NSW SCIENTIFIC COMMITTEE

Final Determination

The Scientific Committee, established by the *Threatened Species Conservation Act 1995* (the Act), has made a Final Determination to list the Bellinger River Snapping Turtle *Myuchelys georgesi* (Cann, 1997) as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1A of the Act. Listing of Critically Endangered species is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. The Bellinger River Snapping Turtle *Myuchelys georgesi* (Cann, 1997) (family Chelidae) is a moderately large, short-necked, freshwater turtle described by Cogger (2014) as "brown above, dull whitish below. Usually a distinct yellow stripe from the angle of the jaws, especially in the young. Shell above broadly oval, not extended posteriorly, with a smooth hind edge. Plaston moderate, nearly twice as long as broad, the front and rear lobes tapering from the bridge. Intergular shield as wide as or wider than each gular shield. Neck above with low rounded tubercles. No alveolar ridge on the maxilla. Macrocephaly does not occur. 20 cm (shell length)." In addition, the head and neck are shorter than the length of the shell, a central groove on the carapace is absent, the tail lacks bright markings and there are five claws present on both webbed forelimbs (Cann 1997; Georges and Thomson 2010; Cogger 2014; Cann *et al*. 2015). *Myuchelys georgesi* is morphologically similar to the Saw-shelled Turtle *M. latisternum,* Purvis's Turtle *M. purvisi* and Western Saw-shelled Turtle *M. belli* (Cogger 2014) but is genetically distinct (Georges and Adams 1996; Fielder *et al*. 2012).

2. The Bellinger River Snapping Turtle *Myuchelys georgesi,* also called Bellinger River Saw-shelled Turtle and Georges' Turtle, was previously known as *Elseya* sp. (Bellingen), *Elseya* sp. 3, *Elseya georgesi* and *Elseya latisternum georgesi* (Georges and Adams 1992, 1996; Cogger *et al*. 1993; TFTSG 1996; Allanson and Georges 1999; Spencer *et al*. 2007; Artner 2008). In addition, the genus name is currently under dispute, with *Wollumbinia georgesi* used in some publications (Georges and Thomson 2010; Wilson and Swan 2010; Cogger 2014).

3. The Bellinger River Snapping Turtle should not be confused with a turtle referred to in the literature as the "Bellinger River Emydura", "Bellinger River Turtle" or "*Emydura macquarii* (Bellinger River form)" (Cann 1998; Spencer and Thompson 2000; New South Wales (NSW) NPWS 2001; Blamires *et al*. 2005; NSW Scientific Committee 1997, 2009).

4. *Myuchelys georgesi* is endemic to NSW and is restricted to the Bellinger catchment in coastal north eastern NSW (Cann 1998; Georges and Thompson 2010; Cogger 2014; Cann *et al.* 2015). In the Bellinger catchment *M. georgesi* co-occurs with two more widespread freshwater turtle species, the Eastern Long-necked Turtle (*Chelodina longicollis*) and *Emydura macquarii* (Cann 1998; Georges and Thompson 2010). The latter species appears to have been introduced to the Bellinger catchment from nearby rivers (Georges *et al*. 2007, 2010, 2011), whilst the former is uncommon in the Bellinger Catchment (Cann *et al.* 2015). Hybridisation between *E. macquarii* and *M. georgesi* is occurring in the Bellinger catchment producing some morphologically atypical individuals (Georges *et al.* 2007; Spencer *et al*. 2007; NSW Scientific Committee 2009; OEH *in litt*. June 2015; Georges and Spencer 2015).

5. Within the Bellinger River, *Myuchelys georgesi* has only been recorded in the mid-section of the river from Bellingen township upstream to east of Brinerville (Spencer *et al.* 2007; Cann *et al.* 2015; Moloney *et al.* 2015). The species has not been recorded from the Never Never River which enters the Bellinger River at Gordonville, nor from all but the lower 600 m of the Rosewood River which meets the Bellinger River near Thora (OEH *in litt*. June 2015). The status of *M. georgesi* in the Kalang

River is uncertain. The Kalang River is the other major river in the Bellinger catchment which meets the Bellinger River near its mouth at Urunga (Georges *et al.* 2007). Cann (1993) reported that *M. georgesi* was present in a few scattered locations in the Kalang River, however surveys in 2000, 2007 and 2015 found no specimens of *M. georgesi* but found several turtles which have since been genetically confirmed as *M. georgesi* X *E. macquarii* hybrids (OEH *in litt.* June 2015; Georges and Spencer 2015). There are no specimens of *M. georgesi* from the Kalang River in museum collections.

