# 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 Manning River Helmeted Turtle *Myuchelys purvisi* (Wells and Wellington, 1985) as an ENDANGERED SPECIES in Part 1 of Schedule 1 of the Act. Listing of Endangered species is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. The Manning River Helmeted Turtle *Myuchelys purvisi* (Wells and Wellington, 1985) (family Chelidae) is a medium-sized freshwater chelid turtle (Cann 1998; Cogger 2014). Cogger (2014) describes this species as "similar in most respects to [Bellinger River Snapping Turtle *Myuchelys georgesi*] *Wollumbinia georgesi.* Like the latter it is brown above, but is usually quite bright yellow below, except in large older individuals. Usually a distinct yellow stripe from the angle of the jaws, especially in the young, while the underside of the tail has distinctive yellow markings: a bright yellow stripe from median plastron notch to anus; another stripe on each side of the tail slopes down to also reach the anus; and there is a bright yellow patch under the tip of the tail. Shell above broadly oval, not expanded posteriorly, with a smooth hind edge. Plastron 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)". Adults can usually be distinguished from *M. georgesi* by throat colour, the throat being divided medially by a black bar instead of being yellow overall as in *M. georgesi* (Cann 1998). The Manning River Helmeted Turtle has neural bones present, unlike *M. georgesi* (Thomson and Georges 1996). Juvenile and young adult Manning River Helmeted Turtles have golden eyes with numerous specks (*M. georgesi* has golden eyes with a few specks) and a yellow tinge ventrally (*M. georgesi* has blue-green ventral colours) (Cann 1998). Males are more brightly coloured than females (Wells 2002). The Manning River Helmeted Turtle is morphologically most similar to *M. georgesi* and resembles other *Myuchelys* species (Cann 1998; Cogger 2014) but is genetically distinct (Georges and Adams 1996; Fielder *et al*. 2012; Spinks *et al.* 2015).

2. The Manning River Helmeted Turtle has also been referred to as *Elseya purvisi, Elseya latisternum purvisi, Elseya* sp. 2 and Undescribed *Elseya* (TFTSG 1996; Cann 1998; Georges and Thomson 2010; Cogger 2014; Spinks *et al.* 2015). Le *et al.* (2013) found that *M. purvisi* is the sister species to members of *Elseya*, *Myuchelys* and *Emydura* and proposed the new genus *Flaviemys,* however Spinks *et al.* (2015) recommended returning this species to the genus *Myuchelys*. In addition, the genus *Myuchelys* (Thomson and Georges 2009) is currently disputed, with *Wollumbinia* used in some publications (Wells 2007; Wells 2009; Cogger 2014).

3. The Manning River Helmeted Turtle is endemic to the mid-north coast of New South Wales (NSW) and is restricted to the middle and upper reaches of the Manning River catchment area (Thompson and Georges 1996; Cann 1998; Allanson and Georges 1999; Cogger 2014). Within this catchment there are also records of the Eastern Snake-Necked Turtle *Chelodina longicollis* and the Macquarie Turtle *Emydura macquarii.* The former is likely to be widespread in the catchment although the latter is likely to be restricted to the lower reaches. The Macquarie Turtle is naturally widespread in eastern Australia but has also been introduced to other river catchments (Spencer *et al.* 2014; Chessman 2015). The origin of *E. macquarii* in the Manning River catchment is unknown.

4. The Manning River Helmeted Turtle is poorly known, aside from descriptions of its diet, habitat (Allanson and Georges 1999; Wells 2002) and reproductive behaviour (Cann 1998). Cogger (2014) describes *M. purvisi* as being similar to *M. georgesi* so the information on habitat, ecology and reproduction of *M. georgesi* (Spencer and Thompson 2000; Blamires *et al.* 2005; Georges *et al.* 2007,



