The Condor 100:183–192

BOOK REVIEWS

The Red-winged Blackbird: the Biology of a Strongly Polygynous Songbird.—Les Beletsky. 1996. Academic Press, London. ix + 314 pp., 27 black-and-white plates, 53 text figures. ISBN 0-12-0847450. $64.95 (cloth).

Red-winged Blackbirds: Decision-making and Reproductive Success.—Les D. Beletsky and Gordon H. Orians. 1996. The University of Chicago Press, Chicago. xxii + 294 pp., 2 black-and-white plates, 35 text figures. ISBN 0-226-04187-5. $21.95 (paper). 0-226-04186-7. $65.00 (cloth).

The Red-winged Blackbird (*Agelaius phoeniceus*) is one of the most abundant and most frequently studied species of bird in the world, and it now ranks among the most frequent subjects of an ornithological book. Les Beletsky and Gordon Orians, charter members of the large redwing research community, have added two titles to the redwing library. Beletsky attempted to write a comprehensive summary of this species' behavior, ecology, and interactions with humans, whereas Beletsky and Orians chose to focus on reproductive decision making. Together those two books present a readable and well organized look at the mass of research on that species.

The Red-winged Blackbird: the Biology of a Strongly Polygynous Songbird. As Beletsky points out, because of its abundance, ease of study, unusual mating system, and status as a putative agricultural pest, the Red-winged Blackbird has received a disproportionate share of attention from ornithologists. A comprehensive review of the tremendous amount of information about this "white rat" of ornithology is therefore an important contribution to the ornithological community, even though research continues and new results accumulate daily.

Perhaps because I also am a member of the redwing research community, some of the sections that interested me the most were those that described the researchers and their research efforts, rather than their research results *per se.* For example, Beletsky first attempts to answer the often-asked question, Why so much interest in Red-winged Blackbirds? Although each member of the redwing research community has answers that invoke specific hypotheses or scientific interests, there also is something intriguing about the "redwing personality," as Beletsky calls it. As a result, there is a relatively long history of research on this species, which Beletsky summarizes in capsule form. He also includes a map showing 11 "major" study sites in North America. Among other things, that map points out a bias toward northern North America. Nine sites are in the U.S.A., two are in Canada, and none is south of 35°N latitude.

As the title suggests, discussions of the reproductive behavior and ecology, and the socially polygynous mating system of the Red-winged Blackbird are the principal strengths of this book. In addition, sections on territoriality and communication are well organized and clearly presented. I especially appreciated Beletsky's attempt to provide a "feel" for the research, i.e. the motivation for particular studies, the creativity and elegance of study design, the trials and tribulations of conducting research (especially in the field), and the complications of interpreting results, especially when they differ among studies. [One ornithologist who does not study Red-winged Blackbirds once complained to me that no two studies of that species have ever produced similar results.] In contrast, discussion of taxonomy and distribution are not as thorough, but probably because those subjects are not well studied. The so-called "Cuban Redwing" provides an example (e.g., Garrido and Kirkconnell 1996), having been described originally as a species (*Agelaius assimilis*), then included as a subspecies of the Red-winged Blackbird, *A. p. assimilis,* and then recently accorded species status again by the A.O.U. Checklist Committee and named the Red-shouldered Blackbird. Thus despite the disproportionate interest in Red-winged Blackbirds, there still are questions for which we have few answers, and many populations or races, especially in Middle America, about which we know relatively little.

Of the four books on Red-winged Blackbirds published since 1984 (Gordon Orians also wrote a monograph on marsh-nesting in blackbirds [Orians 1980], and a general book on the blackbirds of the Americas [Orians 1985]), two are written for a professional audience and two for a general audience. The two more technical books are William Searcy's and my (1995) monograph on polygyny and sexual selection, and Les Beletsky and Gordon Orians' (1996) treatise on reproductive decisions and reproductive success, which I review below. Robert Nero's (1984) book was the most general of the redwing quadruplet; it described redwing biology as well as Nero's personal involvement in redwing research. Unfortunately, this wonderful introduction to redwing biology, redwing research, and redwing researchers, is out of print. Beletsky's descriptions of the biology of the strongly polygynous Red-winged Blackbird, and of the researchers who study it, may help to fill the current void in the general market, although his attempt to write for both redwing researcher and lay person may make in difficult for some lay readers. One other aspect that may give readers pause is the hefty price and lack of a paperback alternative. I would urge Academic Press to publish a paperback edition so that many more readers can benefit from Beletsky's labors.

This book is a must for college, university and museum libraries. Its easy writing style suggests that it also would be useful in community libraries; bookstores with large "nature" sections and specialty shops that cater to the naturalist shopper should consider it as well. Given its price, I hesitate to mandate its inclusion in personal libraries, although it would be an extremely useful addition to any ornithologist's bookshelf. I purchased my own copy at the first available opportunity, and I am very happy to own it.

Red-winged Blackbirds: Decision-making and Reproductive Success. In recent years some ornithologists

have adopted the behavioral ecologist's approach to the study of reproductive success, which is to consider the "reproductive interests" of each "player" separately, then in combination. That approach has led to the important realization that the self interests of those players are sometimes in conflict; males and females do not always "cooperate" to produce young, and parents and offspring do not always "agree" on the best way to allocate parental care. A species' reproductive system therefore is the result of the interplay between costs and benefits to females, males, and young. Beletsky and Orians take this approach by examining the cascade of reproductive decisions made by male and female Red-winged Blackbirds and how those decisions determine their seasonal and lifetime reproductive success.

