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RECENT LITERATURE

Edited by Robert C. Beason

RESEARCH TECHNIQUES

1. Flight paths of homing pigeons studied by means of a direction recorder. P. Ioalè, P. Dall'Antonia, L. Dall'Antonia and S. Benvenuti. 1994. Ethol. Ecol. & Evol. 6:519–527.—The objectives of this study were two fold: to test a new direction recording device and to examine the effects of topography on Homing Pigeon (*Columbia livia*) return flights to their loft. The new recorder weighs 13 g and has a memory capacity of 32 kB. The interval between successive recordings of the birds direction could be set to 2, 10, or 20 sec. The pigeons in this study flew more-or-less directly home from the release site, but stayed mostly in the valleys and detoured around mountains. Use of this technique should be useful to researchers examining the influences of various treatments on both the departure direction of the pigeon from the release site and how long (or where) it makes corrections in its path. [Dept. di Scienze del Comportamento Animale e dell'Uomo, Univ. di Pisa, Via A. Volta 6, 1-56126 Pisa, Italy.]—Robert C. Beason.

BEHAVIOR

(see also 7, 11, 15)

2. Observations of a pair of Eastern Bluebirds raising Black-capped Chickadee young. J. M. Zingo, K. Murphy, and D. Rosgen. 1995. Sialia 17:43–48.—The authors provide a detailed account of an Eastern Bluebird (*Sialia sialis*) pair feeding and caring for two Black-capped Chickadee (*Parus atricapillus*) nestlings in a bluebird nest box after they apparently usurped the nest box from the adult chickadees in Hartford Co., Connecticut. No reference is made regarding the age of the chickadee nestlings when the bluebirds took over the nest box; however, after having built a partial new nest around the nestlings, both the male and female bluebird made feeding trips to the young chickadees, often removing fecal sacs on their way out. The young chickadees eventually fledged, presumably at about 17 days of age, after which the bluebird pair initiated their own nest effort in the same box (although no mention is made of the outcome of this attempt). The authors discuss some of the proximate cues that may have stimulated this instance of interspecific feeding and provide some interesting insight into the parental performance of this particular pair of wayward bluebirds. [Massachusetts Coop. Fish and Wildlife Research Unit, Box 34220, Holdsworth Natural Resource Center, Univ. of Massachusetts, Amherst, MA 01003-4220, USA.]—Danny J. Ingold.

3. Factors shaping winter social organization in Hazel Grouse *Bonasa bonasia*: a comparative study in the eastern and western Palearctic. J. E. Swenson, A. V. Andreev, and S. V. Drovetskii. 1995. J. Avian Biol. 26:4–12.—In winter, some Hazel Grouse defend solitary territories whereas others travel about in flocks. In this collaborative study, Swenson et al. examine the influence of habitat and food abundance on dispersion and flock sizes of Hazel Grouse wintering at one site in Sweden and three sites in eastern Siberia. Hazel Grouse in Sweden inhabited dense spruce forest, defended territories, and occurred almost exclusively in groups of one or two. Flock sizes were larger and more variable in Siberia, with the smallest flocks (mean = 2.7) in moderately dense larch-birch forest and the largest flocks (mean = 6.3) in open deciduous forest. Territorial individuals apparently were absent in Siberia. Larger flocks also occupied areas with higher food availability, which confounded attempts to assess the effects of cover on flock size. Abundant food seemed to be a prerequisite for the formation of large flocks. However, large flocks did not occur in food-rich, dense coppice forests in central Europe. Swenson et al. thus conclude that risk of predation was the most important factor selecting for flocking behavior in open habitats, whereas food availability was of secondary importance. [Norwegian Institute for Nature Research, Tungasletta 2, N-7005 Trondheim, Norway.]—Jeff Marks.

4. Altruism as a handicap: the limitations of kin selection and reciprocity. A. Zahavi. 1995. J. Avian Biol. 26:1–3.—In this brief commentary, Zahavi points out weaknesses in using models of group selection, kin selection, and reciprocal altruism to explain the phenomenon of helping at the nest. As an alternative, he suggests that helping behavior is a "simple selfish

investment." His evidence comes from the group-breeding Arabian Babbler (*Turdoides squamiceps*). Individual babblers compete with one another to feed nestlings, mob predators, and defend territories. Indeed, dominants often prevent subordinates from helping the group. Zahavi suggests that investment in group welfare serves to advertise the helper's quality. The helper gains from its investment by increased "social prestige" that enhances its chances of becoming a breeder. Thus, altruistic behavior may be viewed as a handicap that advertises the helper's quality. [Inst. for Nature Conservation Research, Tel-Aviv Univ., Tel-Aviv 69978, Israel.]—Jeff Marks.

FOOD AND FEEDING

(see also 23, 37)

5. Acidification and ecological interactions at higher trophic levels in small forest lakes: the perch and the Common Goldeneye. H. Pöysa, M. Rask and P. Nummi. 1994. Ann. Zool. Fennici. 31:397–404.—An investigation into the relationship of breeding common goldeneye (*Bucephala clangula*) to lake acidification and the resulting effect on perch (*Perca fluviatilis*) population density and invertebrate abundance in small forest lakes in Finland was conducted. Insectivorous waterbirds such as the goldeneye may actually benefit from the decreased population densities of acid sensitive fishes such as the perch, while piscivorous birds may suffer. The authors sought to determine if there was an overall increase in goldeneye pair and brood density in lakes with decreasing perch densities and resulting increased vertebrate abundance, and if the intensity of use of acid lakes by goldeneyes increased after the elimination of perch. Perch population density was determined by the mark-recapture method in three lakes that were each at differing stages of acidification. Horizontally suspended activity traps were utilized to sample invertebrate populations at depths of 50–100 cm. Four traps were used in each lake and sampling was continuous over the duration of the breeding season. Standard point count and round count methods were used to census the goldeneye populations. While no clear response to lake pH by goldeneye pair and brood density was found in pair-wise comparisons, when fish density information and vertebrate abundance associated with lake pH were considered, clear responses existed. Goldeneye densities were discovered to be consistently highest on lakes with the lowest pH and perch populations and high vertebrate abundance. Both goldeneye breeding pairs and broods selected habitats based on the abundance of vertebrates resulting from the decrease in food competition with fish competitors, and may consequently benefit from such a situation. [Finnish Game and Fisheries Research Inst., Evo Game Research Station, Kaitalammintie 75, FIN-16970 Evo, Finland.]—Sue Bennett.

6. Bird use of *Cecropia* (Cecropiaceae) and nearby trees in Espirito Santo State, Brazil. Y. Oniki, R. A. de Melo Jr., E. T. Scopel, and E. O. Willis. 1994. Ornithol. Neotropical 5:109–114.—The authors reported that cecropia trees were an important source of food. Thirty avian species were observed using cecropia trees, with 20 species feeding there. The most common species foraging in cecropias were *Dacnis cayana, Euphonia violacea, Tangara mexicana,* and *Thraupis sayaca.* Most of the species fed on cecropia catkins and some also took insects. Foraging activity peaked three times daily: dawn, midday and midafternoon and ceased about one hour before dark, perhaps in response to pressure from nocturnal predators. Birds visiting the tree foraged rapidly and left to rest in other locations. [Dept. Zoologia, UNESP, C.P. no 199, 13,506-900 Rio Ciaro, SP, Brasil.]—Robert C. Beason.