6. The headwaters of the Bellinger River fall from ~1300 m a.s.l. and are predominately (~60%) forested (Georges *et al.* 2007; Blamires and Spencer 2013). As a consequence the Bellinger River has cool clear water and includes deep pools, boulder rapids and still, sandy-bottomed sections (Cogger 2014). *Myuchelys georgesi* has a preference for moderate to deep pools (> 2 m) with a rocky substrate (Spencer *et al*. 2007; Blamires and Spencer 2013; Spencer *et al.* 2014). Although their preferred habitat is patchily distributed, *M. georgesi* appears able to move readily between pools under normal river flow conditions (Blamires and Spencer 2013). *Myuchelys georgesi* is primarily aquatic and rarely, if ever, disperses overland but will bask on the river bank and on trees that have fallen into the river (Cann 1998). *Myuchelys georgesi* is omnivorous predominately consuming benthic macro-invertebrates, along with fruit and aquatic vegetation (Cann 1997; Alanson and Georges 1999). During winter, activity in *M. georgesi* is significantly reduced and individuals are rarely encountered.

7. Nesting in *Myuchelys georgesi* is terrestrial with females laying clutches of 10–25 (averaging 15–20) brittle-shelled eggs during late spring and early summer (Cogger 2014; OEH *in litt.* June 2015). Hatchlings emerge after 72 days at an average nest temperature of ~27ºC (Cann 1997) and hatching success in the absence of predation is 85% (Blamires *et al.* 2005). Eggs are laid in excavations on the river banks and the few nests that have been studied were 170 ± 24 mm deep, within 10 m of the water's edge and located in heavily vegetated areas (Blamires *et al*. 2005). Females are estimated to reach sexual maturity at ~8 years, males at 5–6 years and maximum longevity is estimated to be ~29 years (Blamires *et al*. 2005; Spencer 2006). Generation length is likely to be ~20 years. In the closely related species *M. belli*, males reach sexual maturity at ~10 years and females at ~20 years with a predicted lifespan of over 40 years (Fielder *et al.* 2014). Many Australian freshwater turtles, including *M. georgesi,* exhibit type III survivorship where mortality rates decrease with age (Spencer and Thompson 2000; Blamires *et al*. 2005; Blamires and Spencer 2013). As a result, populations are strongly skewed towards large/old adults (Blamires *et al.* 2005). As a consequence of these life history traits, the stability of turtle populations is sensitive to changes in adult survivorship (Georges *et al.* 1993; Blamires *et al.* 2005; Blamires and Spencer 2013) and their ability to recover from a catastrophic loss of adults is likely to be limited.

8. The geographic distribution of *Myuchelys georgesi* is estimated to be very highly restricted. The extent of occurrence (EOO) for *M. georgesi* is 145 km^2 based on a minimum convex polygon enclosing all mapped occurrences of the species, the method of assessment recommended by IUCN (2014). This estimate includes the potential Kalang River population. If records for the Bellinger River only are included the EOO for *M. georgesi* is 115 km^2. The area of occupancy (AOO) is estimated to be 5.2 km^2 based on the mapped area of riverine habitat (river bed plus 20 m on either side) known to be occupied by the species (OEH *in litt*. June 2015). This method of estimating AOO is considered most appropriate for a primarily aquatic species that is confined to a narrow linear habitat. These estimates of AOO and EOO are based on historically suitable habitat and specimen records. The contemporary distribution of *M. georgesi* may be more highly restricted, as both the AOO and EOO have potentially declined in 2015 due to a disease outbreak (see point 9).

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

9. The population of *Myuchelys georgesi* in the Bellinger River has recently experienced a substantial decline. A rapid and unexpected mortality event commenced in early 2015 (first reported 16 February 2015). The restriction of the event to a single species, post mortem examination of affected individuals and the pattern of spread are consistent with a disease outbreak (Spencer 2015; OEH *in litt.* June 2015; Moloney *et al.* 2015). A novel virus, associated with the lesions in the turtles, has been identified (B. Kay *in litt.* September 2015) although the extent of its role is yet to be clarified and the disease may be a multi-factorial syndrome (Moloney *et al.* 2015). The mortality rate amongst infected individuals is 97% (OEH *in litt*. June 2015). Since the outbreak, 433 dead turtles have been recovered, mostly adult *M. georgesi* (OEH *in litt*. October 2015). Although this represents the loss of 14% to 27% of the total estimated population, it is likely to be an underestimate as not all carcasses are likely to have been found (OEH *in litt*. June 2015; Spencer 2015). *Myuchelys georgesi* appears to be the only species currently affected and sick or dead individuals have been found from Bellingen upstream for 60 km, which includes all of the species' known distribution (Moloney *et al*. 2015; OEH *in litt.* November 2015). Reports of sick or dead turtles ceased by May 2015 which coincided with the time *M. georgesi* usually becomes inactive with the onset of the cooler months (OEH *in litt*. June 2015). Surveys in the spring of 2015 have reportedly identified a small number of living adult and juvenile *M. georgesi*, although genetic testing will be necessary to confirm their identity and disease status (BCS 2015).

