Assessing the use of counts of migrating birds to estimate broad-scale population trends

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Abstract: A large part of the Canadian boreal forests lies north of human populated regions, and therefore beyond the northern extent of the North American Breeding Bird Survey. Daily counts of birds as they migrate through more populated regions *en route* to or from their breeding grounds is considered a potential alternative to conducting more intensive breeding surveys in those regions. However, migration count data are currently analyzed on a site-by-site basis, and different sites could be capturing different sub-populations with different underlying rates of population change. Using simulated migration count data with known constant rate(s) of population change, we assessed the value of a network of migration monitoring sites for estimating regional and national population trends by determining 1) what level of precision in estimated trends could be achieved with varying numbers of monitoring sites under ideal scenarios for a common and rarely detected species (i.e., model assumptions match simulated data); 2) how much bias might be expected in population trends if model assumptions do not match underlying data (e.g., population trends vary geographically, but model assumes they are the same, or vice versa); and 3) whether model selection procedures (AIC) are able to detect and model regional variation in trends with current or increased numbers of sites. Simulated data were fit using a log-linear regression model with Poisson distribution of counts and hierarchical terms to account for stochastic site, year by site, and day by site effects. Models that assumed a single rate of change were compared to models that allowed the slope of the trend to vary among regions. Results will be discussed in terms of their implication for using a network of migration monitoring sites for broad-scale population monitoring.