

Modelling latent animal movement in distance sampling and spatial capture-recapture

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Abstract: Distance sampling and spatial capture-recapture are statistical methods to estimate the number of animals in a wild population based on encounters between these animals and scientific detectors. Both methods estimate the probability an animal is detected during a survey, but do not explicitly model animal movement and behaviour. The primary challenge is that animal movement in these surveys is unobserved; one must average over all possible histories of each individual. In this talk, a general statistical model, with distance sampling and spatial capture-recapture as special cases, is presented that explicitly incorporates animal movement. An efficient algorithm to integrate over all possible movement paths is given to overcome the computational obstacles. The model is then applied to both simulated and real data to estimate abundance, detection, and movement jointly.

Key words: Distance sampling; capture-recapture; animal movement; hidden Markov model

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