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TRENDS IN GEOGRAPHIC VARIATION OF COOPER'S HAWK AND NORTHERN GOSHAWK IN NORTH AMERICA: A MULTIVARIATE ANALYSIS. Proceedings of the Western Foundation of Vertebrate Zoology, Vol. 5, No. 3. By Wayne H. Whaley and Clayton M. White. Western Foundation of Vertebrate Zoology, Camarillo, California. 1994:161–209 pp., 22 numbered maps and figs., 10 numbered tables. $8.00 (paper).—Subspecies are no longer "popular" in North American ornithology, and studies of geographic variation in avian anatomy are not as common as they once were. Indeed, the most recent previous accounting of geographical variation in North American accipiters was published almost a quarter of a century ago (Wattel, J. Geographical differentiation in the genus *Accipiter*. Nuttall Ornithological Club, Cambridge, Massachusetts, 1973). Whaley and White's substantial and significant contribution helps right this unfortunate wrong.

After an introduction that correctly concludes that studies such as the authors' offer fertile grounds for testing both physiological and ecological theory, the authors detail the results of a painstaking analysis of geographic variation in the anatomical features of more than 1200 museum specimens of Cooper's Hawks (*Accipiter cooperii*) and Northern Goshawks (*A. gentilis*) collected during the breeding season. Reverse sexual size dimorphism is considerable in accipiters, and Whaley and White analyze their data both within (female versus male) and across species. After presenting their results, the authors conclude with a discussion that encompasses numerous physiological and ecological hypotheses, including Bergmann's and Allen's rules, competition theory, and the results of many regional studies of the diets, breeding ecology, and migration behavior of the two species. Building upon a strong foundation of natural-history information, Whaley and White's results and discussion offer considerable food for thought.

As might be expected, the more migratory Cooper's Hawk (with two recognized races) exhibits less geographic variation, overall, than the more sedentary Northern Goshawk (with five recognized races in the region). Even so, the two species exhibit considerable concordance in their geographical trends, as do males and females within species. In both Cooper's Hawks and Northern Goshawks, individuals from southwestern locations are larger than birds elsewhere, a phenomenon the authors attribute both to physiological (e.g., reduced water stress) and ecological (e.g., enhanced competitive ability in the face of incursions from more northerly migrants) forces. The authors go on to suggest that the smaller size of birds in the northwestern United States reflects an adaptation for maneuverability in the dense rain forests they inhabit there. Geographic shifts in the relative importance of avian prey in the diets of the two species are used to explain why Cooper's Hawks have longer toes in the east, and goshawks shorter toes in Alaska. The fact that goshawks east of the Rockies are more migratory than their western counterparts is used to explain why the former have more pointed wings than the latter. A similar argument is made for both wing shape and wing loading in eastern versus western Cooper's Hawks. The results are compared with additional data on Sharp-shinned Hawks (Smith, J. P. 1988. Morphometric variation in accipiter hawks with emphasis on western North America. Unpublished M.S. thesis, Utah State University, Logan, Utah), with Whaley and White concluding that the high degree of concordance existing among the three species reflects similar selection pressures.

Although Whaley and White assemble convincing cases for most of their conclusions, I could not help but wonder if recent ecological and evolutionary forces may have contributed to several of their findings. The museum specimens used by the authors were collected over

a period of more than 100 years, a time of considerable ecological upheaval for North American raptors. Populations of many species, especially accipiters, were reduced significantly during this time, both as a result of the wholesale destruction of the birds' forested habitats, as well as the methodical shooting of masses of birds at traditional migratory bottlenecks. The extent to which such acute selective forces have acted to, quite literally, shape the geographic ecology and anatomy of the birds in question remains an unstudied topic.

The above is but one example of the food for thought Whaley and White's analysis serves up for the reader. The authors, together with the Western Foundation of Vertebrate Zoology, are to be congratulated for publishing this major contribution to the raptor literature. I highly recommend it, both for its content and potential use as a role model in similar studies.—KEITH L. BILDSTEIN.

