

General model-based methods for distance sampling

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Abstract: In distance sampling, distances of detected animals from a line or point are used to estimate animal density and abundance. Conventional distance sampling is a hybrid method; probability of detection is estimated from the recorded distances using model-based methods, while encounter rate (number of animals per unit distance for lines, number of animals per visit to a point for points) is estimated using design-based methods. In the last decade, there has been much interest in developing methods that are fully model-based. Such methods allow inference on the relationships between animal density and covariates. By including random effects, spatial and temporal correlations may be accommodated. We explore the potential for full likelihood approaches to distance sampling, using either maximum likelihood or Bayesian methods for fitting. We discuss how key assumptions of standard distance sampling may be relaxed in a model-based framework, and speculate on future developments.