

NSW SCIENTIFIC COMMITTEE

Preliminary Determination

The Scientific Committee, established by the Threatened Species Conservation Act, has made a Preliminary Determination NOT to support a proposal to list the Western Grey Kangaroo *Macropus fuliginosus* (Desmarest 1817) as a Vulnerable species in Part 1 of Schedule 2 of the Act. Rejection of nominations is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. *Macropus fuliginosus* (Desmarest 1817) (family Macropodidae), known as the Western Grey Kangaroo, is a large, highly sexually dimorphic macropod. Head-body to 2225 mm (males), 1746 mm (females); tail to 1000 mm (males), 815 mm (females); weight to 72 kg (males), 39 kg (females). Brown dorsally, pale grey ventrally. Blackish face, muzzle, digits and distal third of tail. Ears long, dark brown to black outside, paler inside. Muzzle finely haired (Menkhorst and Knight 2001; Johnson 2006; Coulson 2008).
2. *Macropus fuliginosus* is endemic to Australia. It is widely distributed across southern Australia from Shark Bay, Western Australia, to the western plains of New South Wales (NSW) and southwest Queensland. Two subspecies are recognised: *M. f. melanops* from mainland Australia and *M. f. fuliginosus* from Kangaroo Island, South Australia. In western NSW, western Victoria, southeastern South Australia and southwestern Queensland *M. fuliginosus* is sympatric with its sister species the Eastern Grey Kangaroo (*Macropus giganteus*) (Johnson 2006; Coulson 2008; Dawson 2012). Eastern and Western Grey Kangaroos were recognised as separate species only in the 1970s (Kirsch and Poole 1972). *Macropus fuliginosus* occurs in areas with predominantly winter rainfall of >250 mm per annum (Caughley *et al.* 1987b) and inhabits sclerophyll forest, woodland (including mallee), shrubland, heathland and farmland with remnant native vegetation (Coulson 1990, 1993). In recent years *M. fuliginosus* has expanded its range northwards in South Australia, most likely as a consequence of the provision of watering points for domestic livestock (Pople *et al.* 2010).
3. *Macropus fuliginosus* is largely nocturnal or crepuscular, spending the day resting in a scrape dug in the shade of dense vegetation. They become active in the late afternoon or early evening and move to more open grassy areas to feed throughout the night (Coulson 2008; Dawson 2012). *Macropus fuliginosus* is a specialist grazer, with a variety of grasses comprising the majority of the diet, although some herbs and browse are also consumed (Norbury 1987; Coulson 2008).
4. *Macropus fuliginosus* is gregarious and forms fluid groups of 2 to 25 individuals (Coulson 2008). Average home range size varies from 83 to 897 ha, with males having larger home ranges than females (Priddel *et al.* 1988a; Arnold *et al.* 1992; Coulson 1993; McCullough and McCullough 2000). Ecological studies suggest that while most individuals are sedentary, a portion of the population is more mobile with movements up to 85 km recorded (Priddel *et al.* 1988b). Genetic studies indicate that dispersal and gene flow over similar or larger distances is common (Neaves *et al.* 2009; 2012). Local population sizes are known to fluctuate widely with seasonal conditions (Bayliss 1985a, b; Norbury *et al.* 1988) and can reach densities of over 9 per km² (Bayliss 1985a).