MOULT AND AGEING OF EUROPEAN PASSERINES. By Lukas Jenni and Raffael Winkler. Academic Press, London and San Diego, 1994: 225 pp., 652 figures (mostly color photographs of spread wings and diagrammatic representations of molt stages). $40.00.—The first thing that must be said about this oversized (24 × 31 cm) book is that it could only have been done in Europe. The authors are Swiss, and the data for the book were collected over many years at the banding station at Col de Bretolet in the Swiss Alps and at the Natural History Museum in Basel. There are simply no individuals or teams in North America with a sufficient data base, background knowledge, and, alas, interest in molt to be able to produce a comparable tome for New World passerines. I would love to be wrong about this.

The book is in two parts, each with several chapters. The first chapter is an exceptionally thorough introduction to plumage and the role of molt in the life history of a bird. This is followed by a chapter entitled "The terminology of feathers, plumages, moults and age classes." I was happy to see that they advocate numbering the primaries descendently (i.e., from inside to outside). They point out that "papers describing exceptional moult patterns are still presented without giving [the] vital information" as to which numbering system was used. The authors somewhat grudgingly admit that "A terminology based on homologies of plumages and moults would certainly be desirable and has many advantages (Humphrey and Parkes 1959 [Auk 76:1–31], 1963 [Auk 80:496-503], Rohwer et al. 1992 [Condor 94:297–300])." However, in defense of their failure to adopt the concepts and resultant terminology of Humphrey and Parkes, they point out that there are numerous Palearctic passerines that have evolved unusual molt cycles. These have been studied purely descriptively, and not in any phylogenetic or evolutionary context that would clarify homologies; Humphrey and Parkes (1959, 1963) admitted that apparent exceptions to the widely prevalent and easily homologized molt cycles would take special study. Such studies being lacking, Jenni and Winkler therefore revert to a molt terminology based on the reproductive cycle. In accordance with their rather defeatist desire for simplification, they have taken the position that for long-distance migrants, only the molt prior to fall migration is to be called the "postbreeding/postjuvenile moult," with any subsequent molting in the winter range being attributed to the "prebreeding moult." They are not consistent in this usage, however, as the complete molt of the [Barn] Swallow (*Hirundo rustica*) in the winter quarters is "interpreted as a complete postjuv[enile] moult in 1yr [=first year] and a complete postbr[eeding] moult in ad." They admit that some individual Barn Swallows begin body molt prior to and continue it during migration, finishing it in the winter range, but it is the wing molt alone that determines their terminology.

Chapter 3 is a detailed account of the molt strategies of adult passerines, illustrated with

diagrams and graphs that take a bit of study to comprehend. Much attention is paid to variations from the commonest patterns, with examples, and there is a detailed discussion of the great variation in sequence and timing of molt in trans-saharan migrants, a variation that appears to be without counterpart in Neotropical migrants. Chapter 4 is an even longer discussion of molt patterns in the first year of life.

Part II begins with a chapter on techniques for ageing European passerines using plumage and molt characters; skull pneumatization is described and figured in an appendix. Ageing by rectrix shape, useful in so many American species, is barely mentioned on p. 50 as a possibility, but is not pursued further.

The body of the book is devoted to descriptions and figures (both color photographs and diagrams) of the wing molt of (only) 58 species of European passerines, with the emphasis on age determination. Areas of the plumage other than the wing are usually briefly mentioned if they are pertinent to age determination. The approximately 480 photographs of spread wings are carefully labelled as to date, age of the bird, and the stage of molt or wear that indicates the age.

The species accounts, the largest part of the book, are clearly intended for use by banders, although a few museum curators will want to apply the criteria to ageing specimens; in the case of remiges, this will not be easy unless the skin has been prepared with one wing spread.