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2011; Georges and Thomson 2010; Blamires and Spencer 2013; Spencer *et al.* 2014; Cann *et al.* 2015) and *M. bellii* (Fielder 2010; Fielder *et al.* 2014, 2015; Chessman 2015) must be relied upon in the absence of direct studies. The Manning River Helmeted Turtle is found in relatively shallow, clear, continuously fast-flowing rivers with rocky and sandy substrates (Wells 2002). Similar species require complex in-stream habitats (*e.g.* underwater caverns, boulders, large woody debris, overhanging banks, macrophyte beds) and deep pools interspersed with shallow areas and riffle zones (Spencer *et al.* 2007, 2014; Blamires and Spencer 2013; Chessman 2015; Fielder *et al.* 2015). Boulder beds in pools 2-3 m deep and submerged logs are used as shelter sites by individuals or small aggregations of turtles (Wells 2002). This species is predominately diurnal, often seen basking on logs, rocks or the river banks near deep pools, although nocturnal foraging in shallow areas has been observed (Wells 2002). *Myuchelys purvisi* is apparently omnivorous (Allanson and Georges 1999; Wells 2002). The Manning River Helmeted Turtle lacks the ability to catch fast moving prey like fish, adult coleopterans or hemipterans, instead foraging on the benthos for less mobile food such as other macro-invertebrates, terrestrial fruit and aquatic vegetation (Allanson and Georges 1999). In sites studied by Allanson and Georges (1999) the macro-invertebrate assemblages were diverse. In *M. purvisi*, mating has been reported in captivity in March; in the wild this may extend from February to April (Cann 1998). Nests of up to 23 eggs are laid into soft sediments in riparian habitat (Cann 1998; Wells 2002; Blamires *et al.* 2005). In *M. bellii*, females lay a single clutch per year although Fielder *et al*. 2014 found that only 78% of females ovulate in any one season. Other *Myuchelys* species are inactive during the colder months and hibernate in deep pools (Fielder *et al.* 2015; NSWSC 2016).

5. The generation length of the Manning River Helmeted Turtle is uncertain. Generation length is likely to be ~20 years. For comparison, *M. georgesi* 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). In *M. bellii*, males reach sexual maturity at ~10 years and females at ~20 years with a predicted lifespan of over 40 years (Fielder *et al.* 2014).

6. The number of populations and population size is not known. Available records, potential habitat and topography suggest that there are populations in at least five of the seven sub-catchments of the Manning River. Cann (1998) noted that the Manning River Helmeted Turtle is more abundant than the Bellinger River Snapping Turtle and occurs over a larger area, however more recently the abundance of Manning River Helmeted Turtles appears to have declined dramatically (J. Cann pers. comm. April 2016). The total population size of the Manning River Helmeted Turtle is inferred to be moderately low. Although preferred habitat is patchily distributed, *M. georgesi* (and by inference *M. purvisi*) appears able to move readily between pools when conditions are suitable (Blamires and Spencer 2013). Unlike some other turtles (*e.g. C. longicollis* see Cogger 2014) both *M. bellii* and *M. georgesi* are largely aquatic (Chessman 2015; NSWSC 2016), so terrestrial movements between river systems are unlikely. Thus, the distribution of *M. purvisi* is inferred to be severely fragmented.

7. The geographic distribution of Manning River Helmeted Turtle is estimated to be highly restricted. The Manning catchment is 8,170 km$^2$, 1.3% of the catchment is classified as river and drainage system (Hope 2016; OEH 2011) and this species is restricted to the mid to upper reaches of this catchment. The extent of occurrence (EOO) for *M. purvisi* is 2,083 km$^2$ based on a minimum convex polygon enclosing all mapped occurrences of the species in NSW (OEH 2016a; Georges 2016; J. Cann *in litt.* April 2016), the method of assessment recommended by IUCN (2016). The area of occupancy (AOO) is estimated to be 76 km$^2$, based on 2 × 2 km grid cells, the scale recommended for assessing AOO by IUCN (2016).

8. There is substantial evidence for continuing declines in habitat quality for the Manning River Helmeted Turtle. Although most of the Manning River catchment is forested (56% of catchment) and a large proportion of these forests are conservation areas (18% of catchment), most of the fertile valley floors adjoining suitable habitat have already been converted to beef and dairy grazing land


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(40% of catchment), with clearing commencing in the early 1800s (MidCoast Water Council 2011; OEH 2011; Hope 2016). There has been a lack of targeted surveys in the more remote and inaccessible upper catchments so the habitat value of upper catchment areas is unknown as is the presence of this species in conservation reserves. The Manning River Helmeted Turtle faces multiple threats including predation, illegal collecting, habitat degradation and, potentially, disease as well as competition and hybridisation with *E. macquarii*. High rural densities, land clearing, agricultural use, human settlement and recreation have led to changed runoff conditions, excess turbidity and elevated nutrient levels especially following high flow events (MidCoast Water Council 2011; DPI 2016). Increased sedimentation of deep pools, the removal of log jams and other activities that simplify habitat complexity are likely to have detrimental impacts. As most prey is gained from vegetation growing on the river bank, increased erosion, sedimentation, turbidity and other processes that prevent benthic vegetation growth are a threat to food availability (Allanson and Georges 1999; OEH 2016b; DoE 2016). Despite these changes, Allanson and Georges (1999) noted that healthy macro-invertebrate communities were present in their mid to upper catchment study areas. Ongoing removal or degradation of riparian vegetation (*e.g.* through clearing or trampling and grazing by livestock) and changing land use within the catchment may further degrade water quality and reduce the availability of nesting habitat.

The nests and nesting females of Manning River Helmeted Turtle are likely to be preyed upon by the introduced Red Fox (*Vulpes vulpes*), feral pigs (*Sus scrofa*) and goannas (*Varanus* spp.) (NSWSC 2016; OEH 2016b). The nest predation rate of this species is unknown but in *E. macquarii* the rate exceeds 90% from foxes alone (Thompson 1983). For *M. georgesi*, nest predation rates of 72% (from foxes and Lace Monitors *Varanus varius*) have been recorded and 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). Hatching success for *M. georgesi* in the absence of predation is 85% (Blamires et al. 2005), although predation of eggs by foxes, pigs and goannas can be severe and fish predation of juveniles may also further reduce recruitment (Blamires *et al.* 2005; Blamires and Spencer 2013). Herbivore activity on river banks during the nesting season may also disturb nests (QLD DEHP 2016). As mortality of eggs and hatchlings is high and fecundity modest, the stability of turtle populations is sensitive to changes in adult survivorship (Georges *et al.* 1993; Blamires *et al.* 2005; Blamires and Spencer 2013; NSWSC 2016).

Hybridisation with and competition from *E. macquarii* are potential threats and have been identified as significant threats to *M. georgesi* (Blamires *et al.* 2005; Spencer *et al.* 2007, 2014) and as a potential threat to *M. bellii* (Chessman 2015). Artificial barriers to movement (*e.g.* dams or weirs) and other changes to natural stream flows (*e.g.* water extraction for irrigation) may increase habitat fragmentation and degradation or directly injure turtles (Allanson and Georges 1999; Bunn and Arthington 2002; Freeman and Cann 2014). Currently most of the rivers in this area are only lightly regulated with small weirs and other structures (DPI 2016). In the closely related *M. georgesi*, recent and rapid catastrophic mortality has been associated with an un-described disease (NSW Scientific Committee 2016). In *M. bellii* an unidentified disease causing blindness is also present (Cann 1998; OEH 2016b; DoE 2016). The susceptibility of *M. purvisi* to these diseases is unknown. A lack of published long-term monitoring on this species make estimation of past rates of decline difficult, however J. Cann (pers. comm. April 2016) reports recent declines in abundance. Illegal collecting is known to occur and removal of the adult females can cause population declines (J. Cann pers. comm. April 2016). Their ability to recover from a catastrophic loss of adults caused by disease, poaching or other causes is likely to be limited (NSWSC 2016). 'Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands', 'Clearing of native vegetation', 'Predation by the


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European Red Fox *Vulpes vulpes*' and 'Predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*)' are listed as Key Threatening Processes under the Act.

9. The Manning River Helmeted Turtle *Myuchelys purvisi* is not eligible to be listed as a Critically endangered species.

10. The Manning River Helmeted Turtle *Myuchelys purvisi* (Wells and Wellington, 1985) is eligible to be listed as an Endangered species as, in the opinion of the Scientific Committee, it is facing a very high risk of extinction in New South Wales in the near 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:

(b) highly restricted,

and either:

(d) a projected or continuing decline is observed, estimated or inferred in the key indicator:

(b) the geographic distribution, habitat quality or diversity, or genetic diversity; or

(e) the following conditions apply:

(i) the population or habitat is observed or inferred to be severely fragmented;

(ii) all or nearly all mature individuals are observed or inferred to occur within a small number of populations or locations.

Dr Mark Eldridge
Chairperson
NSW Scientific Committee

Exhibition period: 28/04/17 – 23/06/17 Gazettal date: 28/04/17

**References**

Allanson M, Georges A (1999) Diet of *Elseya purvisi* and *Elseya georgesi* (Testudines: Chelidae), a sibling species pair of freshwater turtles from eastern Australia. *Chelonian Conservation and Biology* **3**, 473–477.

Blamires SJ, Spencer R-J, King P, Thompson M (2005) Population parameters and life-table analysis of two coexisting freshwater turtles: Are the Bellinger River turtle populations threatened? *Wildlife Research* **32**, 339–347.

Blamires SJ, Spencer R-J (2013) Influence of habitat and predation on population dynamics of the freshwater turtle *Myuchelys georgesi*. *Herpetologica* **69**, 46–57.