7. Observations of Mexican Jays (*Aphelocoma ultramarina,* Corvidae) overwhelming defenses of two species of wooly bear caterpillars (Arctiidae). D. H. Simens and E. Green. 1995. Southwest. Nat. 40:232–233.—The authors report observations of adult Mexican Jays in Cochise, Co., Arizona, eating two species of wooly bear caterpillars, which were clearly avoided by other insectivorous bird species in the area. Before consuming a caterpillar, an adult jay would let it dangle from the tip of its mandibles and sweep it back and forth several times through loose gravel or sand. The net result of this action was to remove the urticating hairs which likely hindered consumption. Based on a single observation of a yearling jay, it appears that young birds are not as efficient at this technique and may have to learn the sweeping behavior. It remains unclear whether chemicals other than the pyrrolizidine alka-

loids and cardenolides in the hairs affected the jays and if jays are better able to detoxify such compounds once ingested than other bird species. [Dept. of Biological Sciences, Northern Arizona Univ., Flagstaff, AZ 86011, USA.]—Danny J. Ingold.

8. Trumpeter Swan (*Cygnus buccinator*) food habits in the greater Yellowstone ecosystem. J. R. Squires and S. H. Anderson. 1995. Am. Midl. Nat. 133:274–282.—Seasonal food habits of Trumpeter Swans in the greater Yellowstone area (where Wyoming, Idaho, and Montana adjoin) were examined using microhistological fecal analysis. Twenty-three foods were detected from 467 fecal samples collected during the winter, spring, and summer of 1989; however, only eight of these contributed to at least 3% of the diet during any one season. Dominant foods included *Potamogeton* spp. (32.3%), *Chara* spp. (21.7%), *Potamogeton pectinatus* tubers (15.7%), and *Elodea canadensis* (11.4%). *Chara* spp. and *Potamogeton* spp. were the prominent summer food items while *Chara* spp. and *Elodea canadensis* were the most important winter food items. Seasonal dietary shifts from winter to spring were evident, in which swans consumed significantly more *Elodea canadensis* in the winter versus the spring and significantly more *Potamogeton* foliage and tubers in the spring versus the winter. Only *Potamogeton* spp. (during summer) and *Potamogeton pectinatus* tubers (during winter) were preferred food items since they were consumed in greater proportions than their availability. Conversely, swans avoided eating *Ceratophyllum demersum* which was common on all feeding sites. The significant increase in tuber consumption that occurred from winter to spring suggests that this food item is important for swans when securing the necessary endogenous reserves necessary for reproduction. [U.S. Forest Service, Rocky Mountain Forest and Range Experimental Station, 222 S. 22nd Street, Laramie, WY 82070, USA.]—Danny J. Ingold.

9. Foraging behavior of Black-backed and Three-toed Woodpeckers during spring and summer in a Canadian boreal forest. P. Villard. 1994. Can. J. Zool. 72:1957–1959.—The congeneric Black-backed (*Picoides arcticus*) and Three-toed (*P. tridactylus*) Woodpeckers are sympatric in the boreal forests of North America, and might be expected to fill similar niches. To explore foraging niche segregation between the species, the author collected field data on foraging behavior including technique (categorized as pecking, scaling, excavating, or licking), zone (i.e., vertical and horizontal strata), and substrate (tree species, condition, and diameter). Statistically significant differences were found in foraging technique (Three-toed Woodpeckers scaled bark more frequently, while Black-backed Woodpeckers excavated more frequently), foraging zone (Three-toed Woodpeckers foraged higher in standing trees, Black-backed Woodpeckers foraged on downed trees more often), and substrate diameter (Black-backed Woodpeckers used larger-diameter trunks). Neither species exhibited a strong preference for a particular tree species. Both species demonstrated an affinity for dead trees and branches, with Black-backed Woodpeckers using them 88% of the time and Three-toed Woodpeckers 95% of the time. The results of this study are generally in agreement with previous studies on these species, with the exception of sap-licking behavior. While Three-toed Woodpeckers in the Palearctic region are reported to employ this technique extensively, birds in this study did so minimally. The author posits that the sap-licking niche in the Nearctic is filled by the sapsuckers (*Sphyrapicus* spp.), a group absent in the Palearctic. [Taiga Biological Station, Univ. of Manitoba, Bissett, MB, R0E 0J0, Canada.]—Scott W. Gillihan.

10. Influence of primary prey on home-range size and habitat-use patterns of Northern Spotted Owls (*Strix occidentalis caurina*). C. J. Zabel, K. McKelvey, and J. P. Ward, Jr. 1995. Can. J. Zool. 73:433–439.—Northern Spotted Owls in northern California and southern Oregon were radio-tracked to obtain data on home range; cast pellets were collected concurrently and analyzed to provide information on dietary preferences. The proportions of woodrats, flying squirrels, and voles in the diet differed significantly among three study sites. Home range size changed with the dominant prey item—it was largest where flying squirrels were the primary component, smallest where woodrats were the primary component, and intermediate when the proportions were equal. The authors believe that this response was due to the larger size of woodrats, which affords owls greater energy gain per prey item. Also, woodrats generally occur in higher densities than flying squirrels, so owls feeding on woodrats would require less area for foraging. Habitat use also varied with prey proportions. Where woodrats were the primary prey, owls utilized edges between mature and second-growth forests. However, where flying squirrels were the primary prey, edge habitats were used only

incidentally. The authors were careful to point out that, although woodrats in second-growth forest can be an important food source for Spotted Owls, all of the nests located in this study were in mature forest with large-diameter trees and dense canopy cover. [U.S. Forest Service, Pacific Southwest Forest and Range Experiment Sta., 1700 Bayview Dr., Arcata, CA 95521, USA.]—Scott W. Gillihan.

11. Cache and recovery behavior of wild Pinyon Jays in northern Arizona. N. G. Stotz and R. P. Balda. 1995. Southwest. Nat. 40:180–184.—Two flocks of Pinyon Jays (*Gymnorhinus cyanocephalus*) were observed for almost three years in and around Flagstaff, Arizona, to document seasonal and age-related changes in cache and recovery behavior. The relative proportion of cache and recovery bouts in adult jays differed significantly ($P < 0.001$) among seasons; cache bouts occurred more frequently during fall and winter while recovery bouts were observed most frequently during winter. The majority of cache bouts (70%) involved more than a single cache site whereas only 20% of recovery bouts involved multiple sites. Caches were stored significantly more often in above-ground sites during winter which suggests that food is more difficult to recover on the ground after the accumulation of snow. During both caching and recovery, Pinyon jays were involved in aggressive interactions with other Pinyon Jays 16% (caching) and 26% (recovery) of the time. Such interactions also involved Stellers Jays (*Cyanocitta stelleri*) 4% and 9% of the time respectively. Twenty-six percent of all recovered food items were recached, a behavior that seems to help individuals reduce seed theft and control food resources. Caching was first observed in juveniles about three weeks after fledging and nonfood items (i.e., rotten pine seeds, pebbles, and berries) were cached more frequently than were food items during the first 12 weeks. Juvenile birds were also involved in slightly more aggressive interactions during caching bouts than were adults; moreover, they did not cache food in above-ground sites until their eighth week. These data suggest that young birds need time and practice to develop their caching skills. [Dept. of Biological Sciences, Northern Arizona Univ., Box 5640, Flagstaff, AZ 86011, USA.]—Danny J. Ingold.