The book ends with an extensive bibliography, a list of scientific names with their English, German, French, Italian and Spanish equivalents, a species index, and a page (224) of "Explanation," which includes lists of abbreviations, a diagram of names and numbers of wing feathers, and examples of diagrams used in the text. An unnumbered p. 225 is identical to 224, and the authors suggest that this be cut out and used as a book mark; not a bad idea, considering the number of abbreviations used and the strangeness of some of the diagrams.

The authors, of course, know that remex is the singular of remiges (you'd be surprised at the number of people who think it is "remige"), but fail to recognize the parallel singular "phalanx," referring on p. 7 to "the first phalange [*sic*] of the second digit."

The species accounts as such will be of only peripheral interest to American banders except for the few species, such as the [Barn] Swallow, Sand Martin [Bank Swallow] (*Riparia riparia*), [Common] Redpoll (*Carduelis linaria*), and [Red] Crossbill (*Loxia curvirostra*) that are found on both sides of the Atlantic. The introductory parts of the book, however, would make quite a good initiation to molt and ageing studies for the many ornithologists unfamiliar with these aspects of avian biology.—KENNETH C. PARKES.

LA SELVA, ECOLOGY AND NATURAL HISTORY OF A NEOTROPICAL RAIN FOREST. Edited by Lucinda A. McDade, Kamaljit S. Bawa, Henry A. Hespenheide, and Gary S. Hartshorn. The Univ. of Chicago Press, Chicago, 1994: 486 pp., 10 halftones, 17 maps, 69 line drawings, 79 tables. $28.95 paper, $90.00 cloth.—La Selva is a nature reserve and biological station of the Organization for Tropical Studies, which is adjacent to Braulio Carrillo National Park in the Atlantic lowlands of northeastern Costa Rica. This volume provides a comprehensive review of over 30 years of research in one of the most intensively studied tropical field sites in the world. The book includes 26 chapters organized into sections on the abiotic environment, plant and animal communities, plant-animal interactions, and the impact of land use and forestry and agricultural development on La Selva and other areas of Costa Rica. Appendices contain species lists of vascular plants and vertebrates. The list of birds of La Selva and vicinity includes information on abundance, seasonal status, habitat,

and recent changes. The authors synthesize information in their subject areas, compare La Selva to other tropical research sites, and identify gaps in knowledge, which are often gaping in tropical systems. Plant biology and vegetation dynamics have been best studied at La Selva, whereas little is known about the ecology of La Selva birds. Invertebrate biology (with the exception of butterflies) and aquatic ecology have received little study until recently. This book is written primarily for tropical researchers and ecologists, but much of it should be comprehensible to serious natural history tourists. It is a valuable resource for researchers at La Selva and other neotropical sites.—SUE A. PERRY.

RAPTOR CONSERVATION TODAY. World Working Group on Birds of Prey: Proc. 4th World Conference. Edited by B.-U. Meyburg and R. D. Chancellor. 1994:816 pp. $49.95.—An international conference on birds of prey held in Berlin in 1991 attracted more than 500 participants with strong representation from eastern Europe, the Balkans and the components of the former USSR. One hundred of the presentations have been gathered into this large volume. Even so, a smaller one, due this year, will contain those relating to eagles. The cover of this volume is a color photograph of that most spectacular of birds of prey (in size and appearance, if not in behavior)—Steller's Eagle (*Haliaeetus pelagicus*). Excellent sketches of various species by F. Weick are scattered throughout the text. The overall emphasis, as would be expected, is on conservation, management, and status, but investigators, whatever their goals, will profit from the treatment of such subjects as radiotagging and the pitfalls thereof by R. E. Kenward and S. S. Walls. The papers are grouped under ten natural headings concluding with 17 on the inroads of pesticides and poisons. Some contributions relate entirely and others in part to basic research. The longest and most detailed paper, for example, is a taxonomic revision of the entire order Falconiformes (R. N. Holdaway). Others analyze the effects of food supply and nesting success on molt in Tawny Owls (*Strix aluco*), genetic fingerprinting in Eleonora's Falcon (*Falco eleonorae*), and DNA analysis of the species of the genus *Falco*. In short, this volume, with its many included bibliographies, provides a cross-section of current work on the biology, management and conservation of hawks and owls.—DEAN AMADON.

