



## Consultation Document on Listing Eligibility and Conservation Actions

### *Petrogale xanthopus xanthopus* (yellow-footed rock-wallaby (South Australia, New South Wales))

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

- 1) the eligibility of *Petrogale xanthopus xanthopus* (yellow-footed rock-wallaby (South Australia, New South Wales)) for inclusion on the EPBC Act threatened species list in the Vulnerable category; and
- 2) the necessary conservation actions for the above subspecies.

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](mailto: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 25 November 2015.**

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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.

# *Petrogale xanthopus xanthopus*

Yellow-footed rock-wallaby (South Australia, New South Wales)

*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 are reflective of the desire to achieve efficiency over preparation of a large number of advices by adopting the approach of the Action Plan for Australian Mammals in presentation of information and do not reflect any difference in the evidence used to develop the recommendation.*

## **Taxonomy**

Conventionally accepted as *Petrogale xanthopus xanthopus* (J.E. Gray, 1855).

Two subspecies are recognised. The other subspecies is *P. x. celeris* (yellow-footed rock-wallaby (central-western Queensland)).

*P. x. celeris* is proposed for listing in this assessment as Vulnerable.

## **Subspecies Information**

### **Description**

The yellow-footed rock-wallaby (South Australia, New South Wales) is brightly coloured with a distinct white cheek stripe and orange ears. It is fawn-grey above and white below, with a brown mid-dorsal stripe from the crown of its head to the centre of its back. It has a buff-white side-stripe and a brown and white hip-stripe. Its forearms, hindlegs and feet are a rich orange to bright yellow. The subspecies has a head and body length of 48-65 cm and a tail length of 57-70 cm. The tail is orange-brown with irregular dark brown annulations, with a dark brown or white tip (Eldridge, 2008).

### **Distribution**

The yellow-footed rock-wallaby (SA, NSW) has a highly disjunct range in inland South Australia and western New South Wales. In South Australia it is distributed from the Gawler Ranges in the west to the Olary Ranges in the north-east, with the following discrete colonies: 190 in the Flinders Ranges, 13 in the Gawler Ranges, one at Cariewerloo Station (near Port Augusta) and eight in the Olary Hills (Copley, 1983; Copley & Alexander, 1997). In western New South Wales there are seven localities in the Cotaouraundee Range and three localities in the Gap Range (Mutawintji National Park), with distances between localities of about 10 km (Lim & Giles, 1987; Dovey et al., 1997). The New South Wales sites are about 250 km from the nearest colonies in South Australia (NSW DECC, 2008).

The area of occupancy has declined considerably since European settlement, as documented by the loss of many colonies and genetic interpretation (Tunbridge, 1991; Pope et al., 1996; Copley & Alexander, 1997).

### **Relevant Biology/Ecology**

The yellow-footed rock-wallaby (SA, NSW) is closely associated with rugged rocky areas, particularly cliff lines, on sandstones, limestones, granites or conglomerates. It is mostly nocturnal (especially in summer) and shelters during the day in caves and rock crevices (Eldridge, 2008). Most colonies have some access to permanent fresh water (Lim et al., 1992). Its diet primarily comprises a mix of grasses and forbs, in part depending upon seasonal availability (Dawson & Ellis, 1979); some flowers, seeds and fruit are also eaten (Tunbridge, 1991). Yellow-footed rock-wallabies live in colonies ranging in size from about 10 individuals to

over 100 individuals (Sharp, 1997), but most colonies are small (Copley & Alexander, 1997). Dispersal between colonies is very limited, especially where intervening habitat is unsuitable (Pope et al., 1996; Sharp, 1997; Eldridge, 1997; Lapidge, 2001).

Home ranges in poor quality habitat in South Australia were recorded to be 100-200 ha, with considerable overlap between home ranges (Lim et al., 1987). However, individuals may make occasional long (> 1 km) movements to water sources (Sharp, 2009). At Buckaringa Sanctuary winter home ranges averaged 43 +/- 7 ha (Hayward et al., 2011).

Sharp et al. (2014) demonstrated a highly significant increase in abundance at sites in New South Wales and South Australia, subject to intensive fox control relative to comparable nearby sites that were unbaited.

Reproduction may occur throughout the year, although peaks in births have been recorded in April and September (Robinson et al., 1994). Sexual maturity is reached at about 1.5 years (Lim et al., 1992), and longevity in the wild has been recorded as at least 12 years (L. Lim pers. comm., cited in Woinarski et al., 2014). Generation length is assumed to be 5-6 years (Woinarski et al., 2014).

## Threats

Threats to the yellow-footed rock-wallaby (SA, NSW) are outlined in the table below (Woinarski et al., 2014).

| Threat factor   | Consequence rating | Extent over which threat may operate | Evidence base  |
|---|--------------------|--------------------------------------|--|
| Predation by red foxes  | catastrophic       | entire                               | some direct evidence of predation (Hornsby, 1997); and experimentally-demonstrated population-level impacts (Sharp et al., 2014)                           |
| Habitat change (and resource depletion) due to livestock and feral herbivores | severe             | large                                | substantial experimental evidence of impacts of feral goats (Copley et al., 2008)  |
| Predation by feral cats   | moderate           | entire                               | little evidence of population-scale impact, but cat numbers and impacts may increase with control of foxes   |
| Inappropriate fire regimes  | moderate           | large                                | wildfire is considered a major threat to this subspecies (Copley et al., 2008)   |
| Habitat loss (by clearing) and fragmentation                                  | moderate           | minor                                | mostly a former threat (Copley et al., 2008)   |
| Reduced access to water sources   | moderate           | localised                            | closing of artificial water sources, and/or diversion of natural water sources may be a minor threat (L. Lim pers. comm., cited in Woinarski et al., 2014) |

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

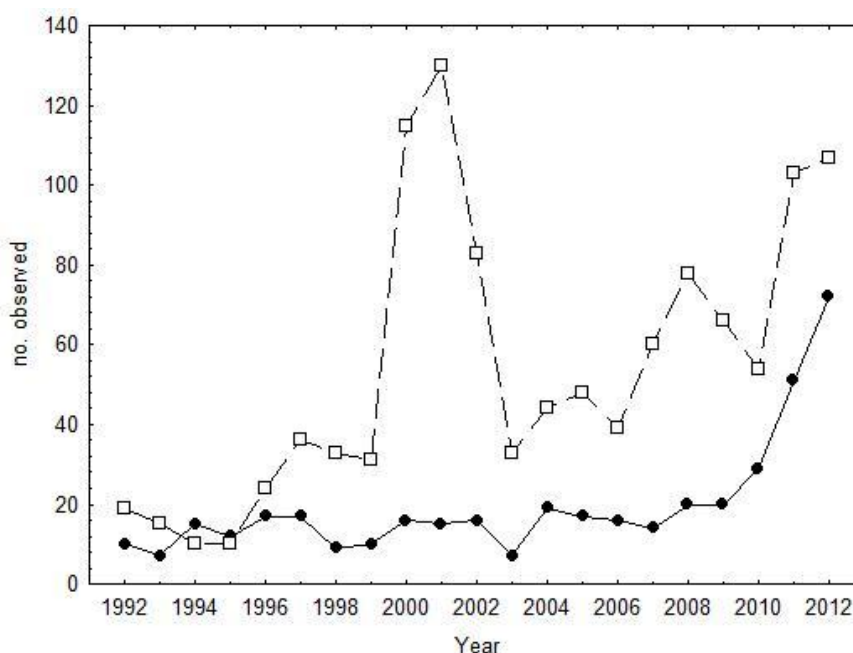
| Criterion 1. Population size reduction (reduction in total numbers)   |  |                                |                                     |
|---|--|--------------------------------|-------------------------------------|
| Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4   |  |                                |                                     |
|   | Critically Endangered<br>Very severe reduction | Endangered<br>Severe reduction | Vulnerable<br>Substantial reduction |
| A1  | ≥ 90%  | ≥ 70%                          | ≥ 50%                               |
| A2, A3, A4  | ≥ 80%  | ≥ 50%                          | ≥ 30%                               |
| <p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>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.</p> <p>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]</p> <p>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.</p> <p style="text-align: center;">based on any of the following</p> <p>(a) direct observation [except A3]</p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</p> |  |                                |                                     |

### Evidence:

Historically, the yellow-footed rock-wallaby (SA, NSW) has declined across most of its range. It was described as 'by far the most abundant of animals' in the Flinders Ranges in the 1880s (Fountain, 1907, cited in NSW DECC, 2008). Copley and Alexander (1997) reported that 35 of 229 recorded colonies in South Australia had been extirpated since European settlement, with eight of these losses occurring in the period 1972-1997 and a further three in the period 1981-1997. They considered that it 'is clearly a species still in decline'; and that 'any remaining isolated colonies which occur in relatively small areas of suitable habitat, must have only a low probability of survival in the short to medium term'.

However, since the 1990s there have been substantial increases in some subpopulations subjected to intensive landscape-scale management (Copley et al., 2008; SA DEWNR, 2012; Christie, 2012). In South Australia the taxon is both 'a target and a key indicator species' for the conservation program 'Operation Bounceback'. In areas subject to the control of feral predators (mostly red foxes *Vulpes vulpes*) and herbivores (mostly goats *Capra hircus*) under this program, yellow-footed rock-wallaby numbers have increased significantly (Sharp et al., 2014). In Flinders Ranges National Park numbers have increased from fewer than 50 in 1993 to more than 1000 in 2009; similar dramatic increases have been reported for other parts of the Flinders and Olary Ranges, and Gawler Ranges National Park (SA DEWNR, 2012). However, over this period, populations dwindled to just a few individuals in nearby Hiltalpa Station where such management was not conducted (SA DEWNR, 2012). The population at the Australian Wildlife Conservancy's Buckaringa Sanctuary has been monitored since 1981, and has remained relatively constant over this period (Hayward et al., 2011).

In New South Wales, Dovey et al. (1997) reported a substantial decline over the period 1980 to 1994 (from sightings of about 58 individuals to about 15 individuals in systematic aerial surveys), notwithstanding a major campaign to control feral goats. Subsequently, the numbers at sampled sites at Gap and Coturaundee Ranges (the two New South Wales subpopulations) have generally increased, particularly following more intensive fox control (Christie, 2012; Sharp et al., 2014), with responses also to marked variation in rainfall.



**Figure 1. The maximum number of yellow-footed rock-wallabies seen by a trained observer over all transects flown on any particular day at two sites in New South Wales (based on Christie, 2012); solid line and dot are for Gap Range; dashed line and open square are for Coturaundee Range (Woinarski et al., 2014).**

Woinarski et al. (2014) consider that while there has been a substantial historic decline in populations of the yellow-footed rock-wallaby (SA, NSW), the population trend is currently stable and has not declined by >30% over a 3 generation period (15-18 years). However, this trend may not be sustained if current intensive management of threats across much of the subspecies' range diminishes or becomes less effective.

The data presented above appear to demonstrate that the subspecies is not eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the subspecies' 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.

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

### Evidence:

Woinarski et al. (2014) estimate the extent of occurrence to be 96 000 km<sup>2</sup> and the area of occupancy to be 1400 km<sup>2</sup>. Both are considered to be stable. The subspecies occurs at five

locations. Trends in habitat extent and quality, area of occupancy and population size are variable across its range; however, overall there is probably no continuing decline (Woinarski et al., 2014). The current stable population trend may not be sustained if current intensive management of threats across much of the subspecies' range diminishes or becomes less effective.

The data presented above appear to demonstrate that the subspecies is not eligible for listing under this criterion. The area of occupancy is limited, it exists at <10 locations, but there is no continuing decline. However, the purpose of this consultation document is to elicit additional information to better understand the subspecies' 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 3. Small population size and decline |  |   |   |   |
|--|--|---|---|---|
|  |  | Critically Endangered<br>Very low   | Endangered<br>Low   | Vulnerable<br>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<br>25% in 3 years or 1 generation<br>(whichever is longer) | High rate<br>20% in 5 years or 2 generations<br>(whichever is longer) | Substantial rate<br>10% in 10 years or 3 generations<br>(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: |   |   |   |
| (a)  | (i) Number of mature individuals in each subpopulation   | ≤ 50  | ≤ 250   | ≤ 1,000   |
|  | (ii) % of mature individuals in one subpopulation =  | 90 – 100%   | 95 – 100%   | 100%  |
| (b)  | Extreme fluctuations in the number of mature individuals   |   |   |   |

#### Evidence:

The yellow-footed rock-wallaby (SA, NSW) has been subject to unusually comprehensive population estimation and monitoring, with intensive long-term monitoring of some subpopulations (Robinson et al., 1994; Copley & Alexander, 1997; Dovey et al., 1997; Hayward et al., 2011; Christie, 2012). Censuses have involved regular aerial survey, ground-based counts and/or capture-recapture population estimation (Copley & Alexander, 1997; Christie, 2012).

In South Australia, the population size was estimated at between 7000 and 10 000 individuals in 1992 (Lim et al., 1992), and about 6000 individuals in 2008 (Copley et al. 2008).

In New South Wales, the total population size was estimated at between 20 and 250 individuals in 1980 (Lim & Giles, 1987), between 170 and 215 individuals in 1992 (Lim et al., 1992), and fewer than 100 individuals in 2008 (Copley et al., 2008). Based on aerial survey, NSW DECC (2008) estimated that there were 'less than 200 individuals (as at Aug 2007)'. This population has been subject to long-term monitoring: the 2012 survey detected 106 individuals on a set of transects continually monitored since 1980, with 'a large proportion of the population... potentially still missed' (Christie, 2012).



Woinarski et al. (2014) estimate the total population size at 6 500 mature individuals. The population trend is considered stable (see Criterion 1), although population size ebbs and flows somewhat with seasonal conditions (Copley & Alexander 1997; Sharp & Norton 2000). The current stable population trend may not be sustained if current intensive management of threats across much of the subspecies' range diminishes or becomes less effective.

The data presented above appear to demonstrate that the subspecies is not eligible for listing under this criterion. The population size is limited but there is no continuing decline. However, the purpose of this consultation document is to elicit additional information to better understand the subspecies' 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 4. Very small population |  |                        |                   |
|------------------------------------|--|------------------------|-------------------|
|                                    | Critically Endangered<br>Extremely low | Endangered<br>Very Low | Vulnerable<br>Low |
| Number of mature individuals       | < 50                                   | < 250                  | < 1,000           |

#### Evidence:

Woinarski et al. (2014) estimate the population size at 6 500 mature individuals.

The data presented above appear to demonstrate that the subspecies is not eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the subspecies' 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<br>Immediate future                                | Endangered<br>Near future  | Vulnerable<br>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:

No population viability analysis has been undertaken.

There are insufficient data to demonstrate if the subspecies is eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the subspecies' status. This conclusion should therefore be considered to be tentative at this stage, as it may be managed as a result of responses to this consultation process.

### Consideration for delisting

The yellow-footed rock wallaby (SA, NSW) is currently listed as Vulnerable under the EPBC Act.

In considering deleting a species from a category of the threatened species list, Section 186(2A) of the EPBC Act states that:

“The Minister must not delete 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.”

With respect to (a), the above assessment suggests that the subspecies no longer meets the criteria for listing under the EPBC Act, as populations have recovered in some areas due to intensive feral animal control programs.

However, with respect to (b), while some apparent recovery has occurred, it may not be sustained and the subspecies may again become threatened if the intensive management diminishes or becomes less effective. Reduction of predation by feral foxes appears to have been a substantial contributor to population recovery for the yellow-footed rock-wallaby. Foxes are extremely widespread and prolific, while control has been localised and intensive. Removal of fox control would be expected to result in an increase in foxes and consequent population decline for the yellow-footed rock-wallaby.

At least some of the recovery investment described in this assessment is based on the subspecies' threatened status, and thus is likely contributing to its survival. Removing it from the threatened species list may result in the removal of current management actions which could result in it being re-eligible for listing in the future.

The data presented above appear to demonstrate that the subspecies should not be deleted from the EPBC Act threatened species list because its inclusion on the list is contributing to the survival of the subspecies. However, the purpose of this consultation document is to elicit additional information to better understand the subspecies' 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

## **Conservation Actions**

### **Recovery Plan**

A decision about whether there should be a national recovery plan for this subspecies has not yet been determined. The purpose of this consultation document is to elicit additional information to help inform this decision.

### **Primary Conservation Objectives**

1. Manage threats to secure or increase overall population size.
2. Maintain viable populations at all known localities
3. Restore extirpated subpopulations (following reduction in threat pressures)

### **Conservation and Management Actions**

The yellow-footed rock-wallaby is present in a series of conservation reserves, including: Flinders Ranges, Mt Remarkable and Gammon Ranges National Parks, Bimbowrie, Telowie Gorge and Dutchmans Stern Conservation Parks and Buckaringa Wildlife Sanctuary (in South Australia); and Mutawintji Nature Reserve and Mutawintji National Park (in New South Wales). Many of these reserves have specific conservation management programs for yellow-footed rock-wallabies, particularly control of feral predators and feral herbivores (Copley & Alexander, 1997; Dovey et al., 1997; SA DEWNR, 2012). Across much of its range, this subspecies has also been the object of specific survey and monitoring programs, and captive-breeding and re-introductions (Lapidge, 2001; Roache, 2011).

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

| Theme                        | Specific actions   | Priority |
|------------------------------|--|----------|
| Active mitigation of threats | continue or expand control mechanisms for introduced predators, with regard to potential interactions amongst predator | high     |

|                                   |  |             |
|-----------------------------------|--|-------------|
|                                   | species  |             |
|                                   | constrain grazing by livestock and feral herbivores to within acceptable limits in and around important subpopulations             | medium-high |
|                                   | maintain or re-establish secure linkages between currently isolated colonies   | medium      |
|                                   | preserve and manage natural water sources  | medium      |
|                                   | undertake landscape-scale fire management, to increase heterogeneity and decrease incidence of frequent extensive and intense fire | low-medium  |
| Captive breeding                  | maintain a captive breeding colony   | low         |
| Quarantining isolated populations | n/a  |             |
| Translocation                     | reintroduce to parts of former range, once threat management is effective  | low-medium  |
| Monitoring                        | implement (or maintain) an integrated monitoring program linked to assessment of management effectiveness                          | high        |
|                                   | monitor abundance of feral predators at key subpopulations, in response to management actions                                      | medium-high |
|                                   | monitor abundance of feral herbivores, and vegetation condition, at key subpopulations, in response to management actions          | medium      |
|                                   | monitor incidence of fire, and vegetation response, at key subpopulations  | low-medium  |
| Community engagement              | seek conservation covenants on private land holding important subpopulations   | medium-high |
|                                   | work cooperatively with Indigenous ranger groups within range area   | medium-high |

### Information and research priorities

Information and research priorities are outlined in the table below (Woinarski et al., 2014).

| Theme  | Specific actions   | Priority    |
|--|--|-------------|
| Survey to better define distribution                       | assess population size of all subpopulations, and then prioritise subpopulations (and meta-populations) for management focus | medium      |
| Assess relative impacts of threats                         | assess impacts of feral predators, including of impacts of interactions between predators                                    | medium      |
|  | assess impacts of fire, and identify a preferred fire regime   | medium      |
|  | assess impacts of livestock and feral herbivores   | low-medium  |
| Establish or enhance monitoring program                    | based on existing programs, design an integrated monitoring programs across subpopulations                                   | medium      |
| Assess relative effectiveness of threat mitigation options | assess efficacy of a range of management regimes for introduced predators, including interactions amongst predator species   | medium-high |

|                                 |   |            |
|---------------------------------|---|------------|
| Resolve taxonomic uncertainties | assess level of gene flow between colonies  | low-medium |
| Assess habitat requirements     | assess options for manipulation of water and food supplies to enhance habitat suitability | low-medium |
| Assess diet, life history       | n/a   |            |

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### **Consultation questions**

1. Do you agree with the current taxonomic position of the Australian Faunal Directory for this taxon (as identified in the draft conservation advice)
2. Can you provide any additional references, information or estimates on longevity, age of maturity, average life span and generation length?
3. Has the survey effort for this taxon been adequate to determine its national distribution and adult population size?
4. Do you accept the estimate provided in the nomination for the current population size of the taxon?
5. For any population with which you are familiar, do you agree with the population estimate provided? If not, are you able to provide a plausible estimate based on your own knowledge? If so, please provide in the form:
  - Lower bound (estimated minimum):
  - Upper bound (estimated maximum):
  - Best Estimate:
  - Estimated level of Confidence: %

6. Can you provide any additional data, not contained in the current nomination, on declines in population numbers over the past or next 10 years or 3 generations, whichever is the longer?
7. Is the distribution as described in the nomination valid? Can you provide an estimate of the current geographic distribution (extent of occurrence or area of occupancy in km<sup>2</sup>) of this taxon?
8. Has this geographic distribution declined and if so by how much and over what period of time?
9. Do you agree that the taxon is eligible for inclusion on the threatened species list, in the category listed in the nomination?
10. Do you agree that the threats listed are correct and that their effects on the taxon are significant?
11. To what degree are the identified threats likely to impact on the taxon in the future?
12. Can you provide additional or alternative information on threats, past, current or potential that may adversely affect this taxon at any stage of its life cycle?
13. Do you agree that the inclusion of the species on the EPBC Act is contributing to the species' survival? Please provide details of your reasoning?
14. In seeking to facilitate the recovery of this taxon, can you provide management advice for the following:
  - What individuals or organisations are currently, or need to be, involved in planning to abate threats and any other relevant planning issues?
  - What threats are impacting on different populations, how variable are the threats and what is the relative importance of the different populations?
  - What recovery actions are currently in place, and can you suggest other actions that would help recover the taxon? Please provide evidence and background information.
15. Can you provide additional data or information relevant to this assessment?