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***“BAYESIAN METHODS FOR ALTERNATIVE RECAPTURE  
MODELS WITH HETEROGENEITY”***

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# Bayesian Methods for Alternative Recapture Models with Heterogeneity

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*Abstract:* In the context of capture-recapture experiments heterogeneous capture probabilities are often perceived as one of the most challenging features to be incorporated in statistical models to draw inference on the unknown population size. The presence of unobservable heterogeneity not explained by available information basically reduces the information of the whole recapture experiment on the population size. In fact some authors argue that only with explicit hypotheses on the characteristics of the distribution of the heterogeneous probabilities one can produce reasonably safe estimates on the unknown population size. In this sense one can easily realize how crucially the effectiveness of Bayesian analysis might depend on the elicitation of prior input. Here we extend the availability of competitive alternative Bayesian techniques for capture-recapture models when heterogeneity of capture probabilities is at stake. We exploit a fully general parametrization of the individual capture probabilities based on the first moments of its distribution, which avoids nonidentifiable assumptions on that distribution. We provide some empirical evidence of the criticality of the prior input and then the effectiveness of the method proposed. We also explore some recent techniques in order to address the problem of model choice.

*Key words and phrases:* Capture-recapture models; Heterogeneity; Bayesian inference; Population size; Jeffreys Prior; Model choice.

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