NESTING AND REPRODUCTION

(see also 2, 4, 5, 25, 34, 35, 38)

12. American White Pelicans at the Molly Islands, in Yellowstone National Park: twenty-two years of boom-and-bust breeding, 1966–1987. K. L. Diem and B. H. Pugesek. 1994 Colon. Waterbirds 17:130–145.—This paper reports on a 20-year study (1966–1987) of a major White Pelican (*Pelecanus erythrorhynchos*) colony that has existed at least since 1890, been studied intermittently since 1917, is the only pelican colony in a national park, and is subjected to severe environmental constraints related to high altitude. The colony is also of interest because it consists of two discrete migrant populations, one wintering along the Gulf of Mexico, the other along coastal California and western Mexico. Killing frosts occurring up to mid-July and after mid-August, ice persisting until late May on Yellowstone Lake, where the two islands of the colony are located, variations in air temperature including persistent cold, hailstorms, and water level of the lake all appear to influence nesting success of the pelicans. The 20 years of census data of nests and pre-fledging young indicate that reproductive success has varied widely between complete or near complete reproductive failure (0–29 young fledged, occurred in five years) to very good (418–650, four years). The most critical factor influencing nesting success appears to be the water level of Yellowstone Lake. Flooding occurs when the water level rises 1.4 m above minimum water level, and complete reproductive failure occurred when levels reached 1.6 m for 40 or more days. The best years were those when no flooding occurred. Snowmelt runoff affects water levels, and unpredictable crustal uplift has produced flooding and constitutes a major long-term threat to the colony. For nonbust years, the average of 546 (± 183 SD) adult birds produced a net annual population increase of 5%, and the authors conclude that "bust" years may have less impact on population stability than one might expect in long-lived species like the White Pelican. This paper illustrates the value of long-term studies. [Dept. of Zoology & Physiology, Univ. of Wyoming, P.O. Box 3166, Laramie, WY 82071-3166, USA.]—William E. Davis, Jr.

13. The influence of human disturbance on the location of Great Blue Heron colonies in the lower Chesapeake Bay. B. D. Watts and D. S. Bradshaw. 1994. Colon. Waterbirds 17: 184–186.—This paper contains a report on the relationship of man-made structures (unimproved and secondary roads, and buildings) and 53 active Great Blue Heron (*Ardea herodias*) colonies. The colony locations were compared with 58 random points within the study area. On average colonies were located farther from disturbance sources than were random points, and distances to nearest man-made structures were more than twice as great. The density of structures was less for colony sites and the density of structures significantly increased with distance from the colonies. The authors conclude that Great Blue Herons seem to avoid human disturbance when nesting in the lower Chesapeake Bay area. The data also suggests that buildings have the strongest influence, followed by secondary roads. Unimproved roads had the least influence on colony location. This paper should be of interest to land managers and those interested in bird conservation. [Center for Conservation Biology, College of William & Mary, Williamsburg, VA 23185, USA.]—William E. Davis, Jr.

14. The influence of synchronous breeding, natal tree position and rainfall on egret nesting success. G. S. Baxter. 1994. Colon. Waterbirds 17:120–129.—This four-year study in a large New South Wales colony of Great (*Casmerodius albus*), Intermediate (*Mesophoyx intermedia*), Little (*Egretta garzetta*), and Cattle (*Bubulcus ibis*) Egrets was designed to quantify fledging success for purposes of comparison with colonies elsewhere in the world. Comparisons included fledging success among breeding seasons, timing within the breeding season, position of the nest within the colony, and rainfall in the five months preceding nesting. Nests were monitored from outside the colony so that investigator disturbance was minimized. No significant differences in fledging success were found among years for any species except for a higher success rate for Intermediate Egrets in one season, which may have been related to increased rainfall prior to nesting and thus increased food availability. There were no significant relationships among fledging success and physical characteristics of nest location (e.g., nest height, distance from center of colony, tree species). The highest nesting success was 2.04 fledglings/nest in Great Egrets, which is below some calculations of the level necessary for population stability. The author suggests that herons in this region may have greater longevity or lower mortality than herons elsewhere. No evidence was found that related fledging success to synchronous breeding ("peak" part of the breeding season). This is a quantitative study that contains some interesting comparisons with herons studied elsewhere in the world. [Dept. of Management Studies, Univ. of Queensland, Gatton College, Lawes Q 4343, Australia.]—William E. Davis, Jr.

15. Inequities in parental effort and costs of communal breeding in the Guira Cuckoo. R. H. Macedo. 1994. Ornithol. Neotrop. 5:79–90.—The Guira Cuckoo (*Guira guira*) has a complex social system with up to 13 adults attending a single nest and communal clutches of as many as 20 eggs. Group members engaged in egg tossing, with a positive correlation between group size and clutch size and the number of eggs lost. However, there was no correlation between group size and the number of young produced. Hatching is mostly synchronous in the Guira Cuckoo, with 75% of the young emerging the same day and all but those eggs in one of the remaining nest hatched within two days. The young left the nest an average of 15 days after hatching, but the adults continued feeding them three more weeks. Single food items brought to the chicks were mostly large invertebrates (orthopterans), but were some vertebrates. The frequency of feeding trips of the adults attending individual nests varied significantly, with some adults making only a single or a few feeding trips and others making most of the feedings. At a minority of nests the work load was shared equally between all individuals. Most (82%) of the adults did not discriminate between young and fed nestlings randomly. Partial brood loss, that could have been caused by infanticide, occurred in 47% of all nests. In all these cases, nestlings disappeared within the first week after hatching. The author proposes that truncation of the nesting cycle by infanticide may serve to shorten the interval between nesting attempts. [Dept. Zoologia, Univ. Brasília, UnB, 70910-900, Brasília, D.F., Brasil.]—Robert C. Beason.

16. Breeding seasons and nesting success of Snow Buntings in north-east Scotland. R. D. Smith and M. Marquiss. 1994. Scottish Birds 17:223–234.—Snow Buntings (*Plectrophenax nivalis*) were monitored for a period of six years in two montane areas in north-east Scotland to

establish the timing and success of breeding. Previous behavioral studies conducted primarily in the 1930s were restricted by a low population size, which is known to have increased in the last 20 years. Breeding biology was examined for two areas. The population on the main Scottish breeding area, in the central and western parts of the Cairngorms (area A) was compared to that of a small number of pairs on a smaller lower nearby massif in the south-eastern Grampian mountains (area B). It was expected that area A would have higher breeding success than area B, because area A is the most extensive and consistently used area of suitable snow bunting habitat in Britain. However, successful first brood egg-laying dates were found to be on the average almost six days earlier on area B than that on A. This was attributed to the fact that the risk of nest failure caused by early season snowfalls is less in area B because of its warmer and drier summer climate. Early summer snowfalls in area A appeared to be a limiting factor in the early production of first brood fledglings, which in turn, contributed to fewer successful second broods compared to area B. Clutch and brood sizes were found to be similar between the two areas, as were nest failure rates. Except for one summer of the study (1992), productivity between summers was similar. Low clutch and brood sizes during the 1992 summer, which was snow-free, followed a notably mild winter with an unusually high adult mortality. The mild winter was believed to have an adverse effect on the invertebrate food supply of the snow bunting, resulting in decreased survival. [Applied Ornithology Unit, Dept. of Zoology, Univ. of Glasgow, Glasgow, G12 8QQ, U.K.]—Sue Bennett.

