RECENT LITERATURE

Edited by Edward H. Burtt, Jr.

MIGRATION, ORIENTATION, AND HOMING

(see also 34, 66)

1. A laser system to remotely sense bird movements. C. E. Korschgen, W. L. Green, and R. G. Seasholtz. 1983. J. Wildl. Manage. 47:1159–1162.—A cost-effective and efficient system is described that uses a laser beam to detect bird movements at low elevations under conditions of poor visibility. At a test site over the Mississippi River in 1980, 103 h of spring and summer operation yielded 152 bird detections (1.5 birds/h). Operation for 59 h in November resulted in 180 detections (3.1 birds/h). A microcomputer-controlled camera photographed birds as they passed through the beam, frequently allowing species identification. The system can supplement bird-detecting radar equipment and could have "applications in other biological research and surveillance problems."—Richard A. Lent.

2. Migration and survival areas of Caspian Terns *Sterna caspia* from the Finnish coast. M. Kilpi and P. Saurola. 1984. Ornis Fenn. 61:24–29.—About 700 returns from Caspian Terns banded between 1913–1982 were used to describe migration and dispersal from the colonies. Soon after fledging 1-yr tern chicks disperse southward, typically accompanied by their parents. Movement away from the colony is gradual with family groups taking advantage of good foraging opportunities along the route. The southern edge of their winter survival area is in Africa, in Mali, on the inundation zone of the Niger. This area is the major wintering site for all age groups of Caspian Terns from Finland. The return migration to the colonies is rapid with few stopovers for feeding. Third year or older birds return to the colony to breed; most first or second-year birds do not return to the colonies but rather disperse northward from Mali. The authors suggest that the patchy distribution of Baltic Caspian Terns in winter results from the distribution of suitable freshwater feeding sites.—Lise A. Hanners.

POPULATION DYNAMICS

(see also 31)

3. Breeding biology of polygynous Hen Harriers *Circus c. cyaneus* in Orkney. N. Picozzi. 1984. Ornis Scand. 15:1–10.—From 1975–1981, polygyny was widespread in a marked population of harriers. Females outnumbered males 3:1, and all territorial males associated (paired?) with at least 1 female. Most yearling males were monogamous, and harem size tended to increase with age of the male. Productivity per male was highest in harems of 3, although a male with 4 or more females had the best chance of nesting successfully. In bigamous pairings, the earliest nesting female received the most help from her mate and was the most likely to raise young. As harem size increased, productivity per female decreased and a female was more likely to fail. For most females, the alternative to joining a harem would have been to forgo nesting. Both sexes were natally philopatric, and in 2 cases a brother and sister paired on or near their natal site (their productivity was not reported). On average, females nested slightly closer to their natal site than did males, contrary to Greenwood's (Anim. Behav. 28:1140–1162, 1980) prediction of male-biased natal philopatry in bird species with a resource defense mating system. Adults of both sexes tended to return to the same territory and mate in years following a successful nesting attempt.

The value of long-term studies of marked birds is very apparent in this paper. Despite good data, discussions of female mate choice and natal philopatry are weak. Hopefully, Picozzi will address these issues in future publications.—Jeffrey S. Marks.

NESTING AND REPRODUCTION

(see also 3, 13, 14, 18, 22, 32, 40, 41, 46, 58)

4. The breeding ecology of coastal and inland Oystercatchers in north Lancashire. K. Briggs. 1984. Bird Study 31:141–147.—Eurasian Oystercatchers (*Haematopus ostralegus*) nesting in an agrarian habitat away from water, fledge more young per nesting attempt than oystercatchers nesting in coastal and riparian habitats. Nest failure of coastal birds is primarily a result of flooding during high spring tides, whereas predation and trampling of nests by livestock are primary factors contributing to nest failure of riparian and agrarian nests. Agrarian and riparian nesting oystercatchers initiate egg-laying earlier than coastal nesting birds, presumably to coincide with the earlier availability of food resources in the former habitats.

Briggs argues that nest density is inversely correlated with nest attendance and that predation on nest contents increases as attendance by the pair decreases. He suggests that as the population of agrarian oystercatchers grows, predation on oystercatcher nest contents will increase bringing down the level of success currently experienced by agrarian breeders. This paper would have been strengthened greatly by the use of some simple statistical tests.—Stephen R. Patton.