By examining reproductive decisions of females and males separately, Beletsky and Orians demonstrate clearly that the polygynous mating system of the Red-winged Blackbird is a manifestation of nonsexual and sexual selection acting at many levels on a complex and constrained system. They also manage to deal effectively with the tremendous variability among individuals and populations by assuming a strategic approach to the analysis of decision "rules," i.e., that the fitness consequences of specific decisions are conditional upon environmental circumstances—"if the environmental situation is *x*, then do *y*."

That analysis of reproductive success relies upon usual assumptions and methods of behavioral ecology: that natural (including sexual) selection favors traits conferring the highest fitness (decision rules are adaptive), that "decisions" are strategic and conditional but not necessarily conscious (decision rules do not require conscious choices, but rather evolve like nonbehavioral phenotypic traits), that a (yet unknown) genetic basis for strategic rules exists (the "phenotypic gambit"), that genetic variance sufficient to enable a response to selection exists (the Fundamental Theorem of Natural Selection), and that components of fitness can be used to analyze specific decision rules (reproductive success estimates fitness).

For me the most interesting sections of this book were the two dealing separately with female and male decisions. Beletsky and Orians look at the kinds of decisions, at the sequence of decisions, and at the information that might be used to make them. For example, a female Red-winged Blackbird that has just arrived on the breeding grounds in late winter must make a series of decisions (e.g., where to prospect, where to settle, when to start nesting, with whom to copulate, how much to invest in a particular nesting attempt, when to stop nesting). At each decision point the female is faced with a wealth of information from the environment, but most of it is worthless because it does not accurately predict future conditions.

Perhaps the true test of the reproductive–decision-making approach comes when Beletsky and Orians attempt to explain two puzzling phenomena: site fidelity and territorial dominance. That females and especially males are faithful to breeding areas is clear, but why they should be faithful is not. The ability of a male Red-winged Blackbird to defend his territory is well known, but why he is able to fend off virtually all intruders and how he is able to establish his ownership are not. Beletsky and Orians test a variety of hypotheses to explain site fidelity and territorial dominance, but are unable to arrive at a definitive explanation. They conclude, for example, that site fidelity is favored in females because it is generally better to return to a known environment than to move to an unknown one even though the predictive power of the environment is poor. Male territorial dominance is even more difficult to explain. Locating vacancies seems to have some "lottery" components, but being in the right place at the right time by chance does not explain the development of site dominance. Resource holding power may explain some aspects of territory acquisition, but a male's fighting ability does not accurately predict his likelihood of acquiring a territory or of holding it. The value of the territory to its owner would seem to explain why a territorial male wins encounters with intruders, but it does not explain why a floater prefers to intrude while the owner is present.

In adopting the hypothetico-deductive approach, Beletsky and Orians have attempted to mimic strong inference tests by treating the competing hypotheses as mutually exclusive. That practice is heuristically valuable, but the authors readily admit that, in reality, the hypotheses are not mutually exclusive. Given that the hypotheses overlap in their predictions, it is probably not surprising that some support has been generated for each of them. The authors reasonably conclude, therefore, that aspects of site fidelity and territorial dominance are explained by each hypothesis. Although I agree with this conclusion in general, it would have been helpful to me to have some depiction of the causal interrelationships.

I consider this book to be a "must have" for ornithologists who study reproductive ecology and behavior. Both its approach and writing style will be appreciated by such readers, and I especially enjoyed its clear presentation of a sometimes murky literature.

Overall recommendations. If the four books on Red-winged Blackbirds published since 1984 are placed within a two-dimensional "niche space" defined by subject matter as one axis and intended audience as the other, there would be surprisingly little overlap among them. As a result, deciding which to buy should be based on the needs and interests of the reader, but each book has much to recommend it. If you wanted to buy only one book, and could afford it, I would recommend Beletsky's *The Red-winged Blackbird: The Biology of a Strongly Polygynous Songbird.* If you were interested in more specialized accounts of recent research on redwings, I would recommend Beletsky and Orians' *Red-winged Blackbirds: Decision-making and Reproductive Success* and *Polygyny and Sexual Selection in Red-winged Blackbirds* by Bill Searcy and me (reviewed by Brown, C. R. 1997. *Condor* 99: 238–239.). Finally, if you wanted to lend a book to someone interested in something less technical, or to a student about to begin a study of redwings, I would try to find a copy of Nero's out-of-print *Redwings.*—KEN YASUKAWA, Beloit College, Department of Biology, 700 College Street, Beloit, WI 53511, e-mail: yasukawa@beloit.edu

LITERATURE CITED

GARRIDO, O., AND A. KIRKCONNELL. 1996. Taxonomic status of the Cuban form of the Red-winged Blackbird. Wilson Bull. 108:372–373.

NERO, R. W. 1984. Redwings. Smithson. Inst. Press, Washington, DC.

ORIANS, G. H. 1980. Some adaptations of marsh-nesting blackbirds. Princeton Univ. Press, Princeton, NJ.

ORIANS, G. H. 1985. Blackbirds of the Americas. Univ. Washington Press, Seattle, WA.

SEARCY, W. A., AND K. YASUKAWA. 1995. Polygyny and sexual selection in Red-winged Blackbirds. Princeton Univ. Press, Princeton, NJ.

The Raven, A Natural History in Britain and Ireland.—Derek Ratcliffe. 1997. T & A D Poyser, London. xxii + 326 pp., 39 black and white photographs, 18 text figures, 27 tables. ISBN 0-85661-090-9. $39.95 (cloth).

Few birds have captured our imagination, garnered our respect and fear, and exploited our wasteful habits like the Common Raven (*Corvus corax*). Few writers have captured all aspects of the raven in a single volume as personally and accurately as Derek Ratcliffe does in this wonderfully informative book. Ratcliffe's love, respect, and interest in this bird is obvious throughout the book, but is most clearly presented in the preface where we learn that he was drawn to the black beauty and its nesting haunts as a young boy. More impressively, we learn that he gathered his information on ravens over some 50 years in his "spare time." Throughout his life, it seems, when Derek wanted to recreate he went looking for ravens. That passion for ravens allows him to write from the heart as well as from the mind. His passion allows readers to take a raven's eye view into the behavioral and population ecology of one of the world's greatest birds.