17. Breeding biology of secondary cavity-nesting birds in Oklahoma. D. W. Pogue and W. A. Carter. 1995. Southwest. Nat. 40:167–173.—One hundred and fifty nest boxes were erected on two study areas in south-central Oklahoma in order to examine the nesting phenology and reproductive success of five secondary cavity-nesting bird species during five breeding seasons. A total of 334 nests were monitored during the study on a weekly basis and nest success was calculated using the Mayfield method. Carolina Chickadees (*Parus carolinensis*) and Tufted Titmice (*P. bicolor*) nested early in the season, were single brooded, and had the highest overall nest-success values (0.800 and 0.735 respectively). Eastern Bluebirds (*Sialia sialis*) were double and sometimes triple brooded and had an overall nest-success value of 0.641; however, they had the lowest nestling survival rate of all species (0.891). Overall nest success of Bewick's Wrens (*Thryomanes bewickii*) was consistently lower than that of the parids and bluebirds (0.562), while House Sparrows (*Passer domesticus*) had the lowest overall nest-success (0.496). Nest failures among all species increased from 4% to 10% from mid-March to August primarily as a result of increased black rat snake (*Elaphe obsoleta*) predation and hotter weather. As a result of differences in nesting phenology and habitat preferences, interspecific competition for nest boxes was apparently uncommon except between bluebirds and House Sparrows. [Oklahoma Biological Survey and Dept. of Zoology, Univ. of Oklahoma, Norman, OK 73019, USA.]—Danny J. Ingold.

18. Are large clutches costly to incubate: the case of the Pied Flycatcher. P. Siikamäki. 1995. J. Avian Biol. 26:76–80.—The title of this paper is a bit misleading in that *energetic* costs of incubation were not considered. Pied Flycatcher (*Ficedula hypoleuca*) clutch sizes were manipulated during laying for three consecutive years in central Finland. Experimental nests with the same laying date either received two extra eggs or had two eggs removed. Costs of incubating manipulated clutches were measured in terms of incubation length, hatching success, and female mass. Mean incubation length of reduced and control clutches were statistically equal, whereas enlarged clutches were incubated for 0.8 days longer than control clutches. Although differences were not always significant, hatching success of fertile eggs consistently was highest in reduced clutches and lowest in enlarged clutches. Female mass toward the end of incubation did not differ among treatments. During a spring of abnormally harsh weather, however, female body mass was negatively correlated with incubation length. Siikamäki suggests that enlarged clutches altered reproductive success by prolonging incubation and reducing hatchability. Thus, incubation costs could be a factor in the evolution of clutch size. Clearly, the door is open for additional experiments that measure energetic costs of incubating enlarged clutches. [Dept. of Biology, Univ. of Jyväskylä, FIN-40351 Jyväskylä, Finland.]—Jeff Marks.

19. Utility pole bluebirding. D. E. Sheldon, Jr., 1995. Sialia 17:102–106.—Previous studies suggest that nest boxes for Eastern Bluebirds (*Sialia sialis*) should be erected away from

roads and utility lines in order to avoid American Kestrels (*Falco sparverius*). In this mostly descriptive report, the author presents four years of Eastern Bluebird reproductive data from utility pole-mounted and post-mounted field nest boxes in north-central Ohio. Bluebirds nesting in utility pole-mounted boxes produced proportionally as many or more fledglings than bluebirds nesting in post-mounted field boxes (although no statistical analyses were performed). Moreover, in a few instances bluebirds fledged young from boxes situated less than 23 m from active kestrel nest boxes. These data contradict those from previous studies and suggest that bluebirds were attracted to utility pole-mounted boxes, and that kestrels do not necessarily pose a formidable threat to bluebirds at such locations. [4569 Greenwich-Milan Townline Rd., Greenwich, OH 44837, USA.]—Danny J. Ingold.

20. Nesting persistence of House Sparrows. W. H. Davis and B. A. Blankenship. 1995. Sialia 17:97.—In order to test the nesting persistence of House Sparrows (*Passer domesticus*) in Eastern Bluebird (*Sialia sialis*) nest boxes, 150 boxes in sparrow habitat were monitored during one breeding season. Once a House Sparrow completed a clutch in a box, either the eggs were removed or both the eggs and the nest were removed. If a sparrow completed a second clutch in the same nest box it was considered a repeat. House Sparrows repeated clutches in only 52% of all nest boxes in which an initial attempt was made, and at 54% of these, only a single repeat occurred. Repeat attempts occurred equally likely at boxes in which only the clutch had been removed versus boxes in which both the clutch and nest had been removed. These data suggest that the removal or death of one or both of the adult sparrows is not necessary to deter sparrows from a nest box. [School of Biological Sciences, Univ. of Kentucky, Lexington, KY 40506, USA.]—Danny J. Ingold.

MIGRATION, ORIENTATION, AND HOMING

(see also 1)

21. Melatonin is crucial for the migratory orientation of Pied Flycatchers (*Ficedula hypoleuca* Pallas). T. Schneider, H.-P. Thalau, P. Semm and W. Wiltschko. 1994. J. Exp. Biol. 194:255–262.—When young Pied Flycatchers were pinealectomized and tested for orientation in their first autumn, they were randomly oriented, but controls were oriented in their species specific SW direction. Pinealectomized birds that were treated nightly (1 hr. before dark) with 100 μg of melatonin developed the same directional preference in the local magnetic field as did the control birds. From these experiments the authors conclude that melatonin (produced in the pineal gland) is necessary for the development of the correct migratory orientation or in the temporal program that controls the specific seasonal migratory direction. [Fachbereich Biologie, Universität, Siesmayerstr. 70, D-60054 Frankfurt am Main, Germany.]—Robert C. Beason.

HABITAT USE AND TERRITORIALITY

(see also 3, 5, 10, 12, 16, 24, 26, 27, 28, 29, 35)

22. Dispersal and use of corridors by birds in wooded patches on an agricultural landscape. C. V. Haas. 1995. Conserv. Biol. 9:845–854.—Three common breeding bird species, American Robin (*Turdus migratorius*), Brown Thrasher (*Toxostoma rufum*), and Loggerhead Shrike (*Lanius ludovicianus*), were monitored for movement patterns in south central North Dakota (USA) from 1985–1988. The habitat was comprised of agricultural fields, woodlots, and woody wetland draws. Sixteen discrete stands of woody habitat suitable for nesting (also called shelterbelts) occurred in the study area. A total of 500 birds were individually marked. Birds were censused almost weekly throughout the breeding season each year. Movements of up to 13.4 km could be detected. Insufficient numbers of shrikes were resighted, thus the data were not evaluated. Most adult robins (52/67) and thrashers (54/56) renested in the same shelterbelt in which they were first marked. Of 5 robins that relocated to new nest sites between years, 3 went to neighboring shelterbelts connected to the original nest sites by woody draws, 1 went to the nearest shelterbelt and 1 skipped 2 sites, moving 4 km. Nine percent of robin nestlings (33/368) returned to the study area; 2% of thrasher nestlings returned (8/392); 1% of shrikes (2/243). Natal dispersal of robins was slightly shorter (3.5 km) than that of thrashers (4.9 km). These results are discussed in light of disperal theory,

population genetics and habitat management. [Dept. of Natural Resources, Fernow Hall, Cornell Univ., Ithaca, NY 14853, USA.]—Kristin E. Brugger.

