Australian Government
Department of the Environment

Consultation Document on Listing Eligibility and Conservation Actions

Myuchelys georgesi (Bellinger River snapping turtle)

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

1) the eligibility of *Myuchelys georgesi* (Bellinger River snapping turtle) for inclusion on the EPBC Act threatened species list in the Critically Endangered category; and

2) the necessary conservation actions for the above species.

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.

Draft information for your consideration of the eligibility of this species for listing as Critically Endangered starts at page 3 and information associated with potential conservation actions for this species starts at page 10. To assist with the Committee's assessment, the Committee has identified a series of specific questions on which it seeks your guidance at page 11.

Responses are to be provided in writing either by email to:
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 05 August 2016.

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.

Myuchelys georgesi

Bellinger River snapping turtle

Taxonomy

Conventionally accepted as *Myuchelys georgesi* (Cann, 1997)

Species/Sub-species Information

Description

The Bellinger River snapping turtle is a medium sized freshwater turtle with a shell length up to 185 mm in males and 250 mm in females. Within the Bellinger River system, where the species is endemic, it is most easily distinguished from other species by the distinct yellow stripe from the angle of the jaws, especially in the young, and two small, fleshy protrusions below the chin. In adult turtles, males can be distinguished by the much longer tail.

Distribution

The Bellinger River snapping turtle is known only from the Bellinger catchment on the north coast of New South Wales (Blamires et al., 2005). Within the catchment it is restricted to the Bellinger and, possibly, Kalang Rivers. The range within the Bellinger River extends from Bellingen township upstream to an area east of Brinerville (Spencer et al., 2007).

The distribution of the Bellinger River snapping turtle in the Kalang River is less certain. Cann (1993) states that the species was present at a few scattered locations in the Kalang, although since 2000 a limited number of surveys have failed to locate any Bellinger River snapping turtle or have only been able to locate hybrid animals (*M. georgesi x E. macquarii*) or *E. macquarii* (Murray River turtles). There are no records for Bellinger River snapping turtle from the Kalang River in the Atlas of New South Wales Wildlife database (NSW Office of Environment and Heritage, 2015), nor are there any Bellinger River snapping turtles from the Kalang River in museum collections (New South Wales Scientific Committee, 2016).

Relevant Biology

Lifecycle

Many Australian freshwater turtles exhibit type III survivorship where mortality rates decrease with age (Spencer and Thompson, 2000) and the Bellinger River snapping turtle follows this type of survivorship (Blamires et al., 2005). As a consequence, the stability of the population is sensitive to changes in adult survivorship (Blamires et al., 2005; Blamires and Spencer, 2013).

Female Bellinger River snapping turtles are gravid between September and November and nest between October and December (Cann, 1997; Blamires et al., 2005). Clutch size averages 13.5 +/- 3.2 eggs (Blamires et al., 2005). Hatchlings appear after 72 days (Cann, 1997).

Modelling and life table analysis by Blamires et al. (2005) calculated that female Bellinger River snapping turtles should have a maximum life expectancy of 28.9 (±4.5) years. In the same study, generation time was defined as the minimum female reproductive age, which was calculated to be 7.9 ±1.2 years (mean ± standard error) (Blamires et al., 2005). The generation length (as defined by IUCN) is approximately 20 years.

Specific biological characteristics

A number of Australian freshwater turtles have bimodal respiration capabilities. In Bellinger River snapping turtle, cloacal respiration via cloacal bursae allows for aquatic respiration in the species, providing up to 32 percent of total aquatic oxygen uptake (King and Heatwole, 1994, reported as *Elseya latisternum* from the Bellinger River). This process works most efficiently in cool, clear oxygenated waters.

Habitat

Myuchelys georgesi habitat is not continuous within its riverine distribution. The species has a preference for moderate to deep pools with a rocky substrate (Spencer et al., 2007; Blamires

and Spencer, 2013; Spencer et al., 2014). For example, surveys in 2007 identified a total of 23 waterholes from the Bellinger River potentially containing turtles, with most less than 1 hectare in size (Spencer et al., 2014). Also, eight distinct holes of potentially suitable habitat were identified over a 6.8 km stretch of the Bellinger River mapped by NPWS in 2007.

Feeding and movement patterns

Spencer et al. (2014) reported that *Myuchelys* species are considered dietary specialists. A high proportion of the diet is macroinvertebrates, with some terrestrial fruit and aquatic vegetation such as Ribbonweed (*Vallisneria gigantean*)(Allanson and Georges, 1999).

