

Submission on draft action toolbox for Bell's turtle (*Elseya belli*)

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The following comments are based primarily on initial findings from my current research program on Bell's turtle and associated observations. A manuscript arising from this work, recently accepted for publication in the Australian Journal of Zoology, accompanies this submission.

Action 1.

Survey the entire range of the Bell's turtle, starting with previously researched sub-populations, in order to establish current population density and distribution. Sub-sample using capture techniques to verify the usefulness of more cost-effective methods (e.g. basking survey) across different habitat types.

Comments on action 1.

- To date I have surveyed 60 localities in the New England region and thereby mapped the current distribution of Bell's turtle in some detail.
- Estimation of population density requires further work and is an objective of the next phase of my research.
- I have found fyke and 'cathedral' nets to be effective capture techniques. Bell's turtles can be collected by diving in some cases. Basking surveys are unlikely to be useful because in my experience basking is rare in NSW populations.

Action 2.

Document the current health status of all Bell's turtle using rapid survey techniques to detect animals showing disease symptoms similar to those observed in George's turtle. Prepare and follow strict hygiene protocols for all work.

Comments on action 2.

- To date I have not observed any Bell's turtles with disease symptoms matching those recently reported for Georges' turtle.

Action 3.

Educate local stakeholders and recreationists who may come across dead or sick turtles on symptoms and response so as to increase sampling effort and coverage. Provide twice-yearly educational press releases in local newspapers.

Comments on action 3.

- Public reporting is likely to be critical should a disease outbreak occur in a population of Bell's turtle or another species. My research can provide only periodic observations at selected locations.

Action 4.

Install signage at main access points to Bell's turtle habitat to inform fishers and other recreationists of hygiene protocols required to prevent disease transfer. Use all media opportunities available to emphasise the need for careful attention by the broader community.

Use signage and media to inform fishers of the species' vulnerability and encourage safe release of captured turtles, with consideration of more degradable hooks.

Comments on action 4.

- Better understanding of the virus affecting Georges' turtle, e.g. of its distribution, means of transmission, and virulence in different turtle species, is needed to inform risk management for Bell's turtle.
- Some recreational fishers kill turtles deliberately and some may be unaware that this practice is illegal.
- The licensing process for recreational fishing might also be used to inform fishers about the protected status of turtles, appropriate procedures to reduce the impact of fishing on turtles, and how to report illegal harming of turtles.

Action 5.

Determine the cost-effectiveness of locating turtle nests using sniffer-dogs and protecting them with inverted mesh cages from which hatchlings can exit. Focus on Bell's turtle nests if olfactory selectivity is feasible.

Comments on action 5.

- Better understanding of population dynamics is needed in order to determine whether actions to increase hatchling recruitment are necessary for population persistence. Population dynamics are an intended focus of my future research.
- If enhanced recruitment is necessary, artificial incubation of eggs obtained from gravid females may be more cost-effective than attempting to locate and protect nests.

Action 6.

If demographic models indicate that recruitment is inadequate for viability, and predation cannot be cost-effectively controlled, explore potential for gathering eggs from females or nests and raising hatchlings for safe release (as has been trialed with this and other species).

Comments on action 6.

- Please see comments on action 5.

Action 7.

Document sites where water is being drawn from turtle habitat, and work with property owners to decrease the impact of this action.

Comments on action 7.

- Any water extraction within or upstream of reaches inhabited by Bell's turtles will affect habitat availability to some degree. However, my impression from field work is that the effect of extraction is likely to be much smaller than that of climatic fluctuations.
- The importance of availability of riffle-run habitat for night-time foraging by Bell's turtles needs to be better understood. Water extraction in dry periods may affect the availability of such habitat.

Action 8.

Work with landholders to create interest and incentives to protect turtle habitat, primarily through fencing and the creation of non-riparian water points for livestock. Select sites where feral pig exclusion is cost-effective, and encourage landholder to enter into agreements to manage habitat appropriately (preferably in-perpetuity covenants or stewardship agreements).

Comments on action 8.

- Bell's turtles rely on deepwater habitat for daytime and drought refuge. Protection of deep pools that are threatened with infilling as a result of bank erosion and mobile sediment is likely to be beneficial.

Action 9.

Identify high priority sites with turtle habitat and implement restoration and rehabilitation of locally native riverbank vegetation to improve water quality and nesting habitat.

Comments on action 9.

- Better understanding of nest-site selection and nest survival is needed to inform this proposed action.

Action 10.

Conduct targeted research to assess the effects of flooding on habitat quality, food resources, turtle health, reproduction and survival (following similar work on George's turtle and other species).

Comments on action 10.

- On available evidence, drought is likely to be a greater threat than flooding.

Other comments

- My research has revealed the existence of a population of the Macquarie turtle, *Emydura macquarii*, in Lake Copeton. I strongly suspect this population to be the result of turtle translocation (e.g. release of unwanted pets) because the Macquarie turtle is absent elsewhere in the Gwydir River system upstream of the Gwydir River gorge.
- The Macquarie turtle appears to be a superior competitor to Bell's turtle, and there is potential for the Macquarie turtle to expand its range upstream of Lake Copeton and to displace Bell's turtle from the upper Gwydir River system over time.
- I therefore suggest addition of an action or actions to (1) further investigate the Macquarie turtle population in Lake Copeton to determine its size and likely origin (through molecular genetic analysis), (2) remove or control this population to prevent its expansion into the upper Gwydir River system and (3) educate the public about the potential undesirable consequences of releasing aquatic animals.