23. Influence of forb abundance on winter bird use of Conservation Reserve Program fields in Kansas. S. D. Hull, R. J. Robel, and K. E. Kemp. 1995. Prairie Nat. 27:17–21.—The value of Conservation Reserve Program (CRP) fields to breeding birds has been well-documented, but their utility for wintering birds has received little attention. Breeding birds are more abundant in CRP fields with high forb densities; the authors hypothesized that the same would be true for wintering birds. Six fields were selected, three each with high and low forb densities (HF and LF, respectively). Bird abundance was determined by counting birds seen along line transects; total transect length was 7.4 km in HF areas, and 7.8 km in LF areas. The total number of birds seen was low (101 in HF fields and 80 in LF fields); there was no statistically significant difference in total number of birds seen between the two field types. The only species abundant enough to test individually, the American Tree Sparrow (*Spizella aborea*), did not demonstrate a statistically significant difference between the field types. Measurements of habitat structure (visual obstruction, maximum vegetation height, and canopy cover) likewise did not show any statistically significant differences. The authors believe that the structural similarity of the two field types in winter probably accounted for the similar bird populations. The differential attractiveness in summer was probably due to forbs adding structural complexity and therefore offering more potential nest sites, and providing a higher abundance of invertebrate prey items. [Div. of Biology and Dept. of Statistics, Kansas State Univ., Manhattan, KS 66506, USA.]—Scott W. Gillihan.

ECOLOGY

(see also 14)

24. Effects of forest patch size on avian diversity. M. E. Mclntyre. 1995. Landscape Ecol. 10:85–99.—The effects of patch size and fragmentation on avian species diversity was studied on the Georgia Piedmont. Increased fragmentation reduces diversity and the number of interior species, but increases the number of edge species. Patch size of 10 ha is too small to support the same number of species as contiguous forest habitats, but patches of 10–13 ha contained the same diversity as contiguous forest patches of the same size. The author interprets this to mean that 10–13 ha represents the threshold size for forest interior species. Consequently, she concludes that the minimum size of a forest fragment to maintain forest interior species is larger than 10 ha. [Colorado State Univ., Dept. of Biology, Ft. Collins, CO 80523.]—Robert C. Beason.

25. El Niño-Southern Oscillation effects on provisioning and growth in Red-tailed Tropicbirds. E. A. Schreiber. 1994. Colon. Waterbirds 17:105–119.—The author examines the energy acquisition rate of Red-tailed Tropicbird (*Phaëthon rubricauda*) chicks and how spatial and temporal differences in the rate affect chick growth. Of special interest is how El Niño-Southern Oscillation (ENSO) events affect chick growth and what selective pressures ENSO events exert on seabird reproductive biology. The author hypothesizes that ENSO events produce selective pressures which favor flexible growth rates in chicks, and that there is an upper limit to chick growth rate. The study was conducted in 1986 and 1989–1992 on Christmas Island and Johnston Atoll in the Pacific Ocean. ENSO events produce changes in wind patterns and ocean currents that affect fish distribution and thus the food supply for tropicbirds. The author weighed chicks regularly and calculated the amount of food received and their mass gain. She concluded that reduced food received and reduced growth rates in 1991 on both islands, and on Christmas Island in 1986 were the result of diminished food availability because of ENSO events. However, tropicbirds fledged many chicks on both islands despite the ENSO effects, which suggests that in non-ENSO years parent birds may not be working at a maximum energy capacity. Fledging masses of tropicbirds may vary depending on food availability and the differing effects of ENSO events. Tropicbirds have single-egg clutches and hence cannot reduce brood size in bad food-years. The ability of chicks to respond to changing food conditions by varying their growth appears to be an adaptive response to ENSO-induced food shortages. This is an interesting paper with many bits of evidence supporting or opposing a number of hypotheses concerning, for example, the

generally slow rate of growth of seabird young. [Los Angeles County Museum of Natural History, 900 Exposition Blvd., Los Angeles, CA 90007, USA.]—William E. Davis, Jr.

26. Factors affecting the structure of Finnish birds of prey communities. T. Solonen. 1994. Ornis Fennica 71:156–169.—The effects of body size, population density, range size and various environmental factors and their interactions on the community structure in Finnish birds of prey was examined. Three general expectations were given: (1) with increasing body size, the geographic range should increase; (2) range size should increase with population density, possibly being complicated by the size of the bird; and (3) bird abundance and diversity should increase with increasing productivity and habitat diversity, while decreasing with increasing climatic harshness and anthropomorphic effects. Larger species were found to occur in lower densities. Smaller-sized species tended to have more expansive ranges, counter to anticipated projections, which could be explained by disturbance to the population as well as habitation of marginal ranges. No significant correlation was found between the density and the range size of the species. Species abundance and diversity were found to increase in local assemblages, while total overall density was found to decrease with increasing latitude. Forest tree species composition in combination with latitude best explained geographical variation in the number of species that was encountered. Overall, forest availability was offered as an explanation for the large scale difference in community structure that was observed between the central and peripheral parts of the country. The author suggests that the best explanation for the total population density of birds of prey was a combination of those variables that were indicative of productivity, with the presence of fields being the most influential. Local communities and their variations in productivity, population density and structural compositions were most strongly influenced by environmental factors. [Dept. of Zoology, Div. of Ecology, P.O. Box 17 (P. Rautatiekatu 13), FIN-00014 Univ. of Helsinki, Finland.]—Sue Bennett.

POPULATION DYNAMICS

(see also 16, 30)

27. Overwinter survival of neotropical migratory birds in early-successional and mature tropical forests. C. J. Conway, G. V. N. Powell, and J. D. Nichols. 1995. Conserv. Biol. 9:855–864.—Many species of neotropical migratory birds use both mature and early-successional forests at wintering sites. The authors examined whether overwintering survival differed between habitat types for 4 species, Wood Thrush (*Hylochichla mustelina*), Ovenbird (*Seiurus aurocapillus*), Hooded Warbler (*Wilsonia citrina*), and Kentucky Warbler (*Oporornis formosus*). Capture probabilities differed between habitats for KEWA; however, there were no large differences in survival (lambdas differing by >15%) between habitats for any species. In 2 species (HOWA, KEWA), females predominated in successional habitats, males in mature forests. There is a need for age- and sex-specific survival estimates before conclusions can be drawn. [Dept. of Natural Resources Science, Univ. of Rhode Island, Kingston, RI 02881 USA.]—Kristin E. Brugger.

28. Age related difference in return rate of Willow Warblers, *Phylloscopus trochilus*, at two breeding sites in Sweden. M. Cuadrado and D. Hasselquist. 1994. Ornis Fennica 71:137–143.—Willow Warbler breeding and natal site fidelity was examined at two study sites in Sweden: Kvismaren in south-central Sweden and Ammarnas in Swedish lapland. Pooled data from all study years were utilized in the analysis. The overall recapture rate at Kvismaren was almost twice that at Ammarnas. The authors attribute this to the fact that Kvismaren had a recapture rate of Willow Warblers that were banded as juveniles eight times greater than that of Ammarnas. Adult recapture rates did not differ between sites. Data analyis was restricted primarily to local birds; however, between year juvenile recapture rates were still found to be more than 20 times higher at Kvismaren than at Ammarnas. The authors postulate that higher juvenile mortality rate at Ammarnas, caused by a longer migration route or the adverse weather conditions that occurred in the breeding area in late summer, might explain the differences. However, because greater breeding densities of Willow Warblers occur in mountain birch areas as opposed to other habitats, this is unlikely. The more plausible explanation is that natal site fidelity at Ammarnas is lower, possible because of the homoge-

neous mountain birch habitat and because rich food patches have unpredictable between year distributions. [Dept. of Ecology, Lund Univ., Ecology Bldg, 223 62 Lund, Sweden.]—Sue Bennett.