NSW SCIENTIFIC COMMITTEE

5. *Macropus fuliginosus* is monovular and polyestrus (Tyndale-Biscoe and Renfree 1987). Breeding occurs throughout the year but with a reduction in births during winter. A single young, born after a gestation period of about 31 days, spends around 11 months in the pouch and is weaned at about 18 months (Poole and Catling 1974; Poole 1975). Females do not have a post-partum estrus, nor embryonic diapause. Females reach sexual maturity from 14 months and males from 20 months (Poole and Catling 1974; Poole 1975). The generation time is estimated to be 7-10 years (Dawson 2012).
6. *Macropus fuliginosus* is not listed as threatened under the Commonwealth *Environmental Protection and Biodiversity Conservation Act* 1999 and is listed as 'least concern' by the IUCN due to its wide distribution, presumably large population, occurrence in protected areas and lack of major threats (IUCN 2013). In some areas *M. fuliginosus* is regarded as an agricultural pest or overabundant and periodic local culling is undertaken (Calaby and Grigg 1989; Coulson 2007; DOE 2012). The species is also commercially harvested in NSW, South Australia and Western Australia (DOE 2012).
7. In assessing changes in the number of *Macropus fuliginosus* in NSW over the last three generations (21-30 years), survey data from the NSW Office of Environment and Heritage (OEH) Kangaroo Management Program (KMP) (Payne 2013) has been used as an index of abundance. Aerial surveys (light plane) for *M. fuliginosus* are conducted annually for the KMP and virtually cover the entire species' range in NSW (Coulson 2008). There are a number of limitations associated with the interpretation of these data including, changes in both methodology and areas surveyed (Payne 2013), as well as the inability for aerial surveys to distinguish between the two sympatric grey kangaroo species (*M. giganteus*; *M. fuliginosus*) that occur in western NSW (Cairns and Gilroy 2001). For *M. fuliginosus*, directly comparable data exist for 0.4-0.6 of the three generation length (21-30 years), from 2001 to 2012 (Payne 2013). From 2001 to 2012 the data reported in Payne (2013) shows a decline and then an increase in *M. fuliginosus* abundance. It is well established that numbers of large kangaroos fluctuate widely as a consequence of seasonal conditions, animal movements and other factors (Caughley *et al.* 1984; Bayliss 1985a, b; Caughley *et al.* 1987a; Cairns and Grigg 1995; Pople 2006; Pople *et al.* 2007, 2010a; Dawson 2012). Since the last decade has seen drought conditions throughout most of NSW, it is unsurprising that the index of abundance of *M. fuliginosus* has declined during that period. With the breaking of the drought in 2010/11 a subsequent increase in *M. fuliginosus* abundance occurred in 2012 (Payne 2013). There is no consistent long-term trend in the index of abundance for *M. fuliginosus* in NSW. Consequently, there is currently no evidence of ongoing decline in *M. fuliginosus* in NSW.
8. Location records for *Macropus fuliginosus* from the Atlas of Living Australia (ALA May 2013) may give a guide to any change in geographic distribution over the last three generations. However, for *M. fuliginosus*, some 60% of records are pre-1982 and these records only cover a subset of the current distribution. Most of these records are from Mt Hope Station over a three year period (1962-1964). Post-1982 records cover the full extent of the distribution of *M. fuliginosus* in NSW. Consequently, there are not sufficient records to form a baseline for inferring any change in the distribution of *M. fuliginosus* in NSW in the last three generations.
9. There are likely to have been changes to the habitat quality for *Macropus fuliginosus* in NSW since European settlement (reviewed in Calaby and Grigg 1989; Olsen and Braysher 2000).

NSW SCIENTIFIC COMMITTEE

Some habitat, especially in the mallee region, has been lost to cropping but other areas have been converted from woodland to a more fragmented open grassy habitat which has favoured large kangaroos (Dawson 2012). The addition of water points for domestic stock and the suppression of dingoes is likely to have increased the carrying capacity across parts of western NSW (Olsen and Braysher 2000; Letnic and Crowther 2013). In contrast, heavy grazing by domestic stock around watering points (i.e. piospheres) and other areas will have decreased local habitat quality in some parts of the arid and semi-arid zones (James *et al.* 1999). There are insufficient data for the last three generations to infer changes to habitat quality across the range of *M. fuliginosus* in NSW.

10. There is no evidence of a reduction in genetic diversity within *Macropus fuliginosus* in NSW. Population genetic studies of *M. fuliginosus* (Neaves *et al.* 2009, 2012) identified high levels of diversity throughout the species' range, including in NSW. These studies were not directly designed to test the impact of harvesting but samples were collected from harvested populations and diversity levels in this species were amongst the highest yet reported for marsupials (Eldridge 2010).
11. The geographic distribution of *Macropus fuliginosus* in NSW is not considered to be moderately restricted. Based on records in ALA (May 2013), the extent of occurrence (EEO) for *M. fuliginosus* was estimated to be approximately 422, 000 km² covering the distribution of the species in NSW. The EEO is based on a minimum convex polygon enclosing all mapped occurrences of the species, the method of assessment recommended by IUCN (2011), and extending this to the Queensland, Victoria and South Australia borders in line with a continuation of the distribution into those states. The area of occupancy (AOO) of *M. fuliginosus* was estimated to be at least 2,640 km², based on 660 2 x 2 km grid cells, the scale recommended for assessing AOO by the IUCN (2011). This estimate only included cells placed over known ALA records and is hence an underestimate of actual AOO as the species will also occur on areas between known records.
12. The estimated total number of mature individuals of *Macropus fuliginosus* in NSW is not considered to low or moderately low. The annual aerial surveys conducted by OEH for the KMP have estimated that in the eight western NSW Kangaroo Management Zones (which represents virtually all of the species' distribution in NSW) the *M. fuliginosus* population size was at least 0.5 million each year from 2001-2012 (Payne 2013). Even allowing for the presence of immature animals, sampling uncertainty and experimental error, it is highly likely that the total number of mature *M. fuliginosus* individuals is not low or moderately low.
13. In view of the above the Scientific Committee is of the opinion that the Western Grey Kangaroo *Macropus fuliginosus* (Desmarest 1817) does not meet any of the criteria for listing of Vulnerable species in the *Threatened Species Conservation Regulation 2010*, and therefore is not eligible to be listed as a Vulnerable species in Schedule 2 of the Act.