5. Breeding ecology of the Horned Grebe, *Podiceps auritus*, in southwestern Manitoba. R. S. Ferguson and S. G. Sealy. 1983. Can. Field-Nat. 97:401–408.—Pothole marshes in the aspen parkland of southwestern Manitoba support the highest breeding densities of Horned Grebes in North America. Nesting grebes chose permanent, open ponds surrounded by emergent vegetation. Nests were anchored to emergent vegetation in water >20 cm, thus nests floated even during the dry summer months. Clutches of 5, 6, or 7 eggs were most common. Predators, primarily raccoons (*Procyon lotor*), destroyed 38% of the eggs laid, waves washed out 12%, and adults deserted an additional 2%. Mean brood size at hatching was 4.3 chicks of which 64% survived to fledging. Chicks were brooded on a parent's back for up to 9 days and became independent of parental care at 19–21 days of age. Broods <4 were usually cared for by one parent only, although either male or female was equally likely to assume responsibility. In broods >4 the chicks were divided between the parents. Asynchronous hatching may produce a considerable age and size range within a brood. However, parents often chased larger offspring in favor of feeding smaller siblings.—Edward H. Burtt Jr.

6. The microclimate of the nests of waterfowl. P. Howey, R. G. Board, D. H. Davis, and J. Kear. 1984. Ibis 126:16–32.—The characteristics of the microclimate in the nest that have important effects on loss of water vapor and heat from the egg have never been precisely quantified until the invention of the radiotelemetry device used in this study. This device, which can monitor relative humidity, air temperature, and the frequency of egg turning, was used in nests of four waterfowl. The gradient for water loss was affected by both adult attentiveness and moisture in the nest material. The gradient was increased during incubation by progressive drying of the nest material. Water vapor leaves the nest microclimate by convection during adult absences and by diffusion through nest material. Eggs are turned less than once an hour.—Cynthia Carey.

7. Concentrated nesting of Mallards and Gadwalls on Miller Lake Island, North Dakota. H. F. Duebbert, J. T. Lokemoen, and D. E. Sharp. 1983. J. Wildl. Manage. 47: 729–740.—Gadwalls (*Anas strepera*) and Mallards (*A. platyrhynchos*) are the two most common dabbling ducks nesting on islands in lakes. This article reports on breeding populations of these 2 species from 1976–1980. The study was undertaken on Miller Island, a 4.5-ha island on Miller Lake (365 ha) in northwestern North Dakota. Biweekly visits to the island were made during May through July by 3–8 persons who walked 1–3 m apart through the underbrush on the island to locate nest sites. Nests were marked by plastic flagging 1 m from the nest and the site was noted as active or terminated. Data recorded for each nest included species, number of eggs and status of incubation, vegetation at nest site, and plant community. High nest densities were noted by the authors. No mammalian predators were found.

Nest density appears to be the highest ever reported for island nesting of these species. In 1977, 663 nests were reported, 535 hatched, 115 were abandoned, and 7 were destroyed; in 1978, 466 nests were found, 357 hatched, 57 were abandoned, and 2 were destroyed; in 1979, 509 nests with similar fates as previous years were observed. Most nests were placed in shrub cover. Egg moving occurred and nest bowls were reused (73% for Mallards and 49% for Gadwalls). Reuse is not as common in ducks breeding on plots surrounding lakes. Waterfowl using islands for breeding must have suitable wetland habitat nearby for maintenance of pairs and brood raising. This was apparent in the surrounding area as there were numerous temporary, seasonal, and semipermanent wetlands within 3 km of the island.—R. W. Colburn.

8. Biology of the Peregrine and Gyrfalcon in Greenland. W. A. Burnham and W. G. Mattox. 1984. Meddr Grønland, Biosci. 14:1–25.—This study reports the first 10 years (1972–1981) of an ongoing study of *Falco peregrinus* and *Falco rusticolus* in western Greenland. Data were gathered on 34 inland *peregrinus* and 22 inland and 18 coastal *rusticolus* nesting sites. About 60% of the *peregrinus* sites were occupied each year and production of 1.90 young/occupied site occurred on average. Four passerines made up about 90% of the diet of *peregrinus*. The presence of nests of *Corvus corax* and prey availability may affect *rusticolus* nesting outcome. DDE in whole eggs averaged 14.3 ppm (wet wt) in *peregrinus*. A total of 185 Peregrines were banded and returns suggest that they migrate along the eastern shore of the U.S. to winter in South America.—Clayton M. White.