29. Population regulation of wading ciconiiform birds. R. W. Butler. 1994. Colon. Waterbirds 17:189–199.—In this review the author examines the evidence that density-dependent factors regulate wading bird populations. Understanding what regulates populations of ciconiiform birds is important for conservation purposes because many species are threatened with extinction. Also, wading birds are good study subjects because many nest colonially which facilitates monitoring breeding success, and breeding populations generally rebound after natural or human produced population reductions. Many forage in open habitats where measurements of food intake can be made. Further, some species defend feeding territories. The author concludes that there is little evidence that numbers of breeding birds are limited by colony-site availability, or that reproductive success declined with increased density of breeding pairs. However, the numbers of breeding herons and egrets may be limited by food availability near the colony, but the possible role of food availability as a limiting factor is still unclear. Strong evidence exists that populations are limited by survival during the nonbreeding season, particularly of immature birds. Although human-induced factors may affect populations of some species, human factors do not provide a general explanation of population regulation. In general the author concludes that there is little evidence that density-dependent factors regulate populations of most wading birds, and at least in the Great Blue Heron (*Ardea herodias*) intraspecific competition for food does not seem to produce density-dependent effects. The author hypothesizes that in many species population is limited by the number of immature birds that can develop the foraging skills necessary to survive their first winter. This is an interesting review with more than 100 references and should be of interest to ciconiiform biologists, or anyone interested in the regulation of animal numbers. [Canadian Wildlife Service, Box 340, Delta, B.C. V4K 3Y3, Canada.]—William E. Davis, Jr.

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 40)

30. Population characteristics of Red-tailed Hawks wintering on tallgrass prairies in Oklahoma. J. W. Lish and L. J. Burge. 1995. Southwest. Nat. 40:174–179.—Red-tailed Hawks (*Bueto jamaicensis*) in Noble Co., Oklahoma were surveyed by automobile during three winters in order to obtain indices of population density in a tallgrass prairie habitat. Overall, 589 sightings of hawks were made and hawk densities were higher than previously reported on any North American study site. Based on the detection of nesting pairs of Red-tailed Hawks along this route in April, the authors estimate that the influx of wintering birds increased the local population from about 60 to 600 individuals. Fuertes Red-tailed Hawks (*B. j. fuertesi*) comprised the majority of individuals on the study area (82%), while Western (*B. j. calurus*) and Harlan's (*B. j. harlani*) Red-tailed Hawks were about equally frequent (4.7 and 5.4% respectively) but never abundant. The authors pose several possible explanations for the high density of wintering Red-tailed Hawks in this region including geographic location and an abundance of manmade and natural perches. They suggest that the former is important since most arctic storms often dissipate around the Kansas–Oklahoma border, thus allowing birds to migrate minimum distances from the northern plains to escape severe weather. The authors also discuss reasons for the variations in the numbers of wintering hawks between years, as well as why most individuals in the study were adults instead of immature birds. [Oklahoma State Univ., Stillwater, OK 74078, USA.]—Danny J. Ingold.

EVOLUTION AND GENETICS

(see 4)

PHYSIOLOGY AND DEVELOPMENT

(see also 21)

31. Blood pressure regulation by aortic baroreceptors in birds. Physiol. Zool. 67:1402–1425.—This paper is a review of the current knowledge of avian circulatory baroreceptors.

In contrast to mammals, birds have only a single set of arterial baroreceptors that are associated with the root of the aortic arch and innervated by branches of the vagus nerve. Baroreceptors are specialized mechanoreceptors in the arterial walls that are sensitive to changes in the wall tension. The few studies on avian baroreceptors have been limited to ducks. Avian baroreceptors provide beat-to-beat measurement of blood pressure and allow short-term feedback control of blood pressure. They exhibit the characteristics of high threshold, slowly adapting mechanoreceptors, with a dynamic range of up to 200 mm Hg. Cutting the aortic nerves results in acute and chronic hypertension, with no correlation between blood pressure and heart rate. Electrical stimulation of the severed nerve results in a decrease in blood pressure proportional to the stimulation frequency and is mediated by a reduced heart rate. During diving, the input from the baroreceptors is attenuated at least partly by the increased output from the arterial chemoreceptors monitoring CO^2 and O^2. The involvement of the baroreceptors in maintaining blood pressure during flight and other exercises is likely, but has not been investigated. [Dept. of Anatomy and Neurobiology, Faculty of Medicine, Dalhousie Univ., Halifax, NS B3H 4H7, Canada.]—Robert C. Beason.

32. Fasting endurance and cold resistance without hypothermia in a small predatory bird: the metabolic strategy of Tengmalm's owl, *Aegolius funereus*. E. Hohtola, A. Pyörnilä, and H. Rintamäki. 1994. J. Comp. Physiol. B 164:430–437.—The basal metabolic rate for Tengmalm's Owl is less than that predicted for nonpasserine birds, but higher than predicted for other species of similar sized owls. Their resistance to cold is due to the very effective insulation of their feathers. Using radiotelemetry to monitor body temperature, the authors found that Tengmalm's Owl does not become hypothermic even after five days of fasting; nor was there any decrease in triiodothyronine concentration typically found in other species. The possibility of dehydration during fasting may limit the minimum body temperature. Under the conditions observed, the production of metabolic water barely compensated for evaporative water loss. The authors conclude that the metabolic strategy of Tengmalm's owl is determined by adaptation to long fasts, but restricted by small body size and water economy. [Dept. of Zoology, Univ. of Oulu, PO Box 400, FIN-90571 Oulu, Finland.]—Robert C. Beason.

PARASITES AND DISEASES

33. Prevalence of eustrongylidosis in wading birds from colonies in California, Texas, and Rhode Island, USA. J. C. Franson and T. W. Custer. 1994. Colon. Waterbirds 17:168–172.—This paper is a report on the prevalence of eustrongylidosis (an infection in piscivorous birds caused by nematodes of *Eustrongylides* spp.) in Snowy Egrets (*Egretta thula*) and Black-crowned Night-Herons (*Nycticorax nycticorax*) from coastal Texas, Rhode Island, and California colonies, and Great Egrets (*Casmerodius albus*) from Texas. Infection can cause peritonitis and death in heron chicks. A total of 183 nestlings of 5-, 10-, and 15-days age were collected, and 16% were infected (35% from Texas, 6% from California, and 4% from Rhode Island). Of all broods examined, 31% contained at least one infected chick. There were no significant differences among colonies for Black-crowned Night-Heron broods, which was the least affected species. The nematodes use two intermediate hosts, oligochaetes and fish, so differences between levels of heron chick infestation could reflect differences in abundances of either, or in prey selection by herons. The Houston Ship Channel where the Texas colony was located is polluted with agricultural contaminants and the associated nutrient loading may have been linked to increased oligochaete populations, thus increasing the numbers of infected fish. The authors suggest that the prevalence of eustrongylidosis in colonial waterbirds may reflect wetlands contamination. This is a well-written paper that should be of interest to those interested in conservation or in bird diseases. [U.S. National Biological Survey, National Wildlife Health Center, 6006 Schroeder Rd., Madison, WI 53711, USA.]—William E. Davis, Jr.