Bunn SE, Arthington AH (2002) Basic principles and ecological consequences of altered flow regimes for aquatic biodiversity. *Environmental Management* **30**, 492–507.

Cann J (1998) 'Australian freshwater turtles.' (Beaumont Publishing: Singapore)

Cann J, Spencer R-J, Welsh M, Georges A (2015) *Myuchelys georgesi* (Cann 1997) – Bellinger River Turtle. *Chelonian Conservation Monographs* **5**, 091.1–9.



**ESTABLISHED UNDER 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**

Chessman BC (2015) Distribution, abundance and population structure of the threatened western saw-shelled turtle, *Myuchelys bellii*, in New South Wales, Australia. *Australian Journal of Zoology* **63**, 245–252.

Cogger HG (2014) 'Reptiles and amphibians of Australia. 7th edition.' (CSIRO Publishing: Collingwood)

DPI (Department of Primary Industries NSW) (2016) Manning Catchment. http://www.water.nsw.gov.au/water-management/basins-and-catchments/manning-catchment (accessed 4 April 2016)

DoE (Department of the Environment) (2016) *Wollumbinia belli* in Species Profile and Threats Database, Department of the Environment, Canberra. http://www.environment.gov.au/sprat. (accessed 4 April 2016)

Fielder D (2010) 'Population ecology, ecophysiology, phylogenetics and taxonomy of the threatened western sawshelled turtle, *Myuchelys bellii*, from the Murray-Darling Basin of Australia.' PhD thesis, University of New England.

Fielder D, Chessman B, Georges A (2015) *Myuchelys bellii* (Gray 1844) – Western Saw-shelled Turtle Bell's Turtle. *Chelonian Research Monographs* **5**, 088.1–7.

Fielder D, Vernes K, Alacs E, Georges A (2012) Mitochondrial variation among Australian freshwater turtles (genus *Myuchelys*), with special reference to the endangered *M. bellii*. *Endangered Species Research* **17**, 63–71.

Fielder DP, Limpus DJ, Limpus CJ (2014) Reproduction and population ecology of the vulnerable western sawshelled turtle, *Myuchelys bellii*, in the Murray-Darling Basin, Australia. *Australian Journal of Zoology* **62**, 463–476.

Freeman A, Cann J (2014) *Myuchelys latisternum* (Gray 1867) – Sawshelled Turtle, Saw-Shell Turtle. *Chelonian Research Monographs* **5**, 073.1–8.

Georges A (2016) UC Wildlife Tissue Collection. Distribution maps for Australian freshwater turtles. Institute for Applied Ecology. University of Canberra. http://iae.canberra.edu.au/html/staff/georges/georges-turtle-maps.php (accessed 18 April 2016)

Georges A, Adams M (1996) Electrophoretic delineation of species boundaries within the short-necked chelid turtles of Australia. *Zoological Journal of the Linnean Society* **118**, 241–260.

Georges A, Limpus CJ, Parmenter CJ (1993) Natural history of the Chelonia. In 'Fauna of Australia: Amphibia and Reptilia Vol. 2a' (Eds CJ Glasby, GJB Ross, PL Beesley) pp. 120–128 (Australian Government Publishing Service: Canberra)

Georges A, Spencer R-J, Welsh M, Shaffer HB, Walsh R, Zhang X (2011) Application of the precautionary principle to taxa of uncertain status: the case of the Bellinger River turtle. *Endangered Species Research* **14**, 127–134.

Georges A, Thomson S (2010) Diversity of Australasian freshwater turtles, with annotated synonymy and keys to species. *Zootaxa* **2496**, 1–37.



**ESTABLISHED UNDER 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**

Georges A, Walsh R, Spencer R-J, Welsh M, Shaffer HB (2007) The Bellinger *Emydura*. Challenges for management. Unpublished report to NSW National Parks and Wildlife Service by Institute for Applied Ecology, University of Canberra.

Hope B 2016 *Myuchelys Purvisi* - Endangered (proposed status) supporting information 27/4/2016. Report to the NSW Scientific Committee.

IUCN Standards and Petitions Subcommittee (2016) Guidelines for Using the IUCN Red List Categories and Criteria. Version 12. Prepared by the Standards and Petitions Subcommittee. http://www.iucnredlist.org/documents/RedListGuidelines.pdf.

Le M, Reid BN, McCord WP, Naro-Maciel E, Raxworthy CJ, Amato G, Georges A (2013) Resolving the phylogenetic history of the short-necked turtles, genera *Elseya* and *Myuchelys* (Testudines: Chelidae) from Australia and New Guinea. *Molecular Phylogenetics and Evolution* **68**, 251–258.

