VARIANCE OF STRATIFIED SURVEY ESTIMATORS WITH PROBABILITY OF DETECTION ADJUSTMENTS

John Fieberg and John H. Giudice

ABSTRACT

Estimates of wildlife population sizes are frequently constructed by combining counts of observed animals from a stratified survey of aerial sampling units with an estimated probability of detecting animals. Unlike traditional stratified survey designs, stratum-specific estimates of population size will be correlated if a common detection model is used to adjust counts for undetected animals in all strata. We illustrate this concept in the context of aerial surveys, considering 2 cases: 1) a single-detection parameter is estimated under the assumption of constant detection probabilities; and 2) a logistic regression model is used to estimate heterogeneous detection probabilities. Naïve estimates of variance formed by summing stratum-specific estimates of variance may result in significant bias, particularly if there are a large number of strata, if detection probabilities are small, or if estimates of detection probabilities are imprecise.