34. Fire ant predation on blowfly larvae in a bluebird nest box. R. A. Sims. 1995. Sialia 17:96.—The author reports an incident in Jones Co., Mississippi, in which fire ants (*Solenopsis saevissima*) invaded an Eastern Bluebird (*Sialia sialis*) nest box with four bluebird eggs and preyed on the first instar blowfly (*Protocalliphora* sp.) larvae that also occupied the nest. Although the fire ants did not directly damage the eggs they forced the adult bluebirds to

abandon the nest about six days later. [Rt. 1, Box 165-H, Ellisville, MS 39437, USA.]—Danny J. Ingold.

WILDLIFE MANAGEMENT AND ENVIRONMENTAL QUALITY

(see also 5, 13, 24)

35. Response of Black Terns (*Chlidonias niger*) to glyphosate-induced habitat alterations on wetlands. G. M. Linz, D. L. Bergman, D. C. Blixt, and W. J. Bleier. 1994. Colon. Waterbirds 17:160–167.—The Black Tern is considered endangered or a species of special concern in eight states, and is a category 2 species for federal listing because of habitat loss. One factor in habitat alteration has been the spread of cattails (*Typha* spp.). In this study the authors report on two experiments involving cattail control with aerially-applied glyphosate herbicide in an attempt to enhance Black Tern habitat. The authors compare the numbers of Black Terns using herbicide-treated (several spray coverages, e.g., 50%, 90%) wetlands and control plots and investigate the relationship between wetland parameters and tern numbers. In the first experiment, with herbicide application in 1990, significantly more terns were recorded in 1991–1992 combined than in 1990 in the treated wetlands, but there were no differences between the treated and untreated wetlands in subsequent years for the second experiment (1991–1993). The authors attribute the increased numbers of terns in the first experiment to the presence of more open water and less live emergent vegetation in the treated plots. More terns were reported from the second experiment's treated plots in 1992–1993, but they suggest that high variability among treatment plots precluded finding statistically significant differences. They did find a positive relationship between numbers of terns and among of open water and dead emergent vegetation; the latter may be related to the tern's use of floating mats of dead vegetation for nest platforms. The authors conclude that to manage wetlands for Black Terns there should be an interspersion of open water, live emergent vegetation (for nest protection and concealment), and floating mats of dead vegetation. Herbicide use is one possible management strategy, and staggering herbicide treatments on wetland complexes would be helpful by providing a variety of stages of cattail decomposition and regeneration. This paper should prove useful to those interested in wetlands management. [U.S. Dept. of Agriculture, Denver Wildlife Research Center, North Dakota Field Station, North Dakota State Univ., Fargo, ND 58105-5517, USA.]—William E. Davis, Jr.

36. Toward a world strategy for seabird sanctuaries. D. C. Duffy. 1994. Colon. Waterbirds 17:200–206.—In this commentary the author makes an appeal for the establishment of an international conservation policy for seabirds. Seabirds tend to be international in their distribution, and many disasters, such as overfishing and oil spills occur in international waters. The protection of seabird sites in developing countries needs particular attention. Critical seabird sites need to be identified, and provisions for their long-term protection implemented. The author brings together information from marine biology, information science, and international law, and argues, for example, that recent advances in computer technology have radically enhanced information sharing and data storage and processing. The author suggests a formal system of site designation at world, regional, and national scales, based on 10% of the population of a species for each scale (e.g., for world seabird sites, 10% or more of the known world breeding population of some species). The process for acquiring sites is discussed within a largely political context, and includes the role of national governments and private organizations such as the Nature Conservancy, as well as international organizations such as the United Nations. The need for long-term management, including limiting human disturbance, is presented within the context of education at the local level and the need for building scientific and management infrastructures such as libraries or scientific societies. The role of international law and the need for international seabird conventions is also presented. The author concludes with a discussion of some of the shortcomings of the proposal (e.g., it focuses on individual species rather than seabird biodiversity) and argues that we hear comparatively little about the degrading of marine ecosystems and that a concerted campaign for seabird conservation is preferable to *ad hoc* action. I recommend this paper to anyone interested in avian conservation. [Marine Sciences Research Center, State Univ. of New York, Stony Brook, NY 11794, USA.]—William E. Davis, Jr.

37. Avian consumption of blank pesticide granules applied at planting to Iowa cornfields. D. L. Fisher and L. B. Best. 1995. Environ. Toxicol. Chem. 14:1543–1549.—Some insecticides are formulated in silica, clay or organic granules, which are applied directly to the soil. Birds might be exposed to lethal doses of insecticides if they eat enough granules in a day, perhaps mistaking granules for grit. To determine granule consumption by free-ranging birds, insecticide-free granules were applied to corn fields at rates ranging from 3.9 to 17.3 kg/ha. Birds likely to consume grit (Horned Larks [*Eremophilia alpestris*], blackbirds, and sparrows) were collected on the fields and their gizzards were examined for the presence of granules. One or more granules were found in 39% of 256 birds. More than 95% contained <4 granules: the maximum count was 6. Based on granule-voiding tests, gizzard examinations detected 24% of granules consumed per day. Mean intake was 2.4 granules/(bird*d), with 95% consuming <19 granules/(bird*d). The highest count was found in Savannah Sparrows (*Passerculus sandwichensis*) (median = 11; 95% < 24). Granule availability on the soil surface correlated with application rate, averaging 1.4 granules/m^2 for each 1 kg/ha of insecticide-free material applied (equivalent to about 6% of original application). [Bayer Corp., 17745 South Metcalf, Stilwell, KS 66085, USA.]—Kristin E. Brugger.

38. Colored streamers did not deter House Sparrows. W. H. Davis and B. Blankenship. 1995. Sialia 17:50.—In order to determine the effectiveness of plastic colored streamers for discouraging House Sparrows (*Passer domesticus*) from using Eastern Bluebird (*Sialia sialis*) nest boxes, the authors conducted a controlled experiment using 148 nest boxes during the 1994 breeding season. Streamers of different lengths and colors attached to both the outside and inside of boxes failed to deter sparrows from building nests and laying eggs in them (sparrows used 39 boxes with streamers versus 41 boxes without). Fortunately, the streamers did not significantly deter bluebirds, which used 24 boxes with streamers versus 31 boxes without. [School of Biological Sciences, Univ. of Kentucky, Lexington, KY 40506, USA.]—Danny J. Ingold.

BOOKS AND MONOGRAPHS

39. Contributions to the history of North American ornithology. W. E. Davies, Jr., and J. A. Jackson, eds. 1995. Nuttall Ornithological Club, Cambridge, MA, USA. 501 pp. ISBN 1-877973-36-x. $40, hardcover.—This wonderfully insightful and long overdue tome was born from a symposium conducted at the 1991 meeting of the Association of Field Ornithologists at Ohio Wesleyan University. The book, consisting of 16 chapters, over 100 black-and-white photographs, over 1600 literature citations and five appendices, will serve as a veritable gold mine of historical information for amateur and professional ornithologists alike. Each of the chapters was written by authors who themselves were intimately a part of the history that they now bring to surface. As such, the book takes the form of a descriptive narrative filled with personal experiences, interesting anecdotes and opinions, and even bits of heresay, all of which add a discerning perspective to the times during which this history was made. In addition, the book presents numerous academic genealogies in ornithology and information on graduate theses and dissertations. It gives insight into the numbers and kinds of specimens housed at particular institutions as well as the strengths of various collections.