The book is organized into 14 chapters and 5 appendices. There are 10 pages of references that provide excellent coverage of the historical literature. Many little known works from the 1800s and early 1900s, and recent theses from Europe are cited. Some of the more detailed modern works are missed (e.g., Heinrich's book, *Ravens in Winter,* 1990, Summit Books, is cited often, but much of the more recent primary literature produced by Heinrich and his colleagues is not cited). The index is detailed and very useful. The 26 drawings by Chris Rose accurately portray the bird in a wide variety of human and natural settings. Photographs of the bird are somewhat disappointing, but give a good feel for the haunts of the raven in Britain and Ireland.

The first three chapters introduce the reader to raven country, detail the raven's long association with humankind, and provide a quantitative assessment of changes in raven distribution from the 1960s to 1990s in Britain and Ireland. The detailed description of raven occupation in various sections of Britain and Ireland becomes a bit tedious, but Ratcliffe's treatment of the raven's association with humans is provoking and novel. Most previous authors dwell on the fascinating mythology of the raven. Ratcliffe briefly mentions that and also discusses occurrence of ravens in early literature. However, he focuses on documenting actual associations of ravens with humans in Europe, describing in detail the initial beneficial value of the bird as a scavenger in medieval times, its fall from grace in the 1600s as it became a nuisance to gamekeepers and shepherds, and its allure as a pet in the 1800s.

Next we are offered a series of chapters on basic natural history. Ratcliffe discusses the literature on food and feeding habits, including an interesting discussion of changes in scavenging and predation through human history. Social behavior, dispersal, and associations with other animals are treated in succession. Most information on social behavior is from the literature, relying heavily on Lorenz, Gwinner, and Heinrich. The discussion of dispersal presents a new summary of the British banding studies, but only a brief mention of more recent telemetry work. I expected more from the discussion of the association of ravens with other animals and was disappointed to find it focused on competitors and predators, rather than potential symbiotic relationships (only brief mention is made of symbiotic relationships with carnivores and there is no mention of foraging relationships with raptors).

The following three chapters explore the natural history of breeding in detail. There is good basic information here on nests, nest sites, eggs, infertility, clutch size, brood size, and nestling growth. Unfortunately there is little quantitative assessment of those factors and none of the data presented were derived from a long-term study of marked birds. A useful addition would have been a series of photographs of known-aged birds. Few modern theories of breeding behavior or reproductive success are mentioned; notably absent is a discussion of extrapair copulations. There is interesting historical information on nest site use (the use of aeries is traced from the 1800s), variation in egg shape, size, and color (individual females may lay consistently marked eggs), and infertility (commonly 1 egg $nest^{-1}$).

Population biology is the theme of the next two chapters. Territoriality is discussed in a theoretical framework as Ratcliffe grapples with spacing and density of breeding pairs. He highlights importance of social dominance and food availability which determine access to space and amount of space needed, respectively. New data from banding records of over 7,500 nestlings in Britain are summarized in a lengthy discussion of mortality. A life table based on the recovery of 492 individuals of known age is presented. Two surprises were found: (1) mortality is highest during the breeding season, not the harsh winter and (2) lifespan in the wild is quite short (few birds live > 5 years, only four lived for 12+ years). Ratcliffe readily admits that there are biases in those data (one is always lucky to find a dead bird and nothing is known about the ones still alive), but it is a large data set and I suspect the high rate of mortality will be confirmed in future studies of color-marked and radio-tagged birds.

The last three chapters bring us up to date with ravens in the modern world. Ratcliffe discusses current trends in raven populations in Britain and Ireland, noting that persecution by gamekeepers is still a major

FIGURE. 1. Ratcliffe's book was a big hit with American Crows (*Corvus brachyrhynchos*) in Kingston, Washington.

source of mortality. He also presents convincing arguments that increased forest cover (thick conifer plantations) is causing a decline in suitable raven habitat. I was somewhat confused by his use of "afforestation" to describe what we typically refer to as "reforestation." The discussion of raven taxonomy and ravens elsewhere in the world in the penultimate chapter is a bit out of place and would be better as an introductory chapter than an ending one. In a fitting tribute to one of the most intriguing aspects of ravens, Ratcliffe ends with a chapter on raven intelligence. He builds on Lorenz's feeling that ravens had the highest mental capacity of any bird he was familiar with. Interesting anecdotes are presented, including caged ravens luring mice within grabbing distance (hunting with bait!), but there is no coherent discussion of why ravens should be smart or what advantages are accrued by intelligence. There is no reference to the psychological literature on learning and no mention of Heinrich's recent work on insight in ravens (*Auk* 112:994-1003).

Four of the appendices are especially useful. Those include quantities of data on flock and roost size in Britain and Ireland, raven vocalizations, appearance, and names for ravens in various languages.

My general impression of the book is extremely favorable, however one major and a few minor points bothered me. The major point is the lack of data analysis. Much of the book is based upon detailed and thorough literature review, but there is substantial new data presented, derived primarily from the British banding program. Those data are rarely rigorously analyzed (e.g., no survivorship analysis is done and simple association tests between moving nest location and previous success are not done). The quantitative ecologist will be frustrated. There are only a few typographical errors, but the legend for Figure 10 appears wholly incorrect. The presentation of the book is classical Poyser and very appealing. However, a serious mistake was made by not including the subtitle on the dustjacket or cover. This book is about the raven in Britain and Ireland with brief references to the rest of the world. Presenting it as a book about the raven in general is a bit of false advertising.

