

## Supplementary material for

### A pain in the neck: weak links are not a reliable release mechanism for radio-collars

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## Appendix S1. Survey instrument

Thank you for taking this survey. Please read the following definitions before you start.

Radio-telemetry is a tool commonly used in wildlife research. Telemetry devices are often attached to animals by way of a radio-collar, a closed band of material fitted to the neck of an animal. Radio-collars will house a VHF transmitter and battery, but often also include other components such as GPS loggers, accelerometers, mortality sensors etc.

In an effort to make sure collars are only attached to animals temporarily biologists commonly add components to allow collars to fall off such as:

- Weak links – closure attachments or inserts of material that are designed to corrode, degrade or wear away until the structural integrity fails, allowing the collar to fall off the animal
- Release mechanism – electrical component on the collar that can be (1) pre-programmed to release collar from animal at a specified time or (2) remotely controlled, triggering the collar to be released from the animal. This survey will not be asking about release mechanisms.

1. Have you used radio-collars on medium sized (35g – 5.5kg) native mammals in Australia during the last ten years?

- Yes
- No (Go to: End of Survey)

All of the questions in this survey relate to your work on medium sized (35g – 5.5kg) native mammals in Australia ONLY.

- Please do not include collaring work on introduced species, large mammals (average weight >5.5 kg), or non-mammalian species.
- Please only answer with regards to your own personal experience and opinions (not that of your group of organisation).

2. How many collars would you estimate you have deployed in total, across all of your projects on medium-sized mammals?

- <20
- 21–50
- 51–100
- 101–500
- 501+

3. Which medium-sized mammals have you deployed collars on? (Select all that apply.)

- Dasyurids
- Bandicoots and bilbies
- Cuscus, possums and gliders
- Rat kangaroos, bettongs and potoroos
- Wallabies, hare-wallabies and rock-wallabies
- Pademelon and quokkas
- Rodents
- Other (fill in box appears when checked)

4. Were you required to obtain ethics approval for radio-collaring?

- Yes
- No

5. When deploying collars, were there written guidelines you were required to follow? (Select all that apply.)

- No. I was not required to follow any formal guidelines or procedures.
- Yes, my organisation had a Standard Operating Procedure (SOP) or equivalent documentation for radio-collaring that I was expected to follow.
- Other. Please explain: \_\_\_\_\_

5. The first time you deployed radio-collars on animals did you have any of the following experiences (select all that apply):

- You received formal training from someone experienced in radio-collaring
- You were required to work under the supervision of someone experienced in radio-collaring

- You received advice from someone experienced in radio-collaring prior to commencing your work
- None of the above
- I cannot remember

We would now like you to think of the last project where you deployed radio-collars on medium-sized mammals.

6. What species was being collared in this project? \_\_\_\_\_

7. How many collars were deployed? \_\_\_\_\_

8. What was the status of the animals being collared?

- Adult animals within a resident population
- Juvenile or subadult animals within a resident population
- Animals being moved/translocated to a new location beyond resident population or from captivity
- Other (please specify): \_\_\_\_\_

9. Did you sedate the animals in order to fit the collars?

- Yes
- No

10. Did you recapture any animals to check the fit of the collar?

- Yes
- No

11. Did you intend to retrieve collars in your original project plan/s?

- Yes
- No (expands to) Why not? \_\_\_\_\_ (Skip to Q15)

12. In your original project plan, what was the desired timeframe that the animals would wear the collars?

- Short term (less than three months)
- Medium term (more than three months, less than nine months)
- Long term (more than nine months)

13. What percentage of collars were you successfully able to retrieve?

- 0%
- <10%
- 11–25%

- 26–50%
- 51–75%
- 75–99%
- 100% (skip to Q15)

14. How often did the following problems prevent you from retrieving collars?

Reason	Never	Occasionally ( $<10\%$ of collars)	Sometimes (11–49% of collars)	Frequently (more than half of collars)
Transmitters failed and could not be tracked				
Transmitter battery expired before the animal could be recaptured				
Animal moved out of the study area and was lost				
Ran out of time or funding for work before collars were removed				
Other (please state): _____				

15. Have you ever used weak links in any collars you have fitted to medium-sized Australian mammals?

- Yes
- No (skip to 23)

