

Double-observer distance sampling methods: a limiting independence model

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SUMMARY Double-observer distance sampling methods are becoming increasingly widespread, especially for the estimation of marine mammal abundance from aerial and shipboard line transect surveys when detection of animals on the line is uncertain. Models that assume full independence between observers typically underestimate abundance in the presence of heterogeneity in detection probabilities. The assumption of point independence (in which independence is only assumed on the line or at the point) allows less biased estimation. We consider extending this idea to the case that independence is only assumed in the limit, as the probability of detection for an observer tends to unity. We show how this method can be used to reduce bias in abundance estimates, or to assess the assumptions of full independence or point independence. We test the methods by simulation, and illustrate them using real data sets.