

COMMENTARY

ESTIMATING TRENDS WITH A LINEAR MODEL: REPLY TO SAUER ET AL.
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Manuscript received 2 February 2004; accepted 4 February 2004.

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Abstract: Sauer et al. (2004) advocate the use of trend estimation models that adjust counts for differences among observers. We agree that such adjustments are sometimes needed, and we noted (Bart et al. 2003) that they may readily be carried out prior to using the estimation method we described. Including observer covariates, however, is not always necessary and substantially reduces precision, as Sauer et al. (2004) acknowledge. Furthermore, under plausible conditions, including observer covariables introduces bias rather than removing it. In addition, the weighting scheme used in the estimating-equations approach may introduce bias. Our method avoids these sources of bias, is simpler and more flexible than the estimating-equations approach (e.g., carrying out power and sample-size calculations is much easier with our approach), and has smaller standard errors than the estimating-equations approach, especially when counts fluctuate widely. Model-based methods, including the estimating-equations approach, also have advantages, particularly in assessing complex influences on the counts. We recommend that analysts consider both approaches; comparing results obtained with the different methods may be especially informative.

Key words: bias, Breeding Bird survey, indices, trends.