Derek Ratcliffe admits that there is much still to be done with the fascinating raven. His book has made it much easier for us to focus on what is truly unknown about the bird and I thank him for that. I highly recommend this book to any corvid enthusiast, the general ornithologist, and those interested in historical changes in bird abundance, distribution, and behavior. Those interested in how birds and humans have coexisted through the centuries will find much of interest here. The lay public interested in birds will find this book easy to read and stimulating. *The Raven* certainly belongs in all university and museum libraries and many public libraries as well. In a brief field trial, I also found North American corvids to be attracted to this book (Fig. 1).—JOHN M. MARZLUFF, College of Forest Resources, University of Washington, Seattle, WA 98195, e-mail: corvid@u.washington.edu

The Zebra Finch.—Richard A. Zann. 1996. Oxford University Press, New York. xvi + 335 pp., many text figures. ISBN 0-19-854079-5. $105.00 (cloth).

You must admit that any bird that responds biologically to artificial adornment is something special. Zebra Finches (*Taeniopygia guttata*) do exactly that if you put color bands on their legs. Among other matters, the colors influence mate choice and seasonal and lifetime reproductive output.

Males prefer black-banded females in pair formation; females prefer red-banded males. Individuals with such mates rear twice as many young as birds mated to blue-banded females or green-banded males. High-status birds live longer. Low-status birds mated to those of high-status do more of the reproductive work and, seemingly, wear themselves out. I thus looked forward to reading a comprehensive review of bands and Zebra Finches, and went immediately to the index of this new book. I found no entry under "band," "color band," "ring" and its combinations, "courtship," "pair bond," "reproductive success," and some others. The key entry was in the L's–"leg band colour;" two subordinate entries under "mate choice" and "extra-pair copulation" were found. So, the index did its job and I found the right pages, 262–268, although the problem seemed insurmountable for a short time. Professor Zann and I speak different dialects.

But we speak the same language, and it is clear that he has done a first-class job of summarizing information on Zebra Finches, in the lab and in the field. These birds are remarkable in many ways, not least because they can live in confinement in a reasonable approximation of what their lives are like in the wild. That this should be true is remarkable, because wild Zebra Finches are quite specialized birds.

The Australian populations, the ones about which we know a good deal, are adapted to xeric habitats. Pairs undertake breeding only after a significant rainfall. Their major food is seeds of a great number of grass species. Grass seeds also are fed to their nestlings, from hatch day onward. Facultative breeding is coincident with molting, the schedule of which is spread out over many months; one primary is grown at a time, and another not dropped for replacement until the earlier one has completed growth. Zebra Finches occur chiefly in regions in which some free water is likely to be found daily. Nevertheless they can exist for a short time without water beyond that found in grass seeds.

But in confinement Zebra Finches breed more-or-less continually, which is ideal for many research programs. They are plumage dimorphic, which is useful in any research. They have been domesticated, and a number of different strains are available for different kinds of projects. They show precocial breeding in confinement, forming monogamous pairs for life, and they engage in extra-pair matings, as in the wild.

Zebra Finches apparently have spread from their original homeland in the dry country of Australia to the Lesser Sundas, an east-west chain of islands lying northwest of Australia, and colonized to the very westernmost of the islands, Lombok. This means Zebra Finches observe Wallace's Line (separating southeast Asian from Australian faunas), even though Bali lies only 50 km farther west, and their earlier dispersal from Australia required crossing greater overwater distances. Zann points out that, although the first Zebra Finches ever collected were from Timor, little is known of the natural history of the Lesser Sunda Zebra Finches, and that a significant ornithological advance would occur were their biology more fully understood.

For researchers, Zebra Finches are user-friendly and have attractive, individual personalities. They are easily as good as domestic pigeons for a great range of study, but have some advantages—they are smaller and need less lab space and lower maintenance budgets, their reproductive cycles are short, wild populations are available without having to go to the ends of the earth to find them, and a truly great amount of information on their natural and artificial history is available. And then there are color band likes and dislikes.

The available information on Zebra Finches is summarized in this book in a perceptive and informed way, and I highly recommend it. People who like birds will find it engrossing, as will behaviorists, ecologists, and evolutionary biologists; institutional libraries should get this book.—RICHARD F. JOHNSTON, Natural History Museum and Biodiversity Research Center, 602 Dyche Hall, University of Kansas, Lawrence, KS 66045-2454.

Coloniality in the Cliff Swallow.—Charles R. Brown and Mary Bomberger Brown. 1996. The University of Chicago Press. Chicago, Illinois. xiv + 566 pp., 24 halftones, 173 line drawings, 38 tables. ISBN 0-226-07625-3 (cloth), 0-226-07626-1 (paper). $95.00 (cloth), $27.95 (paper).

Sometimes living in colonies containing thousands of nests, Cliff Swallows (*Hirundo pyrrhonota*) are among the most social of all passerine birds. From the start of their study, the Browns set out to answer two deceptively simple questions: Why do Cliff Swallows live in colonies? Why do Cliff Swallow colonies vary so much in size? Besides informing us about Cliff Swallow natural history, answers to those questions could provide insights into the evolution of coloniality in general. Not surprisingly, the Browns found that answers to their basic questions about coloniality are complex and that general explanations may not be easily obtained.

This book outlines the Browns' exemplary long-term study of the costs and benefits of group living. The field work is impressive in its scope. Since 1982, the Browns and their legion of industrious students and field assistants checked thousands of nests at hundreds of colonies and banded thousands of adult, juvenile, and nestling Cliff Swallows in southwestern Nebraska. In addition, many birds were color marked to observe individual behavior. The influence of ectoparastism by swallow bugs (*Oeciacus vicarius*) and bird fleas (*Ceratophyllus celsus*) on Cliff Swallow life history patterns was assessed by clever experiments where parasites were removed from some nests by regularly spraying the nests with an insecticide.