10. In April 2015, 17 healthy *M. georgesi* were captured and are being held in a quarantine environment, with the aim of captive breeding (OEH *in litt*. October 2015). Analyses indicate that genetic diversity is low in both the captive and wild population of *M. georgesi* (Georges and Spencer 2015). Genetic data also indicate that individuals in the Kalang River are hybrids so this population is not a suitable insurance population (Georges and Spencer 2015).

11. Other threats to *Myuchelys georgesi* include the predation of nests and nesting females by the introduced Red Fox (*Vulpes vulpes*) (Cann *et al*. 2015). Blamires *et al*. (2005) reported a turtle nest predation rate of 72%, from foxes and goannas (*Varanus varius*), along the Bellinger River, although elsewhere in Australia it is known to exceed 90% from foxes alone (Thompson 1983). Foxes are also known to prey on nesting females (Spencer and Thompson 2000; Blamires *et al*. 2005; Spencer *et al.* 2007). Short-necked turtles are thought to be particularly vulnerable to fox predation because they are unable to fully retract their limbs and head (Spencer and Thompson 2005). Habitat degradation, including changes to water quality (*e.g*. increased water turbidity) and increased sedimentation of deep pools as well as the removal or degradation of riparian vegetation are other known threats (Blamires and Spencer 2013; OEH *in litt*. June 2015; Cann *et al.* 2015). Hybridisation with and competition from *E. macquarii* is also a threat (Blamires *et al*. 2005; Georges *et al*. 2007; Spencer *et al.* 2014; Cann *et al*. 2015). Recent genetic analyses have confirmed the presence of F2 and backcross hybrids between *M. georgesi* and *E. macquarii* in both the Bellinger and Kalang Rivers (Georges and Spencer 2015). Hybridisation is likely to become more prevalent following the recent population decline, which will result in reduced mate choice. It is also possible that *E. macquarii* will increase in abundance as a result of reduced competition for resources with *M. georgesi* (Georges and Spencer 2015), further increasing the chances of hybridisation. 'Predation by the European Red Fox *Vulpes vulpes*' is listed as a Key Threatening Process under the Act.

12. Within its highly restricted distribution *Myuchelys georgesi* was, until recently, described as common or locally abundant (Spencer *et al*. 2007; Georges *et al*. 2007). In 2005, the total population of *M. georgesi* was estimated to be ~4500 ± 1400 individuals and modelling suggested the population was stable (Blamires *et al.* 2005). There is some evidence to suggest that after 2007 the population declined, associated with historically low river levels (2013–2014) and abnormal rainfall conditions (OEH *in litt.* June 2015). In early 2015 the total population of *M. georgesi* was estimated to be between

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1600 and 3200 individuals (OEH *in litt.* June 2015). The current population size is unknown but is likely to be substantially lower than previous estimates due to disease-related mortality.

13. *Myuchelys georgesi* (Cann, 1997) is eligible to be listed as a Critically Endangered species as, in the opinion of the Scientific Committee, it is facing an extremely high risk of extinction in New South Wales in the immediate future as determined in accordance with the following criteria as prescribed by the *Threatened Species Conservation Regulation 2010*:

Clause 7 Restricted geographic distribution and other conditions
The geographic distribution of the species is estimated or inferred to be:
(a) Very highly restricted,
and either:
(d) a projected or continuing decline is observed, estimated or inferred in either of the key indicators:
(a) an index of abundance appropriate to the taxon, or
(b) the geographic distribution, habitat quality or diversity, or genetic diversity of the species.

Dr Mark Eldridge
Chairperson
NSW Scientific Committee

Exhibition period: 22/04/16 – 17/06/16 Proposed Gazettal date: 22/04/16

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NSW SCIENTIFIC COMMITTEE

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