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 Eastern Grey Kangaroo *Macropus giganteus* Shaw 1790 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 giganteus* Shaw 1790 (family Macropodidae), known as the Eastern Grey Kangaroo, is a large, highly sexually dimorphic macropod. Head-body to 2302 mm (males), 1857 mm (females); tail to 1090 mm (males), 842 mm (females); weight to 85 kg (males), 42 kg (females). Grey-brown dorsally, paler ventrally and on legs. Ears long, dark brown outside, pale grey inside with whitish fringe. Distal third of tail blackish. Muzzle finely haired (Menkhorst and Knight 2001; Johnson 2006; Coulson 2008).

2. *Macropus giganteus* is endemic to Australia. It is widely distributed in eastern Australia from Cape York Peninsula, Queensland, to far southeast South Australia and northeastern Tasmania. It is found throughout New South Wales (NSW). In western NSW, northwestern Victoria and southwestern Queensland *M. giganteus* is sympatric with its sister species the Western Grey Kangaroo (*Macropus fuliginosus*) (Johnson 2006; Coulson 2008). Eastern and Western Grey Kangaroos were recognised as separate species only in the 1970s (Kirsch and Poole 1972). *Macropus giganteus* mostly occurs where annual rainfall is >250 mm (Caughley *et al.* 1987b) in sclerophyll forest, woodland (including mallee), shrubland and heathland. It can also occur in modified habitats including farmland with remnant native vegetation, pine plantations and golf courses (Menkhorst and Knight 2001; Johnson 2006; Coulson 2008; Dawson 2012).

3. *Macropus giganteus* is largely nocturnal or crepuscular, spending the day resting 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 giganteus* is a specialist grazer, with a variety of grasses comprising the majority of the diet, although herbs, tree and shrub seedlings, ferns and seeds will also be consumed (Taylor 1983; Jarman and Philips 1989; Coulson 2008).

4. *Macropus giganteus* is gregarious and forms fluid groups of 2 to over 20 individuals. These smaller groups can be part of larger stable social units (i.e. mobs) of over 50 individuals (Coulson 2008; Dawson 2012). Large temporary feeding aggregations can also occur (Dawson 2012). Home range size varies in mesic environments (27-158 ha) and are significantly larger (777-1356 ha) in drier areas (McCullough and McCullough 2000; Moore *et al.* 2002; Viggers and Hearn 2005; Coulson 2008). Males typically have larger home ranges than females (McCullough and McCullough 2000; Coulson 2008). Although most individuals appear to be largely sedentary, movements of up to 17 km have been recorded (Jarman and Taylor 1983). However, genetic studies indicate that dispersal and gene flow over larger distances (up to 230 km) is common (Zenger *et al.* 2003). Local population sizes are known to fluctuate widely with seasonal conditions (Caughley *et al.* 1984a) and densities can reach over 400 per km^2 (Roberts *et al.* 2010).

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5. *Macropus giganteus* 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 36 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, but instead may come into estrus months after the birth of the incumbent pouch young, with the resultant blastocyst held in suspended animation (i.e. embryonic diapause) until the suckling stimulus of the incumbent young is reduced. Females reach sexual maturity from 18 months and males from 42 months (Poole and Catling 1974; Poole 1975; Tyndale-Biscoe and Renfree 1987). The generation time is estimated to be 7-10 years (Dawson 2012).

6. *Macropus giganteus* is not listed as threatened under the Commonwealth *Environmental Protection and Biodiversity Conservation Act* 1999 and is listed as 'least concern' by the IUCN (2013) due to its wide distribution, large population, occurrence in protected areas and lack of major threats. In some areas *M. giganteus* is regarded as an agricultural pest or overabundant and periodic local culling is undertaken (Calaby and Grigg 1989; Herbert 2004; Viggers and Hearn 2005; Coulson 2007; DOE 2012). The species is also commercially harvested in NSW and Queensland (DOE 2012).

