

We thank the editor and reviewer for their comments on the revision. We included point-by-point responses to comments below in italics.

Revision round #2

Decision for round #2 : *Revision needed*

Dear Authors,

First I really want to apologize for the time it has taken me to get back to you with this decision.

Your preprint entitled “The importance of sampling design for unbiased estimation of survival using joint live-recapture and live resight models” has now been reviewed, by one of the previous reviewers. As you will see, the reviewer was positive about the revision and had no more major comments, but still highlight a few points that you should carefully address before I can recommend your pre-print.

In addition to the reviewers comments I have the following feedback:

- 1) Regarding my previous comment on the use of STAN for one model vs MARK for another, thank you for your explanation. Please add it in the main text so that the reader (who may not look into the review history) can read it too.

Author response: We have added this information to the Methods section for the single-state model (first sentence under ‘Single-state Barker joint live resight model’) and multi-state model (second paragraph in the section ‘Multi-state JLRLR model’).

- 2) Also you still didn’t answer whether STAN was used in a Bayesian framework or not (but I guess so from the code). Please provide brief information on which priors were used, (even if in the appendix), and which diagnostics tests were performed for the convergence of the 3 chains (Gelman Rubin \hat{R} statistics?) and assessing the fit of the model (e.g., any posterior predictive checks?).

Author response: We have added the word “Bayesian” here: “In attempt to minimize bias associated with non-representation bias, we developed a Bayesian multistate version of the Barker JLRLR model.” We have also added information about the priors, etc, as requested.

- 3) Same regarding the answer to Reviewer 1’s previous comment: “Table 1: why select 26 sites in the random + fixed but only 24 in the fixed and random only designs?”. Please justify in the text as well (including for the case with the updated number of sites).

Author response: We have included information about the differences in resight sites towards the end of the first paragraph in 'Resight sampling design'.

I look forward to reading the revised version of this preprint.

Best wishes,

Matthieu

by [Matthieu Paquet](#), 04 Oct 2024 16:36

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version: 2

Review by Rémi Fay, 11 Sep 2024 12:52

It is the second time I review this manuscript that assesses the influence of resight sampling design of a CMR monitoring on survival probability estimated by a Barker joint live-recapture/live-resight model. I appreciated the efforts the authors have done to improve the manuscript, especially rewriting of the methods, the clarification the conceptual figure 1 and the new complementary analyses. Overall, the manuscript is now clearer. After reading this second version, I have no major concern but I find several points that could be improve.

While improvement have been made for the method section, I think slightly more could be done. Readable structure is key for manuscript clarity.

The first paragraph of the motivation section provides information that justify the simulation design. I suggest to rename this section "Motivation of the simulation design", because overall motivations are expected to be given in the introduction. The second paragraph is a mixed of introduction (l. 146-150), and simulation design (l. 151-156) which is fully developed in the following section. I suggest the move these information where they are expected to be (i.e. introduction and simulation design respectively). Additionally, the "Simulating animal movement" seems to appears out of nowhere to me. I think the second sentence could be merged with the motivation section, and the other could be reduced and merged with the paragraph explaining how data were simulated. The mention of the alternative scenario with lower recapture probability could be introduced along with the alternative scenario investigating the influence of sample size (l. 218).

Author response: Thanks – we made these proposed changes, including renaming the 'Motivation' section, moving the second paragraph of the Motivation section to the Intro/Methods, deleting the 'Simulating Animal movement section", and moving the description of Appendix A to the end of the Methods section.

During my previous review I expressed concern with the confusion between probability and percentage. These are two different things. I note that the other reviewer had the same concern. I think it is fair to make changes when reviewer concerns converge.

Author response: We have changed survival and resight probabilities to scale between 0-1, as suggested.

In my previous review, I suggested to specify which data have been used to fit the CJS model. The author response is "Done". But I was not able to find this information in the manuscript...

