

BOOK REVIEWS

Breeding Birds of Washington State. Volume 4 in Washington State Gap Analysis—Final Report, by Michael R. Smith, Philip W. Mattocks Jr., and Kelly M. Cassidy. 1997. Seattle Audubon Society Publications in Zoology No. 1. 538 pages, with 258 figures. Paperback, \$35. ISBN 0-914516-09-4.

This volume is one of a series of five gap-analysis volumes for Washington state; the others treat the distribution of mammals, amphibians and reptiles, land cover, and a summary of the gap analyses. It describes the breeding distribution of 257 bird species in the state, including all current and two extirpated breeders; the distributions of 244 species are described through both maps and species accounts. Because Washington's breeding avifauna has not been treated definitively since 1953, when 225 breeding species were known (Jewett, Taylor, Shaw, and Aldrich, *Birds of Washington State*), a new work has been long overdue.

This work is an intriguing marriage of two very different methods of describing breeding-bird distributions: gap analysis and a breeding-bird atlas. Such a combination holds great promise for monitoring changes in the status of breeding populations but also has the potential of numerous pitfalls.

Data collection for a breeding-bird atlas project may vary between atlases but always relies on field data collected during certain periods in pre-determined atlas blocks. Atlas data are presented in "raw" format, on a block by block basis, and are never extrapolated from adjoining blocks with similar habitat, earlier time periods, or expert judgment. Field collection of atlas data is very labor intensive, and this alone makes atlas efforts difficult to repeat on a frequent basis. Gap analysis, however, offers an alternative approach to mapping breeding distribution, one that is conducive to frequent repetition.

The core of gap analyses are models of each species' breeding-habitat preferences and breeding-range limits overlaid on a land-cover map of the state derived from Landsat images. These models can be constructed from a variety of sources: literature searches, review of field notes, interviews of active field ornithologists and birders, atlas data, Breeding Bird Survey data, directed searches for certain species, etc. There is no requirement for a specified time period for collection of these types of estimates, as it is expected that habitat preferences will not vary over time nearly as much as the amount of each habitat. The advantages to this monitoring method are enormous. As soon as new Landsat data are available and the land-cover map is updated, estimates of the change in suitable breeding habitat and therefore the change in breeding population can be provided. As the human population of Washington pushes towards seven million by the year 2010, gap analysis can provide critical estimates of impacts of this growth on breeding birds in a much shorter time than would be possible with an atlas-based effort.

The atlas portion of this volume presents the data from the Washington Breeding Bird Atlas project, collected over an 11-year period from 1986 to 1996. Atlas blocks were defined as quarters of township/range blocks. More than 600 volunteers contributed countless hours and miles to this effort, but statewide coverage was far from uniform. This results in maps such as that for the Violet-green Swallow, with about 250 blocks shown in the Puget Trough and fewer than 30 blocks on the outer coast. Seven of the state's 39 counties account for 50% of the atlas records. These seven include the state's two most populous counties (King and Pierce), and they appear to have been covered thoroughly. There is little discussion of the adequacy of coverage, however, and it must be inferred from the graphics. In comparison, the Monterey County atlas (Roberson and Tenney 1993) devoted three pages and eight figures to description of both coverage goals and coverage realized.

The gap models were used to make the maps of predicted distributions, but those predictions were never tested. And therein lies one of the major disappointments in

BOOK REVIEWS

this effort. While a portion of the atlas data could have been used to validate some or all of the distribution models, instead they were all used to help formulate the models. Neither was any systematic verification of predicted distributions conducted on the ground. Models are difficult to trust without some attempt to characterize their precision and accuracy; a validation effort can provide one measure of confidence limits, as can quantitative investigation of the input data. Some of the input data, such as interviews of field ornithologists, are relatively subjective. Some standardized tests of these persons' knowledge would have provided model users with a sense of the consistency of such input. The methods section implies that range limits were determined solely from "known locations," without defining the term, and thus implies a high degree of precision for this variable. In reality, many of the range limits used in the model were based on interviews with field workers. Thus, from a statistical perspective, the models presented in this work are unverified and of unknown precision and accuracy.

The bulk of the volume is devoted to the maps and accompanying species accounts. My review of the maps, based on personal knowledge, found them generally accurate and informative. The errors that I noted were generally small; they were invariably a result of inadequate atlas coverage and secondarily a failure to elicit ancillary data from field workers. For instance, the Black-capped Chickadee map does not extend to the northwest corner of the Olympic Peninsula because no atlas blocks were completed there and the gap model did not extend the range to that corner of the state. Similarly, neither the Virginia Rail nor Sora is mapped as a breeder in the Chehalis valley, owing both to a lack of atlas data and an apparent failure by field workers to communicate well-known breeding locations. I did not detect any errors resulting from the scale of the land-cover map. The maps were based on 100-hectare polygons for terrestrial cover and 40-hectare polygons for wetlands, apparently a scale detailed enough to portray breeding distributions in Washington accurately.

The accompanying species accounts include a summary of breeding status and distribution, a description of the habitat preference/range limit model developed for that species, and a comments section. The comments sections often provide a summary of recent literature on the species in Washington, sometimes point the reader to unpublished field work, sometimes discuss subspecific or regional differences, and generally describe changes in status since 1953. The only portion of the comments section that I found disturbing was reference to population-trend analysis from Breeding Bird Survey data: there is no description of the methods employed for trend analysis, and the cited document is unpublished! From 1966 to 1991, the House Wrens was reputed to be increasing at a rate of 8.3% per year, the Hermit Thrush at 11% per year. I am confident that these "trends" are artifacts of the locations of the few BBS routes run two decades ago, but a reader with little knowledge of Washington might assume wrongly that the state was stuffed with these two species. The trends are presented on a statewide basis, leaving the reader to guess whether the Barn Swallow's decline of 3.6% per year from 1982 to 1991 was a function of westside urbanization and/or eastside agricultural changes. The trend analyses appear to have been an afterthought, appear misleading, and should have been left out.

Notwithstanding the reservations I have expressed, this book does represent a valuable contribution. This is a pioneering effort at combining gap analysis with atlas techniques, a combination I believe could prove invaluable in the near future. It does capture the state of our knowledge of breeding populations in Washington at present, and for that reason alone it is indispensable.

Bill Tweit