The Browns attempted to answer their two fundamental questions by using the paradigm championed by C. Brown's major professor John Hoogland (Hoogland, J., and P. Sherman 1976, *Ecol. Monogr.* 46:33–58) to empirically study advantages and disadvantages of coloniality in Bank Swallows (*Riparia riparia*) and by Alexander (Alexander, R. D. 1974, *Annu. Rev. Ecol. Syst.* 5:325–383) to theoretically examine the evolution of group living. That is, to understand group living we must ask, What are the costs and benefits of group living to *individuals*? However, the Browns did not do this directly because relatively few swallows ($n = 27$) nested solitarily. Instead, they looked at how individual costs and benefits varied with colony size. This is an important distinction, because although they are related, the two questions are not exactly the same. As a consequence, the Browns analyzed the costs and benefits of living in colonies of different sizes but not necessarily those of living alone versus living in a group. Shields (1990, *Ecology* 71:401–405) also noted this as a flaw in C. Browns' earlier work on Cliff Swallow colonies as information centers (Brown 1988, *Ecology* 69:602–613). Second, they considered how availability of opportunities to employ alternative reproductive tactics, such as conspecific brood parasitism and extra-pair copulations, varied with colony size. Third, they examined demographic consequences of living in colonies of various sizes by following life histories of banded individuals over an 11-year period. They tracked how survivorship, annual reproductive success, and lifetime reproductive success were related to colony size. Last, they examined variation in colony size itself by exploring three hypotheses: (1) variation in colony size represents an ideal free distribution (*in sensu* Fretwell, S. D., and H. L. Lucas Jr. 1970, *Acta Biotheoretica* 19:1–36), (2) the individual phenotypes of swallows influence the "optimal" colony size for each individual resulting in variation in colony sizes, and (3) swallows are limited in their abilities to sample, assess, or predict future colony sizes, thereby preventing them from settling in the colony size that is best for them resulting in variation in colony sizes. They conclude that colony size variation results from " . . . phenotype-based colony choice, with individuals selecting the colony sizes that are best for them" (p. 481). Readers less knowledgeable on the evolution of avian coloniality could have benefited from a more complete review of the literature than that provided by the Browns.

Many questions posed in this book have been dealt with before in previous publications by the Browns. However, this book is more than just a rehash of already published work. The book contains new data and new analyses of previously analyzed data. Some of the flaws detected by Shields (1990) in Brown (1988) are corrected in the book. For example, Shields (1990) noted that Brown's (1988) paper on colonies as information centers incorrectly used multiple measures from the single sample units (i.e., colonies) artificially inflating sample sizes rather than using colony means in analyses. This error is corrected here.

How successful were the Browns in answering the questions posed at the beginning of their book? Partly. Even they admit that they do not fully understand why Cliff Swallows live in colonies and why some colonies vary so widely in size. This is more a reflection of the difficulty of the problems rather than the lack of effort by the authors. In fact, the Browns provide us with some interesting data to consider when formulating hypotheses about the evolution of coloniality. Their main findings are summarized below.

Cliff Swallow colonies in southwestern Nebraska vary widely in size from 2–3,700 nests ($\bar{x} \pm SE = 393 \pm 24.3$, $n = 726$). Figure 3.11 illustrating colony size variation could have been greatly improved if all colonies were represented on a single frame, so that the fact that colonies with < 100 nests were very common would be more obvious to the reader. Cliff Swallows were parasitized mostly by hematophagous swallow bugs and bird fleas, which caused 50–100% nestling mortality in some large colonies, representing a major cost of coloniality.

Cliff Swallows competed intensely for nests, especially for those located in centers of large colonies, suggesting the superiority of those sites. Nests were built more quickly at larger colonies because neighbors shared construction on contiguous nest walls, suggesting a benefit to living in larger colonies. However, a disadvantage of nesting at high densities included having the nest entrance blocked by a neighbor's nest, nest material stolen, or eggs destroyed.

Cuckoldry, conspecific brood parasitism, and the mixing of mobile young after fledging increased with colony size and represented costs of coloniality for victims. However, they simultaneously represented bene-

fits for the perpetrators because they led to swallows investing parental care in unrelated young. Patterns of colony use and reuse from year-to-year produced no evidence that the suitability of colony sites was affected by local food resources or that the swallows were limited by available nesting substrates. Observations of attacks by predators at colonies and results of experiments with model predators led the Browns to conclude that coloniality does not provide Cliff Swallows with the antipredator advantages that have been hypothesized for Bank Swallows (Hoogland and Sherman 1976).

Estimated lifetime reproductive success expressed as the number of young surviving to their first breeding season was greatest for swallows that perennially nested in medium-sized colonies of 100–249 nests. It was next highest for swallows using the smallest colonies (1–10 nests) and largest (> 500 nests) colonies. This result may have been biased by the preferential, ectoparasite-influenced dispersal of swallows reared in the largest, most parasite-infested colonies. Thus, the Browns admit that they could not confidently conclude that average fitness, as estimated by lifetime reproductive success, varied significantly between birds nesting in different-sized colonies.

One potential advantage of coloniality for these swallows may be the opportunity to obtain information from other birds about the location of their ephemeral aerial insect food sources. Thus, the colony may serve as an information center (Ward, P., and A. Zahavi 1973, *Ibis* 115:517–534); a controversial view for which a brief review would have been helpful. The Browns acknowledge the empirical difficulties in directly demonstrating that information transfer occurs at colonies and they correctly point out that empirical study must involve following foraging movements of individually marked birds.

