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SUMMARIZING REMARKS: OBSERVER VARIABILITY

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The authors of the papers merit commendation for tackling the problem of assumptions, a far more intricate task than had been expected. The central theme of this session is the observer, who makes mistakes and may be seriously handicapped in learning or seeing.

Robbins and Stallcup (1981) begin at the level of identification. They call attention to errors made by experienced observers. They present a valuable list of species likely to be confused. Lastly they present some criteria for deciding which census method is prone to errors of identification.

Scott et al. (1981b) examine the ability of people to estimate distances of the bird from the observer who may either see or hear the bird. They find, not surprisingly, that observers differ in ability to judge distances and also that species differ in characters that reveal distances. The combination of errors may result in considerable error in estimation of numbers. They provide a method of calculation of discrepancy between estimated and measured distances but it is sufficiently sophisticated to prevent use during a census. Perhaps a "field model" would be useful. The authors do not address the question "Are the deviations constant for observer and species?" But they do suggest some procedures to reduce deviations.

Kepler and Scott (1981) describe a training program which really adapts good teaching to the problem of errors by observer. Improvement during training was modest.

Cyr (1981) experimentally searches for deficiencies in ability to hear and identify birds. From audiograms he records differences in ability to hear different frequencies. He notes from the literature that older persons suffer loss of ability to hear high frequencies and finds that even young people have gaps in their ability. Such persons should not make counts. Cyr uses a tape for some experiments but one wonders about the fidelity of the tape. Hence, to what extent can conclusions drawn from such data be transferred to live birds?

Faanes and Bystrak (1981) examine abilities of trained (experienced) and untrained observers and find striking differences. Unfortunately they did not clearly separate differences due to training (e.g., learning a song) and physiological ability (e.g., hearing loss).

Emlen and DeJong (1981) determine the threshold distance at which a song or call can be heard by a young person with normal hearing. The distances can then be used in calculation of densities by a transect or point method.

As a group these papers indicate the problems of errors by observers but in only a few places suggest what to do. A drastic remedy for observer error is to eschew absolute densities and get relative counts. These make the encompassing assumption that the errors are the same throughout and cancel. But this remedy may be merely shifting from frying pan to fire.

Another remedy would be to eliminate rare species (which can't add much to a census) and to count difficult species by some special method devised for that species (e.g., a caprimulgid).

Still another remedy was hinted at: record the songs and then at leisure count and recount the birds, thereby reducing errors by observers. But the recording would have problems too.

The possibility that the observer causes error (e.g., cessation of song) was considered in other sessions but should be noted here because some observers will cause more than will others.

Lastly, I take this opportunity for a general injunction. Keep this method simple both in collection and calculation of data. I am editing a *Handbook of Census Methods for Terrestrial Vertebrates* and I find that the methods that are actually used (i.e., published) are simple, especially mathematically. My interpretation of this situation is that each particular author is primarily concerned with some particular topic (energy flow, management, habitat, etc.) and resists involvement in complicated census procedures. We can claim that the author is condoning inaccuracies and we may be correct, but he will nevertheless persist in the use of the simplest method.

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