All Bellinger River snapping turtles within the Bellinger River should be considered as a single population. Waterholes in the river do not contain discrete populations and dispersal both up and down stream may occur during flooding. Even during normal river conditions, there is no reason to suspect that the Bellinger River snapping turtle has difficulty moving between waterholes (Blamires and Spencer, 2013).

Threats

The greatest immediate threat to the Bellinger River snapping turtle is the disease outbreak associated with the Bellinger River snapping turtle mortality event that was first observed in February 2015 in the Bellinger River. Prior to the disease outbreak and the associated mortality event, actual or potential threats to Bellinger River snapping turtles were limited distribution and specific habitat requirements, predation, alteration to water quality, hybridisation and possible competition with other turtle species (Spencer et al., 2007; Blamires and Spencer, 2013; Spencer et al., 2014). The effects of the mortality event on species' abundance and lifecycle may potentially amplify the impacts of these other threats.

Disease and the Bellinger River Snapping Turtle Mortality Event

On 18 February 2015, a number of Bellinger River snapping turtles were found dead and dying in the Bellinger River east of Thora. The Environment Protection Authority (EPA) inspected the Bellinger River at four key locations when the situation was first reported and water quality sampling did not identify any contamination impacting the river. Due to this preliminary exclusion of pollutants by the EPA and the observation that only this species of turtle appeared to be affected, this mortality event was subsequently treated as an emergency animal disease event and an incident management team was in operation until the end of March to work on the event.

433 individual Bellinger River snapping turtles are confirmed to have died (NSW OEH in New South Wales Scientific Committee, 2016) (426 of these in a 59 day period), although the actual number is unknown and may be much higher as the majority of affected animals were found on shore close to the river. Additionally, a flood event occurred on 21 February 2015, only a few days after the outbreak was noticed, preventing many of the carcasses being found. The mortality rate observed amongst the turtles found was 97 percent (NSW OEH in New South Wales Scientific Committee, 2016). This directly observed mortality is equivalent to at least a 14 to 27 percent reduction in the population, the vast majority of these being adults (S. Ruming, 2015 personal communication). Approximately 60 km of the Bellinger River is known to be affected, representing 100 percent of the known range of the species in the Bellinger River.

The event has been interpreted as a disease outbreak (Moloney et al., 2015; New South Wales Scientific Committee, 2016). A novel virus, associated with the lesions in the turtles, has been identified (B. Kay in New South Wales Scientific Committee, 2016) 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 Bellinger River snapping turtle is the only species known to be affected. Sympatric Murray River turtles (*Emydura macquarii*) have shown no ill effects. No further reports of affected turtles were made after May 2015, coinciding with the inactive period for the species which coincides with the onset of cooler weather. Subsequent surveys have found very few surviving adults despite extensive effort.

The Bellinger River snapping turtle has a lifecycle where mortality rates decrease with age and population stability relies largely on very high adult survivorship (Spencer and Thompson, 2000;

Blamires et al., 2005). Therefore, the apparent loss of most of the adult population will affect any potential recovery of the species. Current recovery efforts aimed at increasing numbers via captive breeding or increased nesting success will have little effect on any population recovery in the immediate future. In the meantime, the species is particularly vulnerable to any additional threat.

A small captive insurance population has been established with 17 healthy Bellinger River snapping turtles with the aim of captive breeding. However, one individual of that population was subsequently found to be a hybrid with the Murray River turtle and is not a suitable breeding candidate (Georges and Spencer, 2015). Georges and Spencer (2015) also showed that the population of Bellinger River snapping turtles in the Kalang River (where the disease outbreak was not recorded) cannot be considered an insurance population as it shows high levels of hybridization and introgression with Murray River turtles.

Limited distribution and specific habitat requirements

Limited distribution and specific habitat requirements are associated with both actual and potential threats. The restricted distribution and specific habitat requirements of the Bellinger River snapping turtle means the species is potentially at risk from human-induced or natural perturbations (Spencer et al., 2007). Like many other species with a small population size, limited distribution and specific habitat requirements, the Bellinger River snapping turtle is susceptible to any demographic or environmental stochastic event that has the potential to affect the entire population, as has been demonstrated by the disease associated with the mortality event of 2015.