CONSERVATION AND MANAGEMENT OF NEOTROPICAL MIGRANT LANDBIRDS IN THE NORTHERN ROCKIES AND GREAT PLAINS. by David S. Dobkin. Univ. of Idaho Press, Moscow, Idaho. 1994: 220 pp., 144 range maps, 6 numbered text figures, 3 tables. $29.95 (paper).—Concern over declining populations of many Neotropical migrant birds has engendered much interest, research, controversy, and several symposiums on the problem in recent years. Most of the work has been from the eastern United States, so this work that summarizes the current state of knowledge for a western region is most welcome.

The book is an extension of a report for the U.S. Forest Service, Region 1, and includes all of Montana and North Dakota, the northern half of Idaho, and northern parts of Wyoming and South Dakota. Figures show the distribution of U.S. Forest Service, Fish and Wildlife Service, and National Park Service lands, and the physiographic regions of the Northern Rockies and Great Plains. The introductory section reviews the literature and arguments over the two major factors contributing to the decline of Neotropical migrant populations—forest fragmentation on the breeding grounds in the United States, and deforestation and other problems on the wintering grounds in the Neotropics. The North American Breeding Bird Survey (BBS) is discussed as the major data base for monitoring long-term population

trends, and the paucity of BBS data in many areas of the west is cited as one reason that less is know about western Neotropical migrant birds. The data do suggest, however, that Neotropical migrant birds in the west are doing better than those in the east. One explanation offered is that most forest fragmentation in the west is due to timber harvest, and hence the land retains the potential of returning to second-growth forest; another is that western migrants tend to use different parts of the Neotropics from eastern birds. The author emphasizes the desperate need for more long-term studies in the west, and argues for a species-level research focus combined with a habitat-based conservation effort.

The second part of the book surveys management activities and their impacts. The survey is divided into three sections, coniferous forests, deciduous forest, and grasslands and shrub-steppe, and reviews the state of knowledge (including a review of the literature) for each of the major plant communities (e.g., Douglas fir and ponderosa pine, riparian woodlands, aspen woodland, shortgrass, mixed-grass, tallgrass prairie). In addition the author considers the effects of livestock grazing, fire and its suppression, pest management, and provides a summary and recommendations.

The bulk of the book (150 pages) is devoted to the 144 species accounts of Neotropical migrant birds which breed in this region. Three tables detail each species' distribution in twelve major habitat types, and wintering area in the Neotropics (e.g., winters exclusively in South America). The accounts are short—one per page—and are meant to provide a synopsis of the most pertinent information concerning the species' conservation and management, and are intended to be of heuristic value. Each account provides seasonal residency status, wintering area, habitat requirements, food and foraging techniques, population status (regional, western, and continent-wide trends), management, recent literature, and a range map.

This book is a valuable resource. Its more than 650 references (most recent 1993) may alone be worth the price of the book. I would like to have seen winter range maps for each species rather than a code number which referred to a key on the first page of the species accounts, but this is a minor quibble. This book should be of interest to anyone interested in Neotropical migrant birds, or the distribution and ecology of western birds.—WILLIAM E. DAVIS, JR.

DISTURBANCE TO WATERFOWL ON ESTUARIES. By Nick Davidson and Phil Rothwell (eds.). Wader Study Group Bulletin 68, Special Issue, August 1993. Obtain from: Policy Operations Department, The Royal Society for the Protection of Birds, The Lodge, Sandy, Bedfordshire SG19 2DL, U.K. £15, postage and handling included (paper).—Recreational use of coasts and estuaries is creating problems for wildlife in many places around the world, including North America. Hence this book, a compendium of 16 papers involving disturbance to a wide variety of birds which inhabit estuaries, is timely and important. It is the outgrowth of a 1991 conference sponsored by the Nature Conservancy Council and The Royal Society for the Protection of Birds. Although the papers deal with problems of disturbance in the estuaries of north-west Europe, they mirror problems of the coasts and estuaries of North America.