MidCoast Water Council (2011) Working with our Catchment: Manning River Catchment Management Program. 2015. http://policy.midcoastwater.com/policies/a330733.pdf (accessed 4 April 2016)

NSW Scientific Committee (2016) Bellinger River Snapping Turtle *Myuchelys georgesi* – critically endangered species listing. Final Determination to list the species under the Threatened Species Conservation Act 1995. NSW Scientific Committee, Sydney. http://www.environment.nsw.gov.au/resources/threatenedspecies/determinations/FDBellRiverSnapTurtleCR.pdf

OEH (Office of Environment and Heritage) (2011) NSW Foundation Spatial Data Framework Theme: Landcover Dataset – NSW Land use. https://sdi.nsw.gov.au/catalog/search/resource/details.page?uuid=%7B9669649C-2BF8-4D8F-B065-F6624B17C96E%7D (accessed 4 April 2016)

OEH (Office of Environment and Heritage) (2016a) NSW Bionet http://www.bionet.nsw.gov.au/ (accessed 4 April 2016)

OEH (Office of Environment and Heritage) (2016b) Bell's Turtle (*Elseya bellii*) http://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10266 (accessed 4 April 2016)

QLD DEHP (Queensland Department of Environment and Heritage Protection) (2016) Mary River Turtle.: https://www.ehp.qld.gov.au/wildlife/animals-az/mary_river_turtle.html (accessed 4 April 2016)

Spencer R-J (2006) The Bellinger River Emydura survey: Effects of foxes and interspecific competition. Unpublished report by Pestat Ltd to NSW National Parks and Wildlife Service.

Spencer R-J, Georges A, Lim D, Welsh M, Reid AM (2014) The risk of inter-specific competition in Australian short-necked turtles. *Ecological Research* **29**, 767–777.

Spencer R-J, Georges A, Welsh M (2007) The Bellingen River Emydura: Ecology, population status and management. Unpublished report to NSW NPWS by Institute of Applied Ecology, University of Canberra.



**ESTABLISHED UNDER 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**

Spencer R-J, Thompson MB (2000) The ecology and status of *Emydura macquarii* and *Elseya georgesi* in the Bellinger River. Unpublished report by Institute of Wildlife Research, University of Sydney to NSW National Parks and Wildlife Service.

Spencer R-J, Thompson MB (2005) Experimental analysis of the impact of foxes on freshwater turtle populations. *Conservation Biology* **19**, 845–854.

Spinks PQ, Georges A, Shaffer HB (2015) Phylogenetic uncertainty and taxonomic re-revisions: an example from the Australian short-necked turtles (Testudines: Chelidae). *Copeia* **103**, 536–540.

Thompson MB (1983) Populations of the Murray River tortoise, *Emydura* (Chelodina). The effect of egg predation by the red fox *Vulpes vulpes*. *Australian Wildlife Research* **10**, 363–372.

Thomson S, Georges A (1996) Neural bones in Australian chelid turtles. *Chelonian Conservation and Biology* **2**, 82–86.

Thomson S, Georges A (2009) *Myuchelys* gen. nov. – a new genus for *Elseya latisternum* and related forms of Australian freshwater turtle (Testudines: Pleurodira: Chelidae). *Zootaxa* **2053**, 32–42.

TFTSG (Tortoise & Freshwater Turtle Specialist Group) (1996) *Elseya purvisi*. The IUCN Red List of Threatened Species 1996. http://www.iucnredlist.org/details/40759/0 (accessed 4 April 2016)

Wells RW (2002) Taxonomic notes on some Australian freshwater turtles of the genera *Chelodina* and *Elseya* (Reptilia: Chelidae). *Australian Biodiversity Record* **2002(2)**, 1–30.

Wells RW (2007) Some taxonomic and nomenclatural considerations on the Class Reptilia in Australia. A new genus of the Family Chelidae from eastern Australia. *Australian Biodiversity Record* **2007(3)**, 1–12.

Wells RW (2009) Some taxonomic and nomenclatural considerations on the Class Reptilia in Australia. A new species of freshwater turtle in the genus *Wollumbinia* Wells 2007 (Reptilia: Chelidae) from eastern Australia. *Australian Biodiversity Record* **2009(1)**, 1–12.

Wells RW, Wellington CR (1985) A classification of the Amphibia and Reptilia in Australia. *Australian Journal of Herpetology (Supplementary Series)* **1**, 1–61.



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