9. On the use of feathers in birds' nests: predictions and tests. A. P. Møller. 1984. Ornis Scand. 15:38–42.—The presence of feathers in bird nests may (1) provide insulation, (2) increase conspicuousness of nests to predators, and (3) to a minor degree, increase the risk of hyperthermia to nestlings. Thus, there may be conflicting selective pressures acting on the number of feathers in a bird's nest. Møller makes several predictions about feathers in nests: e.g., use of feathers should be more common in early nesters vs. late nesters, small species vs. large species, northern species vs. southern species, hole-nesters vs. open-nesters, and concealed nests vs. less concealed nests. Predictions were tested with data from Harrison (**A Field Guide to the Nests, Eggs, and Nestlings of European Birds with North Africa and the Middle East,** Collins, London, 1975) on European passerines. Indeed, most of the predictions were supported, albeit some more strongly than others. For example, feathered nests were not more common among northern than southern species unless the effect of body size was considered.

Testing these predictions with a single source of literature is not a convincing method. Additional data are needed to test (1) the influence of feathers on nest temperatures over a range of environmental conditions and nest types, and (2) the reactions of birds to experimental manipulations of their nesting materials.—Jeffrey S. Marks.

10. Nesting ecology of Red-tailed Hawks and Great Horned Owls in central North Dakota and their interactions with other large raptors. D. S. Gilmer, P. M. Konrad, and R. E. Stewart. 1983. Prairie Nat. 15:133–143.—Data on distribution, nest site characteristics, productivity, and food habits are presented for *Buteo jamaicensis* and *Bubo virginianus* with supplementary information on *Buteo regalis* and *B. swainsonii*. Of 68 Red-tailed Hawk nests, 72% were in eastern cottonwoods (*Populus deltoides*), as were 94 of 135 owl nests (70%). Red-tailed Hawk nests tended to be clumped in wooded river drainages, whereas Great Horned Owl nests were evenly distributed throughout the study area. Mean nest heights for Red-tailed Hawk, Great Horned Owl, Ferruginous, and Swainson's hawks were 12.5, 9.3, 8.4, and 7.1 m. Greatest nest success for red-tails was 78% with 1.8 young fledged per nest. Corresponding figures for owls were 93% success and 1.7 young per nest. Small mammals comprised 75% of prey found at Red-tailed Hawk nests. Birds (14 species) made up 61% of the Great Horned Owl diet, headed by American Coots (*Fulica americana*, 22%).

The authors observed little direct interaction among raptor species, and attributed this "to the abundance of prey and adequate availability and distribution of nesting sites." They also speculate that habitat changes through agriculture "might cause more obvious competitive interactions."—Richard A. Lent.

11. Postembryonic development of Houbara Bustard (*Chlamydotis undulata*) nestlings. (Postembrional'noe razvitie ptentsov dzheka.) T. S. Ponomareva. 1983. Zool. Zh. 62:1221–1231. (Russian, English summary.)—The postembryonic development of 4 captive Houbara Bustard chicks was followed from hatching for 6 months. Growth curves were plotted and are presented along with detailed descriptions of the young. Three stages in chick ontogeny could be distinguished: hatching to age 5–6 days—little change in weight or appearance, an "acclimatization" period; age 6–30 days—chicks gain weight rapidly and consistently and grow feathers quickly; and age 30+ days—rates of growth slow down.

Adult bustards, living solitarily in open habitat, communicate very little by sound, but chicks must keep in touch, vocally, among themselves and with their mother. Four calls were identified, meaning satisfaction ("I'm fed/warm/with my brood"), dissatisfaction ("I'm hungrey/cold/lost"), mild distress, and extreme alarm. After the age of one month, demonstration behavior gradually replaced acoustic communication. While acoustic communication keeps a brood together, visual communication probably plays a role in developing territoriality and "personal space." However, during their first 6 months of life these chicks maintained close intragroup contacts and showed little or no mutual aggressiveness, domination, or submission. (They did have spontaneous "tournaments" involving both males and females, but these presumably were "educational games.")

After age 6 months, territoriality and dominance began to appear, and the birds rarely vocalized. The author theorizes that territoriality and a pecking order develop at this age, when in nature fall migration begins and young birds first encounter and associate with adults other than their mother.—Elizabeth C. Anderson.