The Browns present data that they argue show that unsuccessful foragers returned to the colony, monitored other colony residents looking for successful swallows (i.e., returned with food), and then followed them on their next foraging trip. No swallows were consistent followers or leaders, suggesting that none relied solely on information parasitism to find food and that all colony members were likely to benefit from information sharing. Because successful foragers did not actively recruit more foragers from the colony itself, unsuccessful foragers parasitized information about the location of food sources. In general, foraging efficiency (estimated from food delivery rates, nestling body mass, and adult body mass) increased with colony size, and foraging-related advantages of coloniality varied yearly. The Browns argue that the benefits of information transfer favored the evolution of coloniality in these swallows although it is still unclear how this increased foraging efficiency translates into a net benefit of coloniality.

Shields (1990) pointed out some definitional, methodological, and statistical problems with the approach used by Brown (1988), some of which have been corrected. However, the Browns did not directly refer to or even cite Shields' (1990) critique. I see this as a major oversight by the authors. Readers unfamiliar with the literature on Cliff Swallows, coloniality, or information transfer theory would be unaware that this critique exists. It is important to note that Shields (1990) did not imply that the conclusion that Cliff Swallow colonies act as information centers was faulty, only that the data, as analyzed in Brown (1988), did not support the hypothesis that the benefits of information transfer increase with colony size rather than reach an asymptote.

In summary, the Browns have done an good job of reporting on their long-term research on Cliff Swallows. The book contains interesting information, but it sometimes feels as though they are leading the reader through the forest one tree at a time. Although the book is well written, it is not an easy read. Nevertheless, I recommend this book to all avian behavioral ecologists because they will find an good example of a field study informed by natural selection theory. Just one pet peeve, throughout Anders Møller is cited as Moller. With modern typography this sort of error is inexcusable.—MICHAEL P. LOMBARDO. Department of Biology, Grand Valley State University, Allendale, MI 49401-9403, lombardm@gvsu.edu

Ecology and Management of Neotropical Migratory Birds: A Synthesis and Review of Critical Issues.—Thomas E. Martin and Deborah M. Finch, editors. 1995. Oxford University Press, New York. xvi + 489 pp., 58 text figures. ISBN 0-19-508452-7. $35.00 (paper). ISBN 0-19-508440-3. $65.00 (cloth).

Martin and Finch intended a volume of independent chapters each of which was (1) a review and synthesis of critical conceptual and topic areas, (2) multiple-authored to reflect separate interpretations of evidence and minimally reflective of individuals' biases, and (3) a summary of conservation and management implications relevant to individuals responsible for decisions concerning land management. They succeeded. This useful summary faces controversial issues reasonably squarely and extends the energy from the September 1992 conference in Estes Park, Colorado that spawned it and a companion volume (D. M. Finch and Stangel, eds. 1993. *Status and Management of Neotropical Migratory Birds.* USDA For. Serv. Gen. Tech. Rep. RM-229). Unfortunately, the summarized knowledge points out its own inadequacy (this is always important for scientists to have work to do) and the contradiction inherent in "managing" for Neotropical migratory birds (NTMBs), a group of organisms for which no unified set of recommendations will suffice. First, I identify some of the contradictions in management recommendations, to ensure that the reader appreciates clearly that managing those birds is a real challenge. Later, I offer praise for this volume as a substantial way-station on the path to addressing that challenge.

In perhaps the most telling statement of the entire book, a statement disconcerting in the extreme to one interested in management directions, Sherry and Holmes (p. 100) state "A fundamental issue here is that very few species have been studied intensively enough to detect the effects of habitat change on population size in any season, let alone in both, but the absence of such empirical evidence does not mean that populations may not be limited in both seasons. Un-

fortunately, we know of no empirical data set for any Neotropical-Nearctic migrant species to assess quantitatively whether limitation is occurring in summer, winter, or both . . . " The reality of management contradictions for migratory birds is highlighted by Thompson et al., who recommend for cavity nesting and bark-foraging NTMBs—"lengthen rotation ages in even-aged systems" (p. 215) and for early successional species—"use even-aged systems. Shorten rotations." (p. 216). Noting that species of concern run the spectrum of successional preferences, Dickson et al. (p. 262) recommend uneven-aged management for late successional birds and even-aged management for early successional species. Those recommendations conflict, and represent the crux of a problem that will develop over the next several decades—How can we manage landscapes with both uneven-aged and even-aged silviculture at the same time? The long-term nature and difficulty of developing, testing, applying, and evaluating truly sound management guidelines is clear in the statement by Hejl et al. (p. 237) that the concerns of importance to them at the present time in silviculture of Rocky Mountain habitats are the same as those expressed by Thomas et al. (1975) in a very early symposium on land management for nongame birds (p. 272–287, In Proceedings Symposium, *Management of Forest and Range Habitats for Nongame Birds.* USDA For. Serv. Gen. Tech. Rep. WO-1). Progress in land management is not rapid; succession takes time. We are, however, an impatient people.

