

abundance) seems to be involved in regulating barn-owl populations. The authors suggest further study, including broad evaluation of comparative ecology, eco-ethology, and eco-physiology, is needed. [I.N.R.A., Faune Sauvage, 78350 Jouy-en-Josas, France.]—Jerome A. Jackson.

51. The fruit diet of Ring-Ouzels (*Turdus torquatus*) wintering in the Sierra Nevada (south-east Spain). R. Zamora. 1990. *Alauda* 58:67–70.—Zamora collected 446 droppings (presumably of *Turdus torquatus*, no other thrushes were present) from favored perch sites on rocks during October–November 1984 and February–March 1985. The montane habitat was dominated by *Juniperus communis* and it is not surprising that the fruit of this juniper made up 86.8 to 99.7% of the birds' diet by volume. The only other items identified were seeds from the fruit of the barberry, *Berberis vulgaris*, and arthropod remains. Zamora's discussion dwells on the codependence of this thrush and the juniper in this particular region. [Dept. de Biología Animal, Ecología y Genética, Facultad de Ciencias, Univ. de Granada, 18001 Granada, Spain.]—Jerome A. Jackson.

52. Diets of breeding and nonbreeding California Spotted Owls. J. Thraill and M. A. Bias. 1990. *J. Raptor Res.* 23:39–41.—The authors studied the food habits of 14 California Spotted Owl (*Strix occidentalis occidentalis*) pairs by examining their pellets. Five pairs were considered breeding (here defined as having produced at least one fledgling) while nine pairs were considered nonbreeding. Pellets were collected beneath adult roosts from May to August, 1986 and 1987. Mammalian prey species were categorized as small (<100 g) or large. Prey weights were estimated from museum specimens and records. Avian and insect prey together accounted for about 24% by number or about 13% by weight of the diet, and did not differ between breeding and nonbreeding pairs. Breeding pairs, however, ate more large mammals and less small mammals, both by number and weight, than did nonbreeders. The authors suggest that "breeding success was correlated to the greater relative proportion of large mammal prey within the diet" of these birds. However, this hypothesis was not tested: pairs (number unspecified) which attempted to reproduce but did not fledge at least one young (here fitting the authors' definition for "nonbreeding") were not compared to "breeding" pairs. Lack of information about prey availability precluded any inferences concerning prey selectivity. [Dept. of Wildlife, Humboldt State Univ., Arcata, CA 95521 USA.]—John A. Smallwood.

SONGS AND VOCALIZATIONS

(see 30, 38, 41, 54)

BOOKS AND MONOGRAPHS

53. Cooperative breeding in birds: long-term studies of ecology and behavior. P. B. Stacey and W. D. Koenig, eds. 1990. Cambridge University Press, New York, New York. \$28.00, softcover.—Cooperative breeding, or helping-at-the-nest, is a phenomenon where more than just a breeding pair of birds attend and feed young at a single nest. The topic has generated considerable interest over the last 25 years because of its implications for "altruism," and a number of long-term studies on cooperatively breeding bird species have been conducted. As the editors state in their introduction, these studies have generated a large number of papers, but the literature for most species has been highly fragmented. This book represents the laudable attempt by the editors to combine in one volume comparable data on behavior and general biology from the (arguably) most important studies. Their goal was to gather the data together in one place to facilitate comparisons among the studies and suggest future directions for research. Numerous authors in the volume state that comparative studies are important for understanding cooperative breeding, and this book is a commendable contribution toward that goal. The data presented here will be of interest not only to those studying cooperative breeding, but also to anyone interested in population biology, behavioral ecology, breeding biology, or general ornithology. Because helping behavior affects (and is affected by) all aspects of a species's biology, these studies have produced, in the editors' words, "some of the most detailed portraits of free-ranging animal populations now available."