BEHAVIOR

(see also 3, 5, 42, 46, 57, 59, 61, 63, 65)

12. The chorus-line hypothesis of manoeuvre coordination in avian flocks. W. K. Potts. 1984. Nature 309:344–345.—What ornithologist has not been fascinated by the beautifully coordinated erratic flight often exhibited by tightly flocking birds? Shorebird flocks are especially well endowed with these abilities, an apparent consequence of aerial predators focusing their attacks on isolated individuals. Potts used a film analysis of Dunlin (*Calidris alpina*) flocks to demonstrate that such coordinated group movements are initiated by one or a few birds banking towards the flock and that the group movement is propagated in waves throughout the flock from initiation sites. Potts showed that visual communication leads to a chorus-line effect such that execution of the movement by the immediate neighbors of an initiator will be delayed by at least their own reaction time, whereas individuals far removed from the site of initiation respond much faster owing to an ability to estimate the arrival of approaching movement. Both human chorus-line dancers and flocking Dunlins show interindividual movement speeds that are about twice as fast or faster than individual reaction times. The whole is faster than the sum of its parts.—W. A. Montevecchi.

13. Siblicidal aggression and resource monopolization in birds. D. Mock. 1984. Science 225:731–733.—Siblicide (fatal aggression among siblings) is of particular interest to those attempting to understand inclusive fitness. Since it involves the killing of close kin, inclusive fitness predicts that siblicide can evolve only when the principal's own survival is seriously jeopardized. Such a risk is likely when critical resources are presently or potentially inadequate for all broodmates to survive. However, despite the fact that siblicide is a widespread phenomenon, little is known about the way in which resources affect sibling aggression. Mock proposes that the degree to which small food can be monopolized profitably is an important ecological determinant of siblicide. He tests that hypothesis by a cross-fostering experiment involving two species of colonial Ardeidae (Great Egret, *Casmerodius albus*; Great Blue Heron, *Ardea herodias*).

Herons and egrets were studied over 4 breeding seasons to understand species dif-

ferences in the rates of siblicide. Siblicide was the apparent cause of death in many, if not most, Great Egret brood reductions, but was significantly rarer in neighboring Great Blue Heron nests. The older siblings of Great Egrets feed directly from the parent's bill and thus could monopolize the whole regurgitated bolus by gripping the bill and catching the discrete mass of fish directly. However, Great Blue Heron parents typically regurgitate a single fish which is impossible to catch and hence cannot be monopolized by any nestling. Thus prey size might play a role in the evolution of siblicidal aggression by influencing the economic "defendability" of an important limiting resource.

This hypothesis was tested by a cross-fostering experiment in which ten heron broods were raised by egret parents and ten egret broods were raised by heron parents. If siblicidal aggression is facultative, transplanted egret chicks should show reduced sibling aggression when fed fish too large for them to monopolize in the heron nests. Conversely, the transplanted heron chicks should show increased aggression when monopolizing the small regurgitated food fed to them by the egret foster parents. As predicted, the transplanted heron chicks in egret nests fought at significantly higher frequencies than when raised by their natural parents. Foster heron broods that received extra food did not show reduced fighting relative to unprovisioned broods. Also, transplanted heron broods made a quick transition to direct feeding and performed siblicidal brood reduction at a higher rate.

Unfortunately, the results from the transplanted egrets are more difficult to interpret. Rates of egret sib fighting in foster nests were not significantly lower than in natural egret broods. There was no difference in siblicidal death rates between controls and experimental egret broods. This lack of behavioral flexibility found in the fostered egret chicks is puzzling, but the author provides three possible explanations.

Mock provides us with both a reasonable hypothesis to explain an important ecological determinant of sibling aggression and an elegant experimental test of his hypothesis. As the author suggests, the relationship between prey size and siblicide deserves examination in other species (e.g., boobies, cranes, kittiwakes, some other egrets, eagles, hawks, owls, pelicans, and skuas).—J. M. Wunderle, Jr.

14. The structure of a colony of Black-headed Gulls (*Larus ridibundus*): resettlement of birds throughout the breeding season. (Struktura kolonii i dinamika pereselenii ozernykh chaek (*Larus ridibundus*) v sezon razmnozheniia.) S. P. Kharitonov. 1983. Zool. Zh. 57:1068–1076. (Russian, English summary)—Observations of a colony of Black-headed Gulls near Moscow indicate that these gulls prefer to nest in the center of their colony. The earliest spring arrivals settled there, and many later gulls who first claimed a territory on the periphery of the colony attempted to resettle and nest in the center and the more aggressive, competitive, and persistent ones eventually succeeded. Territories in the center consequently got smaller and smaller as more birds managed to settle there.