Professor Michelle Leishman
Chairperson
Scientific Committee

Exhibition period: 01/08/14 – 26/09/14

Proposed Gazettal date: 01/08/14

ESTABLISHED BY THE THREATENED SPECIES CONSERVATION ACT 1995

Contact Address: C/o PO Box 1967 Hurstville BC NSW 1481 Telephone: (02) 9585 6940 Facsimile: (02) 9585 6606

NSW SCIENTIFIC COMMITTEE

References:

- ALA (Atlas of Living Australia) (2013) <http://www.ala.org.au/> (accessed 13 May 2013)
- Arnold GW, Steven DE, Grassia A, Weeldenburg J (1992) Home range size and fidelity of western grey kangaroos (*Macropus fuliginosus*) living in remnants of wandoo woodland and adjacent farmland. *Wildlife Research* **19**, 137–143.
- Bayliss P (1985a) The population dynamics of red and western grey kangaroos in arid New South Wales, Australia. I. Population trends and rainfall. *Journal of Animal Ecology* **54**, 111–125.
- Bayliss P (1985b). The population dynamics of red and western grey kangaroos in arid New South Wales, Australia. II. The numerical response function. *Journal of Animal Ecology* **54**, 127–135.
- Cairns SC, Gilroy J (2001) Re-appraisal and enhancement of the current methodology used in the estimation of kangaroo populations in Western New South Wales. UNE and NSW NPWS.
- Cairns SC, Grigg GC (1993) Population dynamics of red kangaroos (*Macropus rufus*) in relation to rainfall in the South Australian pastoral zone. *Journal of Applied Ecology* **30**, 444–458.
- Cairns SC, Lollback GW, Bearup D (2011) Kangaroo monitoring: Northern Tablelands Harvest Zones – Redesign and analysis of helicopter surveys. Report to the NSW Office of Environment and Heritage, Sydney.
- Calaby JH, Grigg GC (1989) Changes in macropodoid communities and populations in the last 200 years and the future. In 'Kangaroos, Wallabies and Rat-kangaroos'. (Eds G Grigg, P Jarman, I Hume) pp. 813-820. (Surrey Beatty and Sons: Sydney)
- Caughley J, Bayliss P, Giles J (1984) Trends in kangaroo numbers in western New South Wales and their relation to rainfall. *Australian Wildlife Research* **11**, 415–422.
- Caughley G, Grigg GC, Smith L (1985) The effect of drought on kangaroo populations. *Journal of Wildlife Management* **49**, 679–685.
- Caughley G, Shepherd N, Short J (Eds) (1987a). 'Kangaroos: Their Ecology and Management in the Sheep Rangelands of Australia.' (Cambridge University Press, Cambridge).
- Caughley G, Short J, Grigg GC Nix H (1987b) Kangaroos and climate: an analysis of distribution. *Journal of Animal Ecology* **56**, 751-761.
- Coulson G (1990) Habitat separation in the grey kangaroos *Macropus giganteus* Shaw and *M. fuliginosus* (Desmarest) (Marsupialia: Macropodidae), in Grampians National Park, western Victoria. *Australian Mammalogy* **13**, 33–40.
- Coulson G (1993) Use of heterogeneous habitat by the western grey kangaroo, *Macropus fuliginosus*. *Wildlife Research* **20**, 137–149.

NSW SCIENTIFIC COMMITTEE

- Coulson GM (2007). Exploding kangaroos: assessing problems and setting targets. In *'Pest or guest: the zoology of overabundance.'* (Eds. D Lunney, P Eby, P Hutchings, S Burgin) pp. 174-181. (Royal Zoological Society of New South Wales, Mosman, NSW)
- Coulson G (2008) Western grey kangaroo *Macropus fuliginosus*. In *'The Mammals of Australia, 3rd edition.'* (Eds S Van Dyck, R Strahan) pp. 333-334. (New Holland, Sydney)
- Dawson TJ (2012) *'Kangaroos. Second edition'* (CSIRO Publishing: Melbourne)
- DOE (Department of Environment) (2012) *'Wild harvest of Australian native animals.'* <http://www.environment.gov.au/topics/biodiversity/wildlife-trade/australian-native-plants-and-animals/wild-harvest> (accessed 2 April 2014)
- Eldridge MDB (2010) Population and conservation genetics of marsupials. In *'Marsupial genetics and genomics'*. (Eds JE Deakin, PD Waters, JAM Graves) pp. 461-497. (Springer, Dordrecht)
- IUCN Standards and Petitions Subcommittee (2011) Guidelines for Using the IUCN Red List Categories and Criteria. Version 9.0. Prepared by the Standards and Petitions Subcommittee.
- IUCN (2013) Red List of Threatened Species. Version 2013.2. www.iucnredlist.org. IUCN, Gland, Switzerland.
- James CD, Landsberg J, Morton SR (1999) Provision of watering points in the Australian arid zone: a review of effects on biota. *Journal of Arid Environments* **41**, 87-121.
- Johnson PM (2003) *'Kangaroos of Queensland.'* (Queensland Museum, Brisbane)
- Kirsch JAW, Poole WE (1972) Taxonomy and distribution of the grey kangaroos *Macropus giganteus* Shaw and *Macropus fuliginosus* (Desmarest), and their subspecies (Marsupialia: Macropodidae). *Australian Journal of Zoology* **20**, 315-339.
- Letnic M, Crowther MS (2013) Patterns in the abundance of kangaroo populations in arid Australia are consistent with the exploitation ecosystems hypothesis. *Oikos* **122**, 761-769.
- McCullough DR, McCullough Y (2000) *'Kangaroos in outback Australia: Comparative ecology and behaviour of three coexisting species.'* (Columbia University Press, New York)
- Menkhorst PW, Knight F (2001) *'A field guide to the mammals of Australia.'* (Oxford University Press, Melbourne)
- Neaves LE, Zenger KR, Prince RIT, Eldridge MDB (2012) Impact of Pleistocene aridity oscillations on the population history of a widespread, vagile Australian mammal, *Macropus fuliginosus*. *Journal of Biogeography* **39**, 1545-1563.
- Neaves LE, Zenger KR, Prince RIT, Eldridge MDB, Cooper DW (2009) Landscape discontinuities influence gene flow and genetic structure in a large, vagile Australian mammal, *Macropus fuliginosus*. *Molecular Ecology* **18**, 3363-3378.

NSW SCIENTIFIC COMMITTEE

- Norbury GL (1987) Diet selection by western grey kangaroos in relation to declining food availability. In 'Herbivore nutrition research' (Ed M Rose) pp.75-76. (Australian Society for Animal Production, Brisbane)
- Norbury GL, Coulson GM, Walters BL (1988) Aspects of the demography of the Western Grey-Kangaroo, *Macropus fuliginosus melanops*, in semiarid northwest Victoria. *Wildlife Research* **15**, 257–266.
- Olsen P, Braysher M (2000) Current state of knowledge on kangaroos in the environment, including ecological and economic impact of culling. Report to the Kangaroo Management Advisory Committee.
- Payne N (2013) 2013 Quota Report. New South Wales Commercial Kangaroo Harvest Management Plan 2012-2016. NSW Office of Environment and Heritage, Sydney.
- Poole WE (1975) Reproduction in the two species of grey kangaroos, *Macropus giganteus* Shaw and *M. fuliginosus* (Desmarest). II. Gestation, parturition and pouch life. *Australian Journal of Zoology* **23**, 333-353.
- Poole WE, Catling PC (1974) Reproduction in the two species of grey kangaroos, *Macropus giganteus* Shaw and *M. fuliginosus* (Desmarest). I. Sexual maturity and oestrus. *Australian Journal of Zoology* **22**, 277-302.
- Pople AR (2006) Modelling the spatial and temporal dynamics of kangaroo populations for harvest management. Report to Department of Environment and Heritage: Canberra.
- Pople AR, Phinn SR, Menke N, Grigg GC, Possingham HP, McAlpine C (2007) Spatial patterns of kangaroo density across the South Australian pastoral zone over 26 years: aggregation during drought and suggestions of long distance movement. *Journal of Applied Ecology* **44**, 1068-1079.
- Pople AR, Grigg GC, Phinn SR, Menke N, McAlpine C, Possingham HP (2010) Reassessing the spatial and temporal dynamics of kangaroo populations. In 'Macropods: the biology of kangaroos, wallabies and rat-kangaroos'. (Eds GM Coulson, MDB Eldridge) pp. 197-210. (CSIRO Publishing: Melbourne)
- Priddel D, Shepherd N, Wellard G (1988a) Home ranges of sympatric red kangaroos *Macropus rufus*, and western grey kangaroos *M. fuliginosus*, in western New South Wales. *Australian Wildlife Research* **154**, 405-411
- Priddel D, Wellard G, Shepherd NC (1988b) Movements of sympatric Red Kangaroos, *Macropus rufus*, and Western Grey Kangaroos, *M. fuliginosus*, in Western New South Wales. *Australian Wildlife Research* **15**, 339–346.
- Tyndale-Biscoe H, Renfree M (1987) 'Reproductive Physiology of Marsupials.' (Cambridge University Press: Cambridge)