Studies in Avian Biology No. 6:112, 1981.

SUMMARIZING REMARKS: ESTIMATING RELATIVE ABUNDANCE (PART II)

STANLEY A. TEMPLE[1]

We can begin this summary by reviewing the basic premises of studying relative abundances of birds. First, there should be a clear understanding that such estimates of abundance differ from absolute abundance because of biases that are often difficult to assess. It is usually hoped, however, that the estimate is at least nearly proportional to absolute abundance. Secondly, it should be recognized that estimates of relative abundance are useful primarily, if not exclusively, for making certain types of comparisons. They are most useful for comparisons within the same species between different time periods and localities, particularly when methodology has been consistent during the study. Although not as straight forward, comparisons between different methods are possible; comparisons between species are more difficult.

I can think of at least three situations in which a researcher would use measurements of relative abundance in preference to the more difficult measurements of absolute abundance. First, there are instances where data have been collected, or are fortuitously available, in such a form that it is impossible to determine absolute abundance. In this session we have heard about Christmas Bird Counts, Breeding Bird Surveys, migration counts, and atlas work.

Secondly, there are instances where a specific experimental design or objective can be most easily achieved by comparisons of relative abundance. We have heard of studies using mist-net captures to detect seasonal changes and using audio play backs to detect secretive birds.

Finally, there are situations when comparisons between time periods, localities, methods, observers (or interactions between these) cannot be justifiably made in a direct fashion, and only relative abundance can usefully be compared.

There is usually a challenge of making relative abundance data as comparable as possible before the actual comparisons are made. Even when we have not had strict control over how the data were collected, there are some simple ways to make data comparable.

One simple method is to use correction factors, not necessarily to make the estimate closer to absolute abundance, but to make comparisons more easily interpretable. We have heard about attempts to use correction factors to make migration counts more comparable between years when we know that weather, in addition to actual population change, has influenced observed numbers.

Another approach is to use a statistical method such as an analysis of covariance to adjust for sources of bias. I am surprised that we have not seen this approach being used more often. Data from migration counts and Christmas Bird Counts are certainly amenable to such analyses.

Another approach that has not been mentioned directly, but one that I feel has broad utility, is reducing data to simple terms before making comparisons (e.g., in terms of presence or absence, frequency of occurrence, rank abundance). This is a rather conservative basis for comparisons that can facilitate comparisons between time periods, localities and methods. For example, I used changes in frequency of occurrence on weekly checklists over a 37-year period to detect population changes in various species (Temple and Temple 1976). I have also compared mist-netting capture rates with results of nearby line-transect estimates. Although frequencies of capture and frequencies of detection were only weakly correlated, the rank correlation between the two measures of relative abundance was very strong.

I propose that Christmas Bird Count data could be analyzed in a similar way. If each party's checklist was treated separately instead of being combined into the count-circle total, it would be possible to calculate frequency of occurrence on party lists within the count-circle. In this way it would be possible to calculate the variance within the count-circle each year, and comparisons with other localities and years would be facilitated. An analytical change like this would avoid changes in field methodology that might discourage volunteer observers.

It seems clear that many, if not most, of our objectives in surveying bird populations can be adequately achieved by using relative-abundance data. If measures of relative abundance will allow detection of population changes that are interesting to study, perhaps we should not think of relative abundance as less appropriate a measurement than absolute abundance. I suspect that as we discuss other methods, we will find that all of them produce results that are really nothing more than relative abundances.

[1] Department of Wildlife Ecology, University of Wisconsin, Madison, Wisconsin 53706.