scribed (the selected model had a sixth-degree polynomial log-trajectory and an intervention effect corresponding to the severe winter of 1976–1977, for a seven-parameter model). Fifteen of the 20 BBS routes in the Maryland Northern Piedmont Stratum had adequate data to fit the seven-parameter model. We fit the [illegible] dividual trend estimates for the component regions are "shrunk" toward the prior mean estimated for the collection, accommodating the differences in precision of the estimates (Link and Sauer 1996). These empirical Bayes estimates can then be averaged with weights of relative abundance and area to provide an estimated trend for the population total.

Spatial comparisons of relative abundance from BBS data must be viewed with some skepticism. The fundamental difference between spatial and temporal analysis of BBS data is that the assumption of consistency in detectability can be plausibly advanced in considering counts for individual observers taken at the same site, through time; this assumption is less plausible for comparisons of counts among routes at a large geographic scale. Regional differences in observer ability and basic regional differences in detectability of birds may exist, with the potential to bias estimates of relative abundance (Sauer et al. 1995). Unfortunately, little information is available on counts for individual observers at distant sites; hence, this component of detectability has never been modeled.

Conclusions

Analysis of count data should begin with the frank acknowledgment that counts are not necessarily very good surrogates for population sizes. Pattern in counts is reflective not only of corresponding pattern in population sizes, but also of corresponding patterns in the proportion of animals counted. Surveys producing count data should be designed, inasmuch as possible, to minimize variation in the proportion of animals counted. Complete removal of this variation is not likely to be possible, hence, analysts must be aware of potential sources of pattern in this proportion, and must design analytic methods accordingly. Thus, analysis of count data requires a delicate interaction among statistical modeling, biological intuition, and familiarity with the methods of the surveys producing the counts.

For the BBS, we have shown that several factors produce pattern in the proportion of birds counted; these include differences among observers and changes through time in the ability of individual observers. [illegible] through [illegible] e.g., Ken- [illegible] mmodate [illegible] Link and [illegible] ently sur- [illegible] eographic [illegible] opropriate

[illegible] Link and [illegible] modating [illegible] observer [illegible] and other [illegible] s of variance of trend, and can be applied at the scale of individual routes or regions. It also allows more complicated covariable analysis, as shown in the intervention analysis of the example. We feel that modeling on individual routes is unlikely to provide sufficient information for adequate modeling of start-up effects or higher level polynomials; hence, we apply the analysis at a relatively low geographic scale (physiographic strata within states) and then use weighted averages of these estimates to summarize trends at higher scales.

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Conclusions

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