Predation

Predation is an actual threat to Bellinger River snapping turtles (Spencer and Thompson, 2000, 2005). Goannas (*Varanus varius*) and foxes (*Vulpes vulpes*) are the major predator of turtles (both Bellinger River snapping turtle and Murray River turtle) along the Bellinger River (Spencer and Thompson, 2000; Blamires et al., 2005; Spencer et al., 2007). Blamires et al. (2005) report a turtle nest predation rate of 72 percent (for a mix of natural and artificial nests) in the Bellinger River.

While goannas specifically target nests, foxes prey on both nests and nesting females (Spencer and Thompson, 2000; Blamires et al., 2005; Spencer et al., 2007). Short-necked turtle species are thought to be particularly susceptible to predation by foxes because of their inability to fully retract head and limbs (Spencer and Thompson, 2005). Predation by foxes is a Key Threatening Process both nationally and in New South Wales.

It has also been suggested that large catfish are the most probable water-based predators of hatchling and juvenile Bellinger River snapping turtles (Blamires and Spencer, 2013). Analysis of stomach contents of catfish (*Arius graeffei* and *Tandanus tandanus*) museum specimens from the Clarence River found that turtle species were the most abundant item in the stomachs of catfish greater than 400 mm in length. Adult and juvenile Bellinger River snapping turtles seem to be able to use waterholes where catfish are absent, although catfish predation is potentially detrimental to the species (Blamires and Spencer, 2013).

Alteration to water quality

Alteration to river quality is a potential threat. The Bellinger River is an unregulated river with continuous-flowing clear water in the middle and upper reaches (Allanson and Georges, 1999). The in-stream macroinvertebrate fauna is diverse and appears to have been little impacted upon by human activity (Allanson and Georges, 1999). A large amount of the food of Bellinger River snapping turtles is from the macroinvertebrate fauna closely associated with the river bed and any increase in sedimentation could potentially alter the sedentary benthic macroinvertebrate fauna, impacting upon the species (Allanson and Georges, 1999). Any water quality-based changes such as this may exacerbate the impact on the Bellinger River snapping turtle even further because of the species' restriction to a single small drainage system (Allanson and Georges, 1999). Changes in water quality can further impact the Bellinger River snapping turtle because habitat preferences for the species are linked to water quality (Spencer et al., 2007). As an example, sand and silt run-off from unsealed roads upstream of Thora can affect turbidity and as silt enters the river it is deposited on patches of aquatic vegetation and rock substrates.

Both of these factors are key habitat features that limit the distribution of the species in the river (Spencer et al., 2007).

While the Bellinger River snapping turtle probably has a high degree of resilience to flood events in the Bellinger River, major flood events have been known to severely affect the species. In 2001 flooding destroyed much of the upper river aquatic vegetation. In some waterholes, 100 percent of ribbonweed beds were removed and had not returned after one year. During this time five Bellinger River snapping turtles were found with empty guts and there were signs that reproduction had not occurred (Spencer et al., 2014). Floods are also known to destroy turtle nests (Blamires et al., 2005).

Hybridisation

The possibility of hybridisation between Bellinger River snapping turtles and Murray River turtles was first raised in 2007 and was based on individual animals that featured morphological characteristics of both species (Georges et al., 2007; Spencer et al., 2007). In August 2015, analysis using nuclear genetic markers confirmed that the two species are hybridising and this hybridisation is leading to introgression in both the Bellinger and Kalang Rivers (Georges and Spencer, 2015). The high level of hybridisation and introgression demonstrated in individuals from the Kalang precludes the Kalang from being considered as a natural insurance population for the species (Georges and Spencer, 2015).

Hybridisation with the Murray River turtle should be considered an actual threat to the Bellinger River snapping turtle. The removal of a large proportion of Bellinger River snapping turtle adults from the Bellinger River following the mortality event in 2015 may have implications for a further increase in the number of Murray River turtles which, in turn, may have flow on effects in the possible incidence of hybridisation.

Possible interspecific competition

Interspecific competition is a potential threat. Competition between species of *Emydura* and *Myuchelys* is likely to occur when in sympatry (Spencer et al., 2014). The two genera coexist in many catchments, although one genus is usually locally abundant, with competition potentially limiting population numbers of the other. In the Bellinger River, interspecific competition may occur between Bellinger River snapping turtles and Murray River turtles due to similar habitat preferences, diets and life histories (Spencer et al., 2014).

The likelihood that the Murray River turtle is a recent introduction to the Bellinger River identifies it as a potential invasive species (Georges et al., 2007; Spencer et al., 2014) and there is a strong possibility that it is increasing in abundance, as indicated by a relatively high number of juveniles in the population (Spencer et al., 2014). The removal of a large proportion of Bellinger River snapping turtle adults from the river following the mortality event in 2015 may have implications for a further increase in the number of Murray River turtles which, in turn, may influence the degree of competition between the species.

