Inferring habitat use, population distribution and total population size by combining individual-level and population-level data

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Abstract: Winter track counting is a non-invasive population survey method developed for terrestrial mammals. We represent a spatio-temporal Bayesian smoothing model extending the classical result to convert transect crossing counts of animals to population density. The model combines population-level counts with individual-level movement activity and habitat use from GPS tracking information. We infer the movement activity from individual traits and biotic and abiotic factors, with a correction for straight-line distance bias, and the habitat use with a step selection function approach. Furthermore, we adjust the results to match with the population using removal statistics. We demonstrate use of the model with a survey of large temporal and spatial scale and verify population size estimates with assessments from independent sources.

References
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