16. Think back to the last time you used weak links in radio-collars. Is this the same project you just described?

- Yes, the weak links were used in my last collaring project (skip to 19)
- No, the last time I used weak links was for a different project

17. What species was being collared in your weak links project? \_\_\_\_\_

18. How many collars with weak links were deployed? \_\_\_\_\_

19. Can you please describe the weak links that were used in as much detail as possible. If the weak links were custom made, describe the material and design. If you purchased

commercially available weak links, please provide the brand and model information. *(text box response)*

20. Did the weak link material work in the intended manner? (Select all that apply)

Answer	Never	Occasionally (<10% of weak links)	Sometimes (11–49% of weak links)	Frequently (more than half of weak links)
Yes, collars dropped off within the intended timeframe without the need to recapture the animal				
No, the weak links were still intact (animal was still wearing the radio-collar) when the transmitter battery expired.				
No, the animal was recaptured when the transmitter batteries were due to expire and the weak links were still intact				
No, the weak link failed earlier than intended and research information could not be adequately captured				
Unknown (e.g. animal died, animal moved out of study area, collar removed earlier than intended study period).				

21. Describe the failure timeframe for the weak links. For example, how long did the weak links typically last and did they fail within a consistent or variable timeframe? *(textbox)*

22. Were there any complications or unintended negative effects on animals caused by the use of weak links? Please describe *(textbox)*

The following questions relate to all of your experience collaring medium-sized Australian mammals.

23. Have you ever experienced any of the following problems when collaring medium-sized mammals?

Answer	Never	Very Rarely (<1% of animals)	Occasionally (2–10% of animals)	Sometimes (11–49% of animals)	Frequently (more than half animals)
The animal got a limb caught in the collar					
The collar got caught on or in something else (e.g. a branch)					
Rubbing from the collar resulted in skin lesion or a skin infection					
Other (please specify): _____					

24. On occasions where you have experienced problems with the design or function of radio-collars did you contact the manufacturer to notify them of any issues?

- Yes I did.
- No I didn't (Skip to 26)
- I have not had problems with any radio-collars that I have used (Skip to 26)

25. When you contacted the manufacturers with issues did you receive a response?

- Yes, I received a response that I found helpful and thought would improve the collars for use in future studies
- Yes, I received a response but I found it unhelpful
- No, I did not receive a response

26. In your opinion, is it acceptable for animals to wear collars from the time of deployment until the point of death (i.e., for the remainder of their life)?

- Yes
- No

- Sometimes

Please explain your choice: *(textbox)*

27. Have you ever deployed collars on animals with the intention of collecting data for the remainder of the animal's lifespan?

- Yes
- No

28. In your experience have you observed any signs that radio-collars may contribute to decreased survivorship of animals that are wearing them?

- Yes. Please explain. \_\_\_\_\_
- No

29. Do you have any other general comments on collars or collaring techniques? *(textbox)*

30. In what context were you working with Australian mammals when you were using radio-collars as described here?

- Undergraduate student
- Research Student (e.g. Honours, Masters or PhD)
- University researcher
- Government Researcher
- Government wildlife or conservation management
- Consultant
- Non-government conservation organisation
- Other \_\_\_\_\_

31. Which state were you conducting the radio-collar research that you described in the survey?

- ACT
- New South Wales
- Northern Territory
- Queensland
- South Australia
- Tasmania
- Victoria
- Western Australia
- Across state boundaries or other \_\_\_\_\_

32. Do you have any other comments or notes that you wish to make? *(textbox)*

33. Can we contact you if we have any further questions?

You do not need to share your contact details; simply select 'No' to enter your survey anonymously.

If you choose to share your contact details, your identity and contact details will be held in confidence. They will not be published, shared or made public. We will only use your contact details if we have a question about your survey responses (e.g. to clarify answers that lacked detail, gather more information on unusual problems with collars, gather more detail on innovative weak link materials, share information requested in the 'other comments' section, etc.). If we do contact you and you do not feel comfortable providing extra information, you can choose not to reply to the email.

- No (go to End of Survey)
- Yes

34. Please fill in your contact details:

Name: \_\_\_\_\_

Email: \_\_\_\_\_

*End of Survey:*

Thank you for taking the time to fill out the survey. We hope that the responses will help to inform best practice for collaring medium-sized Australian mammals.