Author response: Sorry about that- we have added "...compare it to apparent survival estimates from a CJS model that is fit to the same data but excludes resights"

Abstract: I suggest to simplify "is often confounded with emigration" instead of "is often confounded with permanent and temporary emigration"

Author response: Done

Note 1 (line 208): specify "from the capture site" after "emigration probability"

Author response: Done

I. 219 "Resight sampling design" instead of "Resight process" ?

Author response: Done

I. 220 Table 1 has been moved to the appendix. It should be Appendix C. Please check the correspondence between figure/table names throughout the text.

Author response: Good catch- thanks. We have corrected this.

"Three" instead of "four" scenarios shown with colors on figures?

Author response: Good catch- thanks. We have corrected this.

Please specify somewhere what is the number of simulations that have been done for each scenario.

Author response: Good catch- we have added "We simulated 100 data sets for each scenario."

I. 225: "inherently had higher resight events" instead of "inherently had higher resight probability" ? I. 226 Similarly could be "resight number" instead of "resight probability" ? I

found these formulations with probability confusing because resight probability is fixed (0.8).

Author response: We have changed this to "inherently had a higher marginal resight probability." The 0.8 resight probability is conditional on fish being in a resight site. Because a large proportion of fish do not leave the capture site, the marginal resight probability for designs where resight occurs in the capture site tends to be higher.

I. 299 remove "observed". I think this is not needed.

Author response: Done.

Would be nice to add a few sentences in the results section to mention the influence of sample size and detection probability on model performances with references to the corresponding appendix.

Author response: We have added text to the Results section to incorporate findings from Appendices A & B.

I. 454-455: "animals located into the capture site were more likely to be resight" instead of "animals resighted in the capture site were more likely to be resighted". To be crystal clear, would be useful to recall that individuals outside the capture site could be in site where there is no resight effort and so that the actual resight probability at the individual level is lower. Something trivial for you could be less for someone which read the manuscript for the first time.

Author response: We have changed the text to read "Animals located in the capture site", as suggested. While the reviewer is correct that individuals outside the capture site could be in a site without resight, this is describing 'unobservable resight bias' whereas these lines of text refer to 'non-representation bias'. We have tried to clarify by adding some additional text to the Discussion:

"Our results suggest that using a single-site Barker JLRLR model can lead to substantial non-representation bias in survival when animals in the capture site have resight probabilities that are non-representative of the population. Specifically, when the capture site was included in the resighting effort, captures were positively linked with resights (i.e., animals located in the capture site were more likely to be captured and resighted), and survival was underestimated. When the capture site was excluded from resight, the capture process was negatively related to the resight process (i.e., animals in the capture site were more capturable but less resightable than outside) and survival was overestimated. By using a multistate Barker JLRLR model with different resight probabilities inside and outside the capture site, the capture and resight processes were

spatially separated so that resight probabilities in the study site could differ from those outside the study site and this minimized non-representation bias.

Furthermore, our results suggest that unobservable resight bias was also present in Barker JLRLR models, as evidenced by negative survival biases when the capture site was included in resight (designs 3 & 5), and the observation that these designs led to a subset of animals that became unobservable (i.e., animals that emigrated from the capture site to a site where no resight occurred). This type of bias is similar to that produced by CJS, where emigration and survival are confounded (i.e., apparent survival). However, note that survival estimates from designs 3 & 5 in the Barker JLRLR model were more accurate than survival estimates from CJS models, suggesting that Barker JLRLR survival estimates could serve as a lower bound for true survival that could account for some (but not all) permanent emigration from the capture site."

Appendix A: I suggest to remove the figure A1 and the table A1 which are just repetition of figure 2 and appendix C. Please refer directly to these figure and table

Author response: Figure A1 and Table A1 demonstrate the sites that were selected for the low observability scenario. Note that there are fewer sites for resight in Appendix A compared to the simulations in the main paper, so these tables/figures are not redundant.