

## Objective Bayesian analysis for a capture–recapture model

Chang Xu · Dongchu Sun · Chong He

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**Abstract** In this paper, we study a special capture–recapture model, the  $M_t$  model, using objective Bayesian methods. The challenge is to find a justified objective prior for an unknown population size  $N$ . We develop an asymptotic objective prior for the discrete parameter  $N$  and the Jeffreys' prior for the capture probabilities  $\theta$ . Simulation studies are conducted and the results show that the reference prior has advantages over ad-hoc non-informative priors. In the end, two real data examples are presented.

**Keywords** Capture–recapture · Objective prior · Frequentist property