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 Very severe reduction	Endangered Severe reduction	Vulnerable Substantial reduction
A1	**≥ 90%**	**≥ 70%**	**≥ 50%**
A2, A3, A4	**≥ 80%**	**≥ 50%**	**≥ 30%**

A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

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.

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*]

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.

based on any of the followin

(a) direct observation [*except A3*]

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

(d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

Evidence:
The number of dead adult turtles found during the disease outbreak of 2015 corresponds to at least a 14 to 27 percent reduction in the population. However, not all dead or dying turtles would have been found as many may have died in the water and been scavenged or washed downstream, while others may have moved too far beyond the water's edge and not been found. Spencer (2015) noted that the toll was likely to be far greater as a flood in late February 2015 had removed many of the bodies.

While a precise estimate of overall mortality is unavailable, an approximation can be made by comparing the relative proportions of juveniles in the Bellinger River snapping turtle population (Chessman, 2016). In 2007 the proportion of juveniles was approximately 5 percent while in 2016 it is approximately 82 percent. Assuming no substantial change in detectability of adults or juveniles across surveys, this corresponds to a mortality of adults of close to 99 percent.

A similar approximation can be made by comparing the proportions of Belllinger River snapping turtles to Murray River turtles, the latter of which have not been affected by the disease. In the period 1988-2004 Murray River turtles made up only 2 percent of captures (Blamires et al., 2005), 17 percent in 2007 (Spencer et al., 2007) and rose to 63 percent in 2015. This equates to a decline in Bellinger River snapping turtles of 98 percent in comparison to the 1988-2004 data and 87 percent in comparison to the 2007 data (Chessman, 2015). However, such an approximation requires the assumption that the Murray River turtle population has remained stable, which may not be the case for a recent introduction (Georges et al., 2011). Nevertheless, assessment of decline under this criterion refers only to the number of mature individuals in the population. The approximation considered here includes juveniles which, given the increased proportion of juveniles noted in the previous paragraph, likely considerably underestimates the decline of mature individuals of the species from the disease outbreak.

The moderate proportion of juvenile Murray River turtles in the catch from 2015 suggests that the increase in the ratio of Macquarie: Bellinger turtles is due principally to the collapse of the Bellinger River snapping turtle population rather than to mass recruitment of Murray River turtles.

The data presented above appear to demonstrate that the species is **eligible for listing as Critically Endangered (A2ab)** under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' 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 2.	**Geographic distribution as indicators for either extent of occurrence AND/OR area of occupancy**		
	Critically Endangered Very restricted	**Endangered Restricted**	**Vulnerable Limited**
B1. Extent of occurrence (EOO)	**< 100 km^2**	**< 5,000 km^2**	**< 20,000 km^2**
B2. Area of occupancy (AOO)	**< 10 km^2**	**< 500 km^2**	**< 2,000 km^2**
AND at least 2 of the following 3 conditions indicating distribution is precarious for survival:			
(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:

With the Kalang River excluded from the previous natural distribution of the Bellinger River snapping turtle due to the level of hybridisation (see Threats above) the Area of Occupancy is approximately 70 km^2 (using the IUCN 2x2 km grid approach) and the Extent of Occurrence is approximately 104 km^2 (Ruming, 2016). As the latter is so close to the 100 km^2 threshold, the distribution of the Bellinger River snapping turtle is considered to be very restricted.

There is only one population of the species and a continuing decline can be inferred based on the potential for further effects of the disease outbreak, hybridisation with the Murray River turtle and egg predation by introduced predators.

The data presented above appear to demonstrate that the species is **eligible for listing as Critically Endangered (B2ab(v))** under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' 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. Population size and decline				
		Critically Endangered Very low	**Endangered Low**	**Vulnerable 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 25% in 3 years or 1 generation (whichever is longer)**	**High rate 20% in 5 years or 2 generation (whichever is longer)**	**Substantial rate 10% in 10 years or 3 generations (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:

In early 2015, prior to the disease outbreak, the total population size of the Bellinger River snapping turtle was estimated to be between 1600 and 3200 (New South Wales Scientific Committee, 2016). The evidence presented under Criterion 1 above suggests that the population has declined by at least 87 percent from the 2007 survey, with the decline in the number of mature individuals likely considerably higher. The population of mature individuals is expected to be less than 2500 individuals but while it is possible it has declined to below 250 mature individuals, this cannot be concluded with confidence.

