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Department of Mathematics and Statistics

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Dear Editor,

We are submitting the manuscript entitled "The effect of recycled individuals in the Jolly-Seber model with tag loss". Recycled individuals occur in capture-recapture experiments when individuals lose all tags/marks and when recaptured, are wrongly considered new individuals. Thus, we aimed to study the effect of capturing these recycled individuals on parameter estimates and in particular abundance estimates.

Within the capture-recapture framework so far, recycled individuals are typically assumed to have a negligible effect. However, we have not seen any published literature studying to what degree and when is this assumption violated. We performed a simulation-based study offering clearer guidance and understanding to designers of mark-recapture studies. We illustrate the use of these models under various parameter assumptions and various lengths of studies to determine how much of an impact this issue can have on estimates.

We also offer a case study involving elephant seals. Recycled individuals would not normally be obvious within a data set as they would automatically be considered new individuals. However, in the elephant seal data, individuals were branded as well as tagged; thus, this issue could be explored and we offer new insights on experimental design and parameter estimates.

The novelty of this work lies in confirming expectations about how recycled individuals affect parameter values and offers guidance to practitioners on when they should be most concerned with this issues.

Sincerely,

Dr. Laura Cowen