The book begins with an introduction by the editors detailing the phenomenon and giving

a succinct history of its study. Next come 18 chapters by various authors describing, in varying detail, the biology of their study organisms. Because of the importance of demography in shaping helping behavior, an emphasis was made on the inclusion of long-term studies, with a few exceptions necessary to include examples of extreme diversity. Described species cover the breadth of the phylogenetic and behavioral diversity of birds showing helping. They range from species with few, infrequent helpers (Pinyon Jays, Chapter 7), to primarily polyandrous groups (Galapagos Hawks, Chapter 12), to "typical" helpers with young staying home and helping parents (e.g., Florida Scrub Jays, Chapter 8), to extremely complicated systems that nearly defy description (e.g., Acorn Woodpeckers, Chapter 14, and Noisy Miners, Chapter 18). In the interests of standardization, the editors gave each author a list of potential topics to be included, but because of the different focuses of the studies, no chapter includes all the suggested topics. A final chapter written by J. N. M. Smith, a self-described student of "typical" birds with "no biases" gained by working on a cooperatively-breeding species, summarizes the studies. Smith reviews the general questions asked, how well they have been answered in the book, and points out directions for future work.

Beyond just presenting data, several of the authors use their chapters to advance their own general explanatory theories. Chapter 13 by Craig and Jamieson is partially a critique of how the basic questions have been asked in the first place. They opt for a nonselective explanation, quite at odds with most interpretations of helping. In response to previously published critiques by Jamieson and Craig, many of the other authors have included their own rebuttals to these ideas. Craig and Jamieson argue persuasively for the examination of cooperative breeding in the light of all four of Tinbergen's areas of the study of behavior (causation, development, function, and evolution). However, one also could add that an explanation on one level does not explain or preclude an explanation at a different level. They themselves seem guilty of this error, arguing that a evolutionary explanation of the occurrence (the novel juxtaposition of the normal behavior of feeding young brought into contact with nonoffspring because of demographic factors) is sufficient to explain the phenomenon, with no need of recourse to functional explanations. This conclusion was made despite the fact that the maintenance of the behavior in the light of negative selective forces (see especially the demonstrated costs of helping in Pied Kingfishers [Chapter 17] and Stripe-backed Wrens [Chapter 6]) would appear to require some explanation. Data presented in this volume on the nonrandom distribution of aid provided also argue against the nonselective explanation.

Not surprisingly, given the diversity of systems described and the different tacks taken to investigate them, no single theory emerges as the one answer to why cooperative breeding has arisen. Access to reproduction opportunities, inclusive fitness benefits, and "making the best of a bad job" all are offered as explanations. Given the data presented, they all are likely correct in different situations. Although helping is relatively rare in birds (approximately 220 out of 9000 species), the extreme variability in ecological and demographic characteristics shown by cooperative breeding species, coupled with the broad phylogenetic distribution of the behavior, suggests that cooperative breeding may be a solution to many problems. Undoubtedly, it easily evolved independently in various groups, probably because of its strong developmental connection with normal parental behavior, as argued in Chapter 13. However, as Smith points out in the summary, although many of the ecological arguments for cooperative breeding seem logical, many noncooperative species face the same resource limitations and social constraints. Perhaps more detailed comparative studies of cooperative and noncooperative species in the same habitats will provide as much insight as comparisons of cooperative species in different habitats.

Many of the studies indicate that further work is in progress to examine by biochemical means the actual genetic contributions of each group member to the offspring raised. Only N. Davies in Chapter 15, reporting the studies of DNA fingerprinting of Dunnocks, includes such data here. Any results conflicting with the presumed parentage could open up any or all of these systems to reinterpretation. In fact, an addendum added in proof to the story of Splendid Fairy-wrens (subsequently published in Brooker et al. 1990, *Behavioral Ecology and Sociobiology*) reported that, far from the monogamy with close inbreeding suspected, near promiscuity reigned in the population. One might *almost* wish that this project had waited another several years until a number of these studies were finished.

Overall, this book is an excellent summary of what is currently known about cooperative breeding, and offers more information to the reader than a review of the topic with only selected examples given to support specific points. Indeed, with all of the information included, it is a good reference source for general and population biology of birds, quite aside from any questions concerning cooperative breeding. I highly recommend this book to anyone interested in behavioral ecology, population biology, or even just the intricacies of the lives of birds.—Kevin J. McGowan.

54. Proceedings of the 1988 North American Wood Duck Symposium. L. H. Fredrickson, G. V. Burger, S. P. Havera, D. A. Graber, R. E. Kirby, and T. S. Taylor, eds. 1990. North Am. Wood Duck Symp., St. Louis, Missouri. 390 pp. \$15, softcover. (Order from and checks payable to Gaylord Memorial Lab., Univ. of Missouri, Puxico, MO 63960 USA.)—This volume of selected papers from the symposium held in St. Louis, Missouri, on 20–22 February 1988, includes 54 refereed papers arranged under eight topical headings. Each of the sections is preceded by a general summary of the nature of papers included. I will consider each section in the paragraphs below.

Historical perspectives.—H. M. Reeves presents an historical review of Wood Ducks, including discussion of the paleontological (earliest record from the late Pleistocene) and archaeological records, descriptions of early naturalists and travellers, taxonomic history, a compilation of some native names for Wood Ducks, propagation efforts, market hunting, and the place of Wood Ducks in human cultures. The extensive bibliography associated with this paper will be of use to anyone interested in early American natural history. The chapter by F. C. Bellrose details the history of Wood Duck management efforts, including propagation efforts, development of nest box programs, and population changes.

Biology: a review.—The papers in this section provide an outstanding review of Wood Duck biology and should be required reading for any waterfowl student. Most have excellent literature reviews and make recommendations for future research—a gold mine for graduate students looking for Wood Duck related projects. R. E. Kirby reviews Wood Duck systematics, hybridization, and the role of systematics in Wood Duck management. Kirby and L. H. Fredrickson review Wood Duck molt and plumage literature, summarize some of the problems associated with waterfowl molt and plumage studies, and point out the need for studies that will allow the correct interpretation of pattern and process of molting and identification of relationships between the demands of molting and specific habitat needs. Fredrickson reviews Wood Duck behavior from fall courtship through egg laying. He provides very useful tables of known displays and vocalizations and their functions. Some of the displays are illustrated. Mnemonic interpretations of vocalizations are provided, but sound spectrographs are not. G. M. Haramis reviews Wood Duck breeding ecology and R. E. Kirby reviews non-breeding ecology—both emphasize habitat associations. R. D. Drobney reviews the nutritional ecology of breeding Wood Ducks and relates nutritional needs to wetland management. J. D. Nichols and F. A. Johnson summarize our knowledge of Wood Duck population dynamics.

Regional status.—This section brings us up to date on the status of Wood Ducks in each of the major management regions: Atlantic flyway (J. R. Serie and G. G. Chasko), Mississippi flyway (K. E. Gamble), Central flyway (W. N. Ladd, Jr.), Pacific flyway (J. C. Bartonek, J. T. Beall, and J. E. Cornely), and Canada (D. G. Dennis). These are all brief papers with some discussion of habitat, hunting, regulations, and management efforts.

Natural history.—Here is a pot pourri of reviews and local studies, most related to reproductive ecology. Topics include abundance and habitat use on the Mingo Swamp in southeastern Missouri (M. E. Heitmeyer and L. H. Fredrickson), a review of nest-cavity characteristics (G. J. Soulliere), nest boxes and brood parasitism (B. Semel, P. W. Sherman, and S. M. Byers), characteristics of second clutches in California (S. C. Thompson and S. B. Simmons), female and juvenile survival and movements in Indiana (J. R. Robb and T. A. Bookhout), postfledging survival in Minnesota (R. E. Kirby), and nest success, survival, and habitat selection in Tennessee (S. D. Cottrell, H. H. Prince, and P. I. Padding).

Census and survey.—The five papers in this section are devoted to description and evaluation of techniques for monitoring populations. They include a review of current monitoring techniques (D. H. Brakhaage), evaluation of productivity through brood surveys (T. J. Moser