The papers deal with a wide variety of "disturbances." These include the elimination of habitat through development of marinas, housing, and leisure complexes, and the disturbance of feeding or roosting birds by hunting, boating, water-skiing, walking along beaches or mudflats, dogs, 4-wheel drive RVs, airplanes, and helicopters. Some papers present previously unpublished research; other papers summarize what has been previously published. Some papers are theoretical, others descriptive or experimental. Some deal with a single

species, e.g., Eurasian Widgeon (*Anas penelope*), Kentish Plover (*Charadrius alexandrinus*); others deal with a broad spectrum of gulls, ducks, and shorebirds (Charadriidae, Scolopacidea). One chapter consists of summaries of published papers and reports outside the scope of this book, including summaries of four papers reporting on North American studies.

Aside from the sometimes confusing and overlapping usage of the terms "waterfowl," "waders," and "shorebirds," I found the papers interesting and informative. The book should be of interest to anyone concerned with anthropocentric disturbance, or the ecology and management of estuarine habitat.—WILLIAM E. DAVIS, JR.

THE BIOLOGY AND STATUS OF THE LONG-BILLED CORELLA IN AUSTRALIA. by W. B. Emison, C. M. Beardsell, and I. D. Temby. Proc. West. Found. Vert. Zool. 1994, 5:211–247. 24 numbered text figs., 1 table. $7.00.—This monograph reports on an exhaustive study of the Long-billed Corella (*Cacatua tenuirostris*) in southeastern Australia. Although the stated aims of the study were to collect information on seasonal distribution, flocking behavior, habitat preferences and other activities of this species, this report does much more—it provides a thoroughly researched and documented history of a bird which suffered severe ecological repercussions from interactions with humans.

The corella probably benefitted from the fire regime of the aborigines, since the fires promoted the development of grasslands and grassy woodlands. But the advent of European settler/pastoralists with their sheep, beginning in 1837, caused the rapid disappearance of the corella's primary food resource, the plant murnong. European settlement along the rivers, where cattle and sheep destroyed weedbeds, severely restricted another of the corella's seasonal food resources (aquatic plant roots). Crop damage by corellas soon brought on retaliation by gun and poison. By 1860 the numbers and range of Long-billed Corellas had been severely reduced. The final ecological disaster perpetrated by man followed the explosive growth of the introduced rabbit population. This led to a further, gradual, decline in corella numbers from 1860 to the 1950s when the introduction of myxomatosis eliminated most of the rabbits, and with them intense competition for food, a defoliated landscape, and the farmer's poisoned grain. Since then the recovery of the corellas has been steady, and their range has rapidly expanded, despite increasing conflict with farmers whose crops are a major corella food resource. More than 90% of the diet of Long-billed Corellas consists of introduced plant species.

This study, conducted by the Dept. of Conservation and Natural Resources of Victoria from 1978–1984, included wing-tagging 704 corellas, and produced a wealth of detailed natural history information, including a study of molt. All aspects of breeding biology were studied, and included, for example, studies of nest attendance at nests with tagged birds. Feeding studies included analysis of the contents of 314 stomachs, with onion grass (an alien species) corms and oat grains the predominant food, although seasonal shifts in food resources were considerable. Long-billed Corellas are relatively sedentary, with more than 85% of sightings of tagged birds within 5 km of where they were tagged. Other results detail flocking size and behavior, and mortality ("shot by farmers" was a leading cause of death). The habitat descriptions and analyses, including important plant associations such as the river red gums which are prime breeding habitat, are a major part of this report. They include the distribution of onion grass and the various agricultural crops upon which the corellas depend.

This is a well researched, well written, and informative monograph about a resilient cockatoo species. The history of its interactions with man are fascinating. I recommend this monograph to anyone interested in avian conservation, particularly for its historical perspective.—WILLIAM E. DAVIS, JR.