

The data presented above appear to demonstrate the species is not 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 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 (Medium-term future)¹
Number of mature individuals	< 50	< 250	< 1,000
D2 ¹ Only applies to the Vulnerable category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time	-	-	D2. Typically: area of occupancy < 20 km ² or number of locations ≤ 5

¹ The IUCN Red List Criterion D allows for species to be listed as Vulnerable under Criterion D2. The corresponding Criterion 4 in the EPBC Regulations does not currently include the provision for listing a species under D2. As such, a species cannot currently be listed under the EPBC Act under Criterion D2 only. However, assessments that demonstrate eligibility for listing under other criteria may include information relevant to D2. This information will not be considered by the Committee in making its assessment of the species' eligibility for listing under the EPBC Act, but may assist other jurisdictions to adopt the assessment outcome under the [common assessment method](#).

Evidence:

There is no reliable estimate of population size, however it is considered that there are significantly greater than 1000 mature individuals (Woinarski et al., 2014).

The crest-tailed mulgara exceeds the thresholds for listing under IUCN Criterion D2 as its AOO is >20km² and the number of locations is >5.

The data presented above appear to demonstrate the species is not 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 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 appears not to have been undertaken, and 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.

Consideration for delisting

Under s186 of the EPBC Act (Amending list of threatened native species), the Commonwealth Minister for the Environment must take certain matters into consideration before deleting native species from a category, as follows:

- (2A) The Minister must not delete (whether as a result of a transfer or otherwise) a native species from a particular category unless satisfied that:
 - (a) the native species is no longer eligible to be included in that category; or
 - (b) the inclusion of the native species in that category is not contributing, or will not contribute, to the survival of the native species.
- (2B) In deciding whether to delete a native species from a particular category (whether as a result of a transfer or otherwise), the only matters the Minister may consider are matters relating to:
 - (a) whether the native species is eligible to be included in that category; or
 - (b) the effect that the inclusion of the native species in that category is having, or could have, on the survival of the native species.

The crest-tailed mulgara is currently listed as Vulnerable under the EPBC Act. The assessment presented in this Consultation Document suggests the species may not meet any of the current EPBC Act listing criteria. However, there is uncertainty around several aspects of several criteria, with a lack of data available to determine the species population size, a reliable estimate of population trends, area of occupancy and the number of locations at which the species occurs. Assessing the species against the listing criteria is further complicated as it is unknown whether the species is rare or whether it may be more common but difficult to detect. Woinarski et al. (2014) inferred that the population may be declining due to current and ongoing threats from feral cats, foxes and habitat degradation, however they were unable to provide any direct evidence. Conversely, Pedler et al. (2016) demonstrate that the distribution of the species has increased in South Australia. Given the uncertainty in the assessment, and the suspected population trajectory, there appears to be insufficient evidence to demonstrate that the crest-tailed mulgara is ineligible for listing as Vulnerable under the EPBC Act.

Furthermore, it is not clear whether or not inclusion of the crest-tailed mulgara in the Vulnerable category is contributing to the survival of the species. The EPBC Act requires project proponents to refer a proposal for assessment if it may have a significant impact on a threatened species. Thus any proposals within the distribution of crest-tailed mulgara currently need to consider, and if necessary mitigate, any potentially significant impacts to the species. Where necessary, the Department can issue conditions requiring proponents to avoid, minimise or mitigate impacts on listed species. Therefore, inclusion of the crest-tailed mulgara on the list of threatened species, could potentially have an impact on the survival of the species.

Conservation Actions

Recovery Plan

There is currently no recovery plan in place for the crest-tailed mulgara. The purpose of this consultation document is to elicit additional information to help inform the decision of whether there should be a recovery plan for this species.

Primary Conservation Actions

1. Control the numbers of foxes and feral cats within the species' distribution.
2. Undertake targeted surveys to assess population size and trends, including resurveying of former locations in Western Australia (Canning Stock Route dune crests) with current knowledge of morphological and genetic identification features, and assess the effectiveness of management actions.

