

Bayesian Estimation of Probability at Distance Zero Using a Double Platform and Heterogeneity Model

João Filipe G. Monteiro¹ and Russell Alpizar-Jara¹

¹ CIMA/Department of Mathematics, University of Evora, Portugal

Capture-recapture and line transect models have been widely used to estimate animal population size. We estimate probability at distance zero using a combined model of line transect and capture-recapture, when capture probabilities vary by occasions and depend on individuals' characteristics. We consider models for closed populations, which assume that the number of individuals in the population remains constant during the study period. It is known that an estimator for population size is biased under the presence of heterogeneity in capture probability, relative to the inherent characteristics of the individuals. This sort of unobservable heterogeneity is difficult to measure. The problem has been traditionally approached using capture-recapture models for closed populations, designated by M_h and M_{th} . Here we use logistic regression to model observable heterogeneity in individual capture probabilities using covariates, such as, sex, age and weight. Non-observable heterogeneity is modelled as random effect through a Bayesian approach. The performance of probability at distance zero estimators based on combined M_{th} models will be analysed and compared when only observable heterogeneity is modelled, and when both observable and non-observable heterogeneity are modelled. Our results are supported by simulations and an example is presented for illustration purposes.