Both males and females attempted to move centripetally and both used two methods: either immediately interacting with a male territory-holder (females; courting: males; challenging), or "hiding out" for a time (length unspecified) by getting into the shelter of a weed or rock, keeping very still and quiet to avoid being attacked, and then approaching the bird on the site.

No birds that left the center for whatever reason nested in any of the peripheral areas of the colony, but a few did move to mid-distances. Birds continued attempting to move centripetally throughout the summer; the first claimants having brought off a brood and being willing to cede some territory, settling at the center became easier as the season wore on.

Older birds preceded younger birds to the colony in spring, and began their annual breeding activity sooner. However, not all older birds nested in the center of this colony. Although the first nests were built in the center, the first clutches appeared almost simultaneously throughout the colony: those older birds who did not settle in the center nested where they were when they became physiologically ready to reproduce. This allowed later-arriving, younger birds a chance to settle in the center. The conclusion is that those who nest in the center are the more aggressive and competitive birds of all age groups.—Elizabeth C. Anderson.

ECOLOGY

(see also 5, 7, 8, 10, 27, 28, 35, 36, 39, 46, 59, 62, 64, 65)

15. Wintering biology of Mourning Doves, *Zenaida macroura*, in Ontario. E. R. Armstrong and D. L. G. Noakes. 1983. Can. Field-Nat. 97:434–438.—With the increased availability of waste and stored corn and the increased number of bird feeders, Mourning Doves have extended their winter range north into southern Ontario. However, overwintering immature and second-year doves cease molting. Frostbite damage to the digits may affect 60% of overwintering doves, although numbers are not presented and descriptive information on the extent of digital damage is minimal. These data raise the interesting question of whether the dove cannot retain sufficient heat in its uninsulated toes to prevent freezing or whether countercurrent heat exchange in the tibio-tarsus prevents heat from reaching the tarso-metatarsus and digits. Whatever the disadvantages, overwintering doves begin nesting earlier than migrants, although there are no data on the potential advantages of early reproduction.—Edward H. Burtt Jr.

16. The correlation between ecology and morphology in deciduous forest birds. D. B. Miles and R. E. Ricklefs. 1984. Ecology 65:1629–1640.—Community structure has been studied directly by measuring resource use and indirectly by measuring ecological morphology. Because the latter approach has become increasingly popular, Miles and Ricklefs are concerned by the dearth of adequate tests of the assumption that morphological space and ecological space are highly correlated. Here they indicate statistical problems with earlier tests of such relationships and illustrate a new procedure that they consider to be adequate. The ecological data used are those on 19 species of passerines in Hubbard Brook, New Hampshire, reported by Holmes et al. (Ecology 60:512–520, 1979); the morphological data were gathered from museum specimens using the 8 measures defined by Ricklefs and Travis (Auk 97:321–338, 1980). Comparisons of these two data sets indicated that the positions of species in morphological space and ecological space were canonically correlated and that feeding behavior and substrate use could be predicted from morphology. However, if the ecological divisions recognized were adequate, then substantial variation in morphology seemed unrelated to foraging ecology. In fact, little mattered except lengths of the tarsus and midtoe. Alternatively, it may be that more communities need to be studied both ecologically and morphologically to achieve a better understanding both of how to describe foraging ecology and of how to ecologically interpret additional aspects of avian morphology. The objective techniques illustrated in this paper are just the way to approach this task.—A. John Gatz, Jr.

17. Avian associations of the northern Great Plains grasslands. H. A. Kantrud and R. L. Kologiski. 1983. J. Biogeography 10:331–350.—Two-way indicator species analysis (a numerical classification technique) was used to describe associations of Great Plains breeding birds. The initial data set consisted of bird censuses conducted during 1974–1978 on 615 sample plots distributed through parts of Montana, North and South Dakota, Nebraska, Colorado, and Wyoming. Plots were divided into 3 categories based upon grazing intensity and into 6 soil types.

Twenty-nine bird species were detected in the study area. Abundant, widely-ranging species were excluded from the quantitative analysis because such species had low classificatory value. This left 12 species distributed over 582 plots that were used as indicator species in the numerical classification. Six broad subregions were delineated. The main division in the data separated shrubby from shrubless grasslands; later divisions were interpreted as reflecting avian nesting or foraging cover requirements. Species richness tended to increase on moderately grazed plots and decrease under heavy grazing; however, a pattