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REVIEW

Estimating numbers of terrestrial birds.—Studies in Avian Biology Number 6. C. John Ralph and J. Michael Scott (Editors). x + 630 pp., 1981. $20.00. Published by the Cooper Ornithological Society. Send orders to Allen Press, Inc., P.O. Box 368, Lawrence, Kansas 66044.—Subtitled "The proceedings of an international symposium held at Asilomar, California, October 26-31, 1980," this publication, containing citations to more than 1400 scientific papers, is an excellent summary of current research on avian censusing techniques. Fifteen state, national, and international organizations served as sponsors for the meeting, which was attended by approximately 400 people from around the world. The symposium drew so much interest because avian censusing is an important tool used by scientists, biological consultants, and amateurs to address questions related to bird population fluctations, interspecific interactions, long-term population changes, and land management techniques. More technical reviews of this volume will be available to scientists, therefore I will assess the books' value for amateurs and comment on bird censusing efforts in Florida.

The Proceedings consists of 82 papers in nine sections. Section topics are: estimating relative abundance and density, comparing census methods, sources of bias, sampling design, and data analysis. Each section opens with introductory remarks by the section chairperson and ends with a summary/critique.

John Emlen's Table 1 (Bird census problems and methods) in the "Summary of the symposium" matches objectives of typical bird community studies with available methods and examples. Appendix I is a glossary of avian censusing terms by Ralph, and Appendices II through VI are reports of committees formed during the conference. Harry Recher's report on the need for standardized census methods and Jared Verner's report on future research needs are especially informative. A strong emphasis was placed throughout the conference on gaining comments from statisticians to improve census design, procedure, and analysis.

Bird-sampling techniques most frequently discussed in the Proceedings are mark-recapture sampling, line (or transect) counts, point counts, and spot-mapping. Amateur contributions to ornithological research frequently occur as part of large-scale projects. The National Audubon Society supports the Breeding Bird Census (BBC), Winter Bird-Population Study (WBPS), and Christmas Bird Count (CBC); the U.S. Fish and Wildlife Service runs annual Breeding Bird Surveys (BBS); and breeding bird atlas projects are organized on a state-by-state basis. All of these data sources depend on volunteer participation. It is important for contributors to these projects to become aware of advances in bird sampling techniques. For example, adherence to guidelines on census plot size and the number of census trips strengthens comparability of censuses between habitats and years and will increase scientific value of the enormous time and energy devoted to counting birds.

The BBC and WBPS are based on the spot-map method in which detections of singing males are marked on maps of a rectangular gridded census plot during 8 or more census trips. Emlen, in his closing remarks (p. 576), notes that density-measurement censuses such as the BBC and WBPS are "laborious, costly, and limited in applicability," but goes on to say, "They are producing much valuable information . . . and must be promoted for the present as the best we have been able to devise." From 1947 to 1982, 33 BBCs and 37 WBPSs have been completed in Florida. Many important habitats in the state have been censused, but very few censuses have been continued over years in both winter and breeding seasons. Long-term census continuity is a valuable asset for evaluations of between-year variability. Factors frequently influencing accuracy of spot-map censuses are plot area, observer variability, edge effect, censusing speed and grid size. All of these are discussed in the Proceedings.

Over 1400 people in 40 counts participated in the 1979 CBC in Florida (1980, Amer. Birds 34). While the CBC involves the greatest amount of amateur participation each year in the United States, it is also the most difficult to manage for scientific purposes. Arbib (pp. 30-33) made several suggestions to improve CBC data collection and presentation including greater refinement of habitat analysis and improving numerical estimation of flocks through training sessions. Schreiber (pg. 60) added that CBCs can be made more biologically useful through greater emphasis on counting common birds and recording sex-age data.

The U.S. Fish and Wildlife Service BBS is an automobile survey conducted over a 25-mile route with 3-minute stops every half-mile. Approximately 2000 randomly located roadside routes are surveyed annually throughout North America. Already well-standardized, the BBS involves a limited number of people each year with only 38 routes in Florida.

Florida's breeding bird atlas project is still in the planning stage with Dr. Herbert Kale, II, as state organizer. Its goal is to define the breeding ranges of bird species in Florida. Randomly selected locations throughout the state will be surveyed. This will potentially involve a large number of people over several years. M. Udvardy organized the North American Ornithological Atlas Committee at the Asilomar Conference to encourage atlas projects in as many states and provinces of Canada, Mexico, and USA as possible. Laughlin et al. (1982, Amer. Birds 36: 6-19) provide an overview of bird atlas projects in the United States.

Of the five avian censusing projects discussed that involve amateur participation, the CBC, BBC, and WBPS could benefit the most from technical improvement. Coupled with vegetation data, the BBC and WBPS can be excellent sources of data on bird-habitat relations and interspecific interactions. Improvements in the quality of these data can be made by more rigorous adherence to standards already established by the International Bird Censusing Committee. With immense human population growth projected for Florida over the next 20 years, solid baseline data on bird populations in many habitats is invaluable for detecting any deleterious impact of this growth.

"Estimating numbers of terrestrial birds" is a watershed volume encompassing many refinements of censusing techniques and statistical treatment of data. Although many amateurs may find it too technical, consulting the Proceedings for up-to-date work on censusing problems and revised methods is profitable for anyone interested in scientific bird censusing. Expansion of improved bird censusing efforts such as the BBC and WBPS is needed in Florida. I hope that interested birders around the state will consult this tremendous source of material and get on with the business of counting birds.

Thanks to Frances C. James and Robert L. Crawford for their comments on this review.—**R. Todd Engstrom,** Department of Biological Sciences, Florida State University, Tallahassee, Florida 32306.

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EDITORIAL

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