The book is informally partitioned into four sections: the first 10 chapters are devoted to institutions, approximately in the order in which they were formed; the next three chapters focus on the evolution of Canadian ornithology; two subsequent chapters deal with more general subjects (Alexander Wilson and avian biogeography respectively); and the final chapter provides a thorough layout of the literature of the history of North American ornithology. The "institutional" section (282 pages) sheds light primarily on the emergence of ornithologists in museums and includes chapters on: the Academy of Natural Sciences (Frank Gill), the National Museum of Natural History (Richard Banks), the Museum of Comparative Zoology (Mark Barrow, Jr.), the American Museum of Natural History (Wesley Lanyon), the Field Museum (Peter Lowther), the Carnegie Museum of Natural History (Kenneth Parks), and the Museum of Vertebrate Zoology (Ned Johnson). In addition, chapters are devoted to the history of ornithology at the University of Kansas (Richard Johnston), Cornell University (Gregory Butcher and Kevin McGowan), and within the U.S. Forest Service (Richard Conner). This section provides stories and insights into the blossoming of such admirable

ornithologists as Witmer Stone, Alexander Wetmore, William Brewster, Elliott Coues, and Arthur Allen. From rivalries to camaraderie, the contributions of these and dozens of other natural historians and scientists to American ornithology are thoroughly catalogued, typically in chronological order. Numerous references are made about those who were inspirational in the formation of the American Ornithologists' Union and many other ornithological clubs and organizations.

The second section (75 pages) provides a detailed look at the emergence of ornithology in Canada. Marianne Ainley provides a historical overview through 1950, while Henri Ouellet and Jon Barlow focus on ornithology at Canada's National Museum and the Royal Ontario Museum respectively. This section compliments the first section nicely. From William Mousley to Percy Taverner to Lester Snyder, the reader is introduced to those who helped propel ornithology in Canada from obscure beginnings during which government funding was rare, to a respected and powerful institution in North America and elsewhere.

Section three (70 pages) deals with some general historical information. Edward Burtt and Alan Peterson present an in depth review of the professional life of Alexander Wilson, focusing on his contribution to the identification of new avian species and how his works compare to those of other American ornithologists through time. Francois Vuilleumier and Allison Andors provide a fascinating look into the origins and development of avian biogeography in North America, focusing on the contributions of Louis Agassiz, Spencer Baird, Joel Allen, Frank Chapman, Ernst Mayr, Alden Miller and others.

In the final chapter (25 pages), William Davis, Jr., and Jerome Jackson provide an extensive review of selected publications in the history of North American ornithology. They include references to biographical and autobiographical materials, bird art and photography, women in ornithology, catalogs of ornithological libraries, institution and organization histories, and regional, popular, and extinct bird journals.

The weaknesses of the book are relatively few. There is some repitition as one might expect since many of those who made the history and who wrote about it here served at many institutions and in many capacities. Occasionally the authors unveiled some biases and/or came across somewhat self-indulgent (which I suppose is a fine line to walk). However the book is stimulating and well written, and from an editorial perspective, virtually error free.

In summary, this book is not an "exhaustive treatment" of North American ornithology as the editors freely admit. However, it is a grand beginning and should serve as a powerful reference tool for students of the history of ornithology. Furthermore, it will undoubtedly stimulate others to contribute additional perspectives from other institutions, organizations and places. I recommend it with enthusiasm.—Danny J. Ingold.

40. The atlas of breeding bird of Michigan. R. Brewer, G. A. McPeek, and R. J. Adams, Jr. 1991. Michigan State Univ. Press, East Lansing. xvii + 594 pp. 227 illustrations, 215 species maps plus 19 introductory maps, 56 tables. $ 39.95 hardcover.—Published almost five years ago, the Michigan Breeding Bird Atlas stands as one of the most comprehensive and useful of the published atlases. An estimated 1300 contributors conducted field work between 1983 and 1988. In addition to standard atlas data, some observers collected data on relative abundance and habitat of detected species. The survey blocks are similar in size (9 mi-sq) to most Eastern atlases, with the grid defined as one-fourth of the state's townships. A total of 6116 of the state's 7080 blocks received some coverage, with 2900 blocks reporting 50 or more species. A total of 233 species, including 215 breeding species, were confirmed. Coverage goals were stratified into three areas of the state: All blocks were targeted in the southern lower Peninsula (SLP), half the blocks (two per township) in the northern lower peninsula (NLP), and one of four blocks per township in the upper peninsula (UP). To smooth coverage results between areas of different coverage levels, species maps and summary statistics are presented at the township level.

Chapter 3, on land, climate and vegetation, provides a useful backdrop for understanding bird distributions. It would have sustained the interest of birders (the primary audience) and been more useful if representative species had been mentioned and the use of specialized jargon reduced. The treatment of pre-European avifauna and a chapter on biogeography and ecology comprise a historical and ecological monograph. Brewer makes a solid case for his statement that "The scientific usefulness of a breeding bird atlas lies in what it can tell

us about biogeography and ecology." His many propositions are fertile ground for further assessment.

Maps of reference points and counties are placed before the species accounts, but would have served better on the inside front or back cover. Species accounts, laid out in traditional format, were written by 60 local authorities. The accounts read well, are thorough, and are very informative. A wealth of information is provided on historical occurrence, natural history, and habitat associations which give most accounts value well beyond Michigan's borders. A few accounts are not as thoroughly researched as others, citing only secondary sources or listing county occurrence rather than providing ecological interpretation of species distribution. A critical review of results is sometimes bypassed, such as the comment in the Barred Owl account that "many pairs were missed throughout the state." The stratified sampling effort invariably resulted in unequal coverage of scarce species and habitat specialists. Mapping at the township level standardizes presentation for common birds, but sometimes suggests a bias for rare ones. For example, the tabular summary clearly shows that the SLP supports the highest percentage of townships with Sedge Wren (*Cistothorus platensis*), but the appendix shows that it was found in the highest percentage of blocks (the survey unit) in the Upper Peninsula. Increased survey effort in the UP (admittedly difficult) might have presented a different impression of Sedge Wren distribution.

For species with sufficient data, USFWS Breeding Bird Survey maps are included. These maps of relative abundance provide another dimension to the species' distribution. BBS data are prone to observer biases. Isolated abundance peaks in some maps appear to relate to route anomalies or observer biases rather than represent something significant about regional species abundance. This is dramatically obvious in the Wood Thrush (*Hylocichla mustelina*) account, where a peak in relative abundance occurs in counties with the fewest blocks in the lower peninsula.

The Atlas of Breeding Birds of Michigan is a monument to bird atlas efforts. It is a handsomely produced and thorough volume, from one of the more ambitious efforts to date. This Atlas incorporates all of the finest points traditionally found in breeding bird atlases and adds many innovative features. I highly recommend it to anyone interested in bird distribution.—Daniel W. Brauning