Conservation and Management Priorities

The crest-tailed mulgara is present in some conservation reserves, where it is protected from some threats. Existing plans and management prescriptions that are relevant to this species include:

- National feral camel action plan (NRMCC, 2010)
- Threat abatement plans for predation by foxes and feral cats (DEWHA, 2008a; 2008b)
- Threat abatement plan for competition and land degradation by rabbits (DEWHA, 2008c)

These prescriptions were current at the time of publishing; please refer to the relevant agency's website for any updated versions.

Recommended management actions are outlined in the table below (Woinarski et al., 2014).

Theme	Specific actions	Priority
Active mitigation of threats	Develop and implement appropriate pest management programs for non-native predators, that minimise adverse impacts upon this species	High
	Develop and implement appropriate landscape-scale fire management, to increase heterogeneity and decrease incidence of frequent extensive and intense fire	Medium
	Constrain grazing by livestock and exotic herbivores to within acceptable limits in and around known important subpopulations	High
Translocation	Re-introduce populations to currently unoccupied parts of former range in which exotic predators are now controlled	Low-medium
Community engagement	Seek conservation covenants on private land holding important subpopulations, with particular focus implementing grazing and trampling management.	Medium-high

Survey and Monitoring priorities

Theme	Specific actions	Priority
Establish or enhance monitoring program	Design and implement an integrated monitoring program across subpopulations, taking into consideration any nationally developed monitoring protocols.	Medium-high
	Support/enhance existing monitoring programs such as the one in south-west Queensland and adjacent parts of the Northern Territory (i.e. Dickman et al., 2001, 2011; Letnic et al., 2011; Pavey et al., 2011)	Medium-high
	Monitor the abundance of exotic predators at key subpopulations, in response to management actions	Medium

	Monitor the abundance of exotic herbivores, and vegetation condition, at key subpopulations, in response to management actions	Low-medium
	Monitor the incidence of fire, and vegetation response, at key subpopulations using sandplot surveys, with camera and/or grooming traps	Low-medium
Survey to better define distribution and abundance	Undertake a targeted survey of all suitable habitat within the species' range, using the method identified above.	Medium
	Identify an appropriate sampling regime for calculating population size (e.g. 20 minute / 2 hectare sandplot surveys)	Medium
	Assess the population size (or relative abundance) of all subpopulations, and then prioritise subpopulations for management focus	Medium

Information and Research priorities

Theme	Specific actions	Priority
Assess relative impacts of threats	Assess the impacts of feral predators	Medium-high
	Assess the impacts of livestock and feral herbivores	Medium-high
	Assess the impacts of fire, and identify a preferred fire regime	Medium
Assess relative effectiveness of threat mitigation options	Assess the efficacy of a range of management regimes for non-native predators	Medium
Resolve taxonomic uncertainties	Continue to use genetic and morphological testing to resolve distribution patterning of the two <i>Dasyercus</i> species	Medium-high
Undertake research to develop new or enhance existing management mechanisms	Develop broad-scale, targeted feral cat control technology	Medium

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Consultation questions

PART 1 – INFORMATION TO AID LISTING ASSESSMENT

1. Do you have any additional information in the **ecology or biology** of the species?
2. Can you provide any additional information or estimates on **longevity, average life span or generation length** for the species?
3. Do you have additional information to support an **estimate of the current population size** of mature adults of the species (national extent)?
4. Do you have additional information on **population trends** over 3 generations, or an historic population size for the species (national extent)?
5. Do you have additional information on **current range** (national extent) or **location of populations** for the species?
6. Can you provide additional information on any **change in range** or **location of populations**, or an **historic range** (national extent)?

PART 2 – INFORMATION FOR CONSERVATION ADVICE ON THREATS AND CONSERVATION ACTIONS

7. Do you have further information on the historic, current or potential **threats** facing the species?
8. Do you have further information on current or potential **management actions** to support protection and recovery of the species?
9. Do you have further information on current or potential **monitoring** or **research activities** for the species?
10. Are you aware of **other knowledge** (e.g. traditional ecological knowledge) that may help better understand the threats and management actions to aid recovery of the species?
11. Are you aware of any **cultural importance or use** that the species has?
12. What **individuals or organisations** are currently, or potentially could be, involved in management and recovery of the species?

PART 3 – ANY OTHER INFORMATION

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