7. In assessing potential changes in the numbers of *Macropus giganteus* 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. giganteus* are conducted annually in western NSW for the KMP, covering ~2/3 of the species' state-wide distribution (Coulson 2008). There are a number of limitations associated with the interpretation of these data including, both changes in methodology and areas surveyed (Payne 2013), as well as the inability of 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 western NSW, 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. giganteus* 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.* 1984a; Bayliss 1985a, b; Caughley *et al.* 1987a; Cairns and Grigg 1995; Pople 2006; Pople *et al.* 2010; Dawson 2012). Since the last decade has seen drought conditions throughout most of NSW, it is unsurprising that the index of abundance of *M. giganteus* has declined during that period. With the breaking of the drought in 2010/11 a subsequent increase in *M. giganteus* abundance has occurred (Payne 2013). Therefore there is no consistent long-term trend in the index of abundance of *M. giganteus* in western NSW.

   OEH also conduct triennial aerial surveys (helicopter) for *M. giganteus* in eastern NSW. These surveys commenced in the three Northern Tablelands zones in 2001, the Southeast zone in 2003 and the Central Tablelands zones in 2008 (Payne 2013). Data from these surveys needs to be treated with caution because of adjustments to methodologies between surveys and the short survey history in some zones (Pople *et al.* 2006; Cairns *et al.* 2008; Payne 2013). Two of these surveys show an increasing trend in *M. giganteus*

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abundance, from 2009, except for the Central Tablelands South zone where numbers remain relatively stable (Payne 2013). This overall pattern would be consistent with *M. giganteus* numbers responding to improved seasonal conditions in eastern Australia since 2010. There is no survey data for populations of *M. giganteus* occurring in coastal NSW outside of the KMZ, although this area is known to contain some high density populations (e.g. 400-600 per km^2: Roberts *et al.* 2010). Consequently, there is currently no evidence of ongoing decline in *M. giganteus* in NSW.

8. Location records for *Macropus giganteus* from the Atlas of Living Australia (ALA May 2013) may give a guide to change in geographic distribution over the last three generations. However, for *M. giganteus*, only some 12% of records are pre-1982 and these records only cover a subset of the current distribution. 88% of records are post-1982 and these cover the full extent of the distribution of *M. giganteus* in NSW. Consequently, there are not sufficient records to form a baseline for inferring any change in the last three generations. Hence no inference about change in geographic distribution of *M. giganteus* in NSW can be made from these data. However, some change in the geographic distribution of *M. giganteus* is likely to have occurred since European settlement of NSW. Local population extinctions are likely to have occurred in some heavily settled coastal areas as a result of urbanisation and associated impacts. However, *M. giganteus* has expanded its range westwards into more arid areas (Caughley *et al.* 1984b; Pople *et al.* 2010; Dawson 2012), most likely due to the provision of watering points for domestic livestock and vegetation changes associated with sheep grazing (Dawson *et al.* 2004; 2006).

9. There have been changes to the habitat quality for *Macropus giganteus* in NSW since European settlement (reviewed in Calaby and Grigg 1989; Olsen and Braysher 2000). Some habitat, especially in the coastal zone, tablelands and western slopes, has been lost to cropping, urbanisation and other infrastructure. However, large areas have also been converted from forest and woodland to more open and grassy habitats which are highly favoured by *M. giganteus*. The addition of water points for domestic livestock and the suppression of dingoes is also likely to have increased the suitability of western NSW for *M. giganteus* (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 an overall reduction in habitat quality across the range of *M. giganteus* in NSW.

10. There is no evidence of a reduction in genetic diversity within *Macropus giganteus* in NSW. A population genetic study (Zenger *et al.* 2003) identified high levels of diversity throughout the species' range, including in NSW. This study was not directly designed to test the impact of harvesting but samples were collected from harvested populations and genetic diversity levels in *M. giganteus* were amongst the highest yet reported for marsupials (Eldridge 2010).

11. The geographic distribution of *Macropus giganteus* in NSW is not considered to be moderately restricted. Based on records in ALA (May 2013), the extent of occurrence (EOO) for *M. giganteus* was estimated to be approximately 877,000 km^2 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 and Victoria borders in line with a continuation of the distribution into those states. The area of occupancy (AOO) of *M. giganteus* was estimated to be at least 17,000 km^2, based on 4248 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 giganteus* in NSW is considered to not be 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 only ~2/3 of the species' distribution in NSW and contains much marginal habitat) the *M. giganteus* population size exceeded 1.5 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. giganteus* individuals is not low or moderately low.

13. In view of the above the Scientific Committee is of the opinion that the Eastern Grey Kangaroo *Macropus giganteus* Shaw 1790 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

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