A continuing decline can be inferred based on the potential for further effects of the disease outbreak, hybridisation with the Murray River turtle and egg predation by introduced predators. All mature individuals are contained within a single subpopulation.

The data presented above appear to demonstrate that the species is **eligible for listing as Endangered (C2a(ii))** under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' 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. Number of mature individuals			
	Critically Endangered Extremely low	**Endangered Very Low**	**Vulnerable Low**
Number of mature individuals	**< 50**	**< 250**	**< 1,000**

Evidence:

In early 2015, prior to the disease outbreak, the total population size of the Bellinger River snapping turtle was estimated to be between 1600 and 3200 (New South Wales Scientific Committee, 2016). The evidence presented under Criterion 1 above suggests that the population has declined by at least 87 percent from the 2007 survey, with the decline in the

number of mature individuals likely considerably higher. The population of mature individuals is very likely less than 1000 individuals but while it is possible it has declined to below 250 mature individuals, this cannot be concluded with confidence.

The data presented above appear to demonstrate that the species is **eligible for listing as Vulnerable** under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' 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 Immediate future	**Endangered Near future**	**Vulnerable 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:

Population viability analysis has not been undertaken, there are insufficient data to demonstrate if the species is eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' 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 recovery plan for this species has not yet been determined. The purpose of this consultation document is to elicit additional information to help inform this decision.

Conservation and Management Priorities

Habitat loss disturbance and modifications

- Implement measures to reduce sand and silt run-off from unsealed roads upstream of Thora. Such sediment may increase turbidity and degrade habitat quality when silt deposition smothers patches of aquatic vegetation and rock substrates.

Invasive species

- Manage sites by protection of nests from predation by foxes and feral pigs.
- Consider implementing a program to remove Murray River turtles from the Bellinger River to reduce the threats of hybridisation and competition.

Disease

- Implement suitable hygiene protocols including washing and sterilisation of any equipment to be used in research or management of the species.
- Continue to maintain a captive population for breeding and supplementation of the wild population once the nature of the disease risk is understood and has passed.
- Consider collection of more wild individuals to supplement the current captive population or establishment of a second captive population.

Stakeholder Engagement

- Continue to maintain awareness of the conservation status of the Bellinger River snapping turtle amongst landholders adjacent to the river and river users. Encourage those stakeholders to follow hygiene protocols to prevent the disease spreading, and to report any further potential disease outbreaks.
- Encourage stakeholders to look for signs of turtles nesting and to implement nest protection where possible.

Survey and Monitoring priorities

Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary

- Design and implement a monitoring program or, if appropriate, support and enhance existing programs to assess the demographics of the wild population and to identify at an early stage any further disease outbreaks. It will be particularly important to assess the proportion of mature females in the population and whether they are breeding successfully.
- Monitor the population of Murray River turtles to determine whether it is expanding and may present a barrier to recovery of the Bellinger River snapping turtle population.

Information and research priorities

- Continue research to indentify and understand the nature of the disease outbreak in the Bellinger River.
- Continue research into the extent of hybridisation of Bellinger River snapping turtles and Murray River turtles and whether this is increasing.

Collective list of questions – your views

- Can you provide any further information to assist in assessing the scale of the population decline of the Bellinger River snapping turtle?

- Can you provide further information on the current size and demographics of the Bellinger River snapping turtle population?

- Can you provide any further information on the likely future trend in the Bellinger River snapping turtle population? This may be based on current and projected population structure, or on whether the level of threat(s) is expected to continue.

- Can you provide any further information on the nature of the disease threat to the Bellinger River snapping turtle? This may include, but is not limited to, information on the identity of the disease agent, whether it remains in the wild population or whether the Bellinger River snapping turtle has, or may in future, developed any resistance to the agent.

- Can you provide any further information on the population size or trend of the Murray River turtle?

- Can you provide any information on nest site location and/or suggest appropriate methods to protect nests from predation?

- Can you provide additional or alternative information on threats, past, current or potential that may adversely affect this species at any stage of its life cycle?

- What planning, management and recovery actions are currently in place supporting protection and recovery of the species? To what extent have they been effective?

- Can you provide any specific guidance with respect to the establishment and maintenance of a captive breeding program?

- Can you recommend any additional or alternative specific threat abatement or conservation actions that would aid the protection and recovery of the species?

- Can you identify appropriate individuals or organisations to assist in the conservation actions identified above?

References cited in the advice

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