Having pointed out those contrasts, let the reader have no doubt about my opinion of this book—Martin and Finch have succeeded in their aims. This is a welcome addition to my bookshelf. It will be useful to university instructors, to environmental activists, to policy analysts, as well as to researchers and the land management community for which it is intended. The multiple author approach has provided the seasoning of ideas that the editors desired. The scholarship is high-quality throughout. I repeatedly found ways to cite chapters as I read them. In the initial section on Population Trends, alternative approaches to assessing, interpreting, and studying population trends are vigorously presented by Peterjohn, Sauer, and Robbins; and by James and McCulloch. The contrast between the views of those two groups is enlightening. Part II, Temporal Perspectives on Population Limitation and Habitat Use, contains outstanding chapters on natural perturbations as population regulation mechanisms, evidence for winter vs. breeding season limitation of populations, habitat requirements during migration, and habitat use and conservation on the Neotropical winter grounds. The bibliographies of those chapters alone are worth the price of the book. Part III, Forest Management, summarizes methodologies of silviculture succinctly, with application to Rocky Mountain forests and to Central and Southeastern oak-pine forests treated in separate chapters. Readers must take the time to understand that description and application of silvicultural systems are two different activities, and must also appreciate the history of individual pieces of land as that impinges upon management alternatives. Part IV, General Human Effects, presents substantial detail on effects of farmland structure and agricultural practices, as well as livestock grazing effects in the West, in spite of the relative scarcity of information on the topics. A third chapter in the section reviews the meager evidence on the potential hazards of pesticides and environmental contaminants specifically to NTMBs. Part V, Scale Perspectives, appropriately contains chapters on Temperate Zone habitat fragmentation, on landscape ecology as a distinct and pertinent perspective on land management for NTMBs, on single- versus multiple-species approaches to management, a summary, and a detailed survey of cowbird-NTMB host interactions. Cowbird management suggestions are all control options; the contrast between proposals for manipulations to foster NTMBs and manipulations to limit cowbirds will be an important reality check for many, especially in the environmental community.

It has been said that "It isn't management unless it is done on purpose." Clearly, distinctions among the several hundred NTMBs and their particular habitat needs emphasize the importance of stated objectives to land management. Management goals reflect the capability of the land as well as demands placed on the land for specific products. Economic profitability of land management practices is one legitimate goal, as pointed out eloquently by Rodenhouse et al. (p. 285). Explicit statement of objectives is an important need in land management at the present time. While this volume does not treat societal decision-making and policy formation, it provides both data and practical lessons in summary and interpretation of data that will be substantive examples to those involved in such decision-making. In particular, Hejl et al. (chapter 8) and Saab et al. (chapter 12) provide object lessons in summarizing data; they highlight strengths and weaknesses of applying limited data to extensive questions. Those chapters and the treatment of case histories of cowbird-host interactions by Robinson et al. (chapter 15) will be interesting reading for managers.

The typos are few, but of a new variety in which words are often out of context, but spelled correctly, as an "or" for an "are," or failure of verb-subject agreement. Such miscues are minor distractions. Buy the book and use it. Appreciate the extreme difficulty faced quite forthrightly and courageously by the land managers in the trenches. They must act, for lack of manipulation is a management action as much as is extensive manipulation. This volume is a lantern they can use to illuminate some of the poorly marked guideposts for their decision-making.—PAUL B. HAMEL, USDA Forest Service, Center for Bottomland Hardwoods Research, P.O. Box 227, Stoneville, MS 38776.

Made for Each Other: A Symbiosis of Birds and Pines.—Ronald M. Lanner. 1996. Oxford University Press, New York. viii + 160 pp., 15 color plates. ISBN 0-19-508903-0. $35.00 (cloth), $15.95 (paper).

Nutcrackers and a few other corvids are the main dispersal agents of most, if not all, wingless-seeded pines. In an attractive little book, Lanner tells of those interactions between corvids and pines, and influences they have had on each other and their environment. Lanner begins by providing the basic natural history of the two main sets of players, namely nutcrackers

(*Nucifraga*) and "bird pines." From there he details their interactions with each other and between the other species dependent on seeds of pines. Lanner then covers what little is known about the origin and evolution of those interactions, and then finally the various threats posed to several of the "bird pines." Much of that is aided by wonderfully illustrative photographs and diagrams. A section at the end of the book provides citations and additional edifying details for topics covered in each of the chapters.

Lanner's is a personal view. He devotes a considerable amount of space to Clark's Nutcrackers (*N. columbiana*) and whitebark pine (*Pinus albicaulis*)—species that Lanner and his students have focused on—and to the work of his close colleagues. Although that could lead to a narrow view of the field, it doesn't because those studies are representative of a substantial fraction of the work conducted in the past 20 years. In fact, Lanner will convince many that the interaction between nutcrackers and pines is truly remarkable. Few other plants are so clearly dependent on a single species to disperse its seeds and few other dispersal agents are so reliant on the seeds of a single or several related species. Why this example is absent from most textbooks on ecology and evolution is less clear. Is it that most nutcrackers and pines are not coevolved? Lanner does a good job of reviewing the mostly descriptive but strongly supportive evidence that the relationship between nutcrackers and pines is mutualistic and that each has adaptations for exploiting the other. As the title suggests, this is a main focus of the book. In contrast, the possibility of coevolution is considered only for a subset of the many nutcracker–pine combinations. Lanner believes that once nutcrackers became "pine birds" there was little opportunity for further coevolution. This implies that coevolution is confined to episodes of major evolutionary change. Of course, such a restriction is not necessary. This, however, is only a small quibble.

Nutcrackers and pines do not represent a minor interaction. It is here that I think Lanner is most persuasive. The different species of nutcrackers and pines form a dominant interaction over vast areas of western North America and Eurasia with tremendous effects on other species in the community. I was particularly intrigued by the extent to which grizzly bears (*Ursus arctos*) and possibly brown bears in the Old World rely upon stone pines, and that the decline in whitebark pine in the northern Rockies (due in large part to white pine blister rust) is likely to have dire consequences for grizzly bear populations.

Again, why hasn't the nutcracker–pine interaction been a staple of more textbooks? I think it is because the studies are incomplete, but this could be changed. First, we need more experiments. Some elegant experiments have been conducted on nutcracker caching behavior, but much more could be done, especially if we desire quantification of the mutual adaptations between nutcrackers and pines. We also need more comparative studies to evaluate the influence of other selective agents on this system and to focus on the conditions that promote or prevent coevolution. This includes studies of both within-species geographic variation as well as more global comparisons. In North America, pine squirrels (*Tamiasciurus*) seem to be critical and possibly may be the most important players influencing cone traits, and even may determine whether pines respond much to selection exerted by nutcrackers. Comparative studies also may enable us to address why there are so many races of nutcrackers in the Old World yet only one in North America. Lanner touches on this, but is unable to supply an answer.

Finally, a complete phylogeny of pines and corvids is crucial for providing a context for interpreting the evolution of the interactions. Once completed, I believe many of us, including Lanner, will be surprised that this system is so dynamic. The dynamic nature of this system is hinted at by a recent molecular phylogeny showing that two species that are closely related, sugar pine (*P. lambertiana*) and whitebark pine (S. H. Strauss and A. H. Doerksen. 1990. *Evolution* 44:1081–1096), have cones that differ enormously from each other. Similarly, my recent studies on limber pine (*P. flexilis*) and lodgepole pine (*P. contorta*) on post-Pleistocene islands east (and possibly west) of the Rockies demonstrate that cones evolve exceedingly rapidly in response to the assemblage of seed predators.

Lanner has provided an enjoyable read that gives us an easy entry into a fascinating system. He has done a great service by summarizing much of what is known about the nutcracker–pine interaction for a wide audience. It is now up to future students to make this interaction a classic. All biology libraries should have a copy of this book, and I highly recommend it to those with an interest in birds, pines, ecology, or evolution, or to those who just want to learn more about an important feature of the mountainous West.—CRAIG W. BENKMAN, Department of Biology, New Mexico State University, Las Cruces, NM 88003.

Rare and Endangered Biota of Florida. Volume V. Birds.—James A. Rodgers Jr., Herbert W. Kale II, and Henry T. Smith, eds. 1996. University Press of Florida, Gainesville, FL. xli + 688 pp., 61 text black-&-white photos, 72 text maps. ISBN 0-8130-1127-2. $65.00 (cloth); ISBN 0-8130-1128-0. $29.95 (paper).

The Florida Committee on Rare and Endangered Plants and Animals (FCREPA), founded in 1973, published a volume each on mammals, birds, amphibians and reptiles, fishes, plants, and invertebrates (1978–1982) under the series title *Rare and Endangered Biota of Florida* (P. C. H. Pritchard, series ed.). The primary objective of those volumes was to provide information to individuals and agencies on animals and plants considered by a large group of experts to be in danger of being extirpated from Florida, so that those natural resources could be better conserved. Demand for the volumes was great, and each was reprinted several times. As time passed much new information accumulated for many of the species, and in 1986 FCREPA decided to rewrite the series.

The new volume on birds appears 18 years after publication of the first and contains much more information. It includes accounts for all but 4 of the 74 taxa found in the earlier volume (Clapper Rail *Rallus longirostris,* two races, and Stoddard's Yellow-throated Warbler *Dendroica dominica stoddardi* were "delisted," and a race of the Seaside Sparrow *Ammodramus*

maritimus was lumped) and for five additional taxa (Swallow-tailed Kite *Elanoides forficatus,* Wilson's Plover *Charadius wilsonia,* Gull-billed Tern *Sterna nilotica,* Cave Swallow *Petrochelidon fulva,* and Painted Bunting *Passerina ciris*). The status categories of only a few of the taxa have changed. Most horrifying is the shift of the Dusky Seaside Sparrow *(A. m. nigrescens)* from Endangered to Recently Extinct.

The volume is dedicated to Herb Kale (1931–1995), editor of the original volume, champion for saving the natural environments of Florida, and close personal friend. Herb's forte was "telling it like it is." His account of the Dusky Seaside Sparrow illustrates this exemplary trait. I recommend the account be read by those who wish to gain insight into the conflicts and bumbling of governmental agencies as well as the specifics about the demise of the Dusky.

Both the Ivory-billed Woodpecker *Campephilus principalis* and Bachman's Warbler *Vermivora bachmanii* remain listed as Endangered. The lack of verifiable evidence for their existence for several decades, especially for the large and conspicuous Ivory-bill, supports the contention that those two species should be listed as Extinct. I suspect they, and especially the woodpecker, remain listed as Endangered, in part at least, for political reasons. Ugh. The Piping Plover has been added to the Endangered list, which thus remains at 11 species.

The text for each account includes information on taxonomy, description, population size and trend, distribution and history of distribution, habitat requirements and habitat trends, vulnerability of species and habitat, causes of threat, responses to habitat modification, demographic characteristics, key behaviors, conservation measures taken, conservation measures proposed, and literature cited. Most accounts include an illustration and a distribution map.

During the years since publication of the first FCREPA volume on birds, many listed species have been the subjects of further study, and those studies have been conducted by numerous investigators. Fortunately many of the accounts in the new volume are first hand, prepared by those same investigators.

A table lists the 75 taxa under the seven categories of endangerment used by FCREPA, and gives their official listing according to the U.S. Fish and Wildlife Service and the Florida Game and Fresh Water Fish Commission. For speed of reference, I would have arranged the species accounts taxonomically, and let the table serve as the reference for category of endangerment. Furthermore, I think it would have been proper and courteous to list the authors of the species accounts up front in the Contents as well as with each account.

For students interested in identifying and working on an endangered bird species of Florida, those accounts and references therein should be their first source. For persons contemplating producing a publication to serve as a quick reference to endangered organisms of other geographic regions, I suggest this book as a model. For those reasons, I recommend this book, and the others in the series, be in all college libraries in Florida, and in libraries of other institutions with conservation programs.—GLEN E. WOOLFENDEN, Archbold Biological Station, Venus, FL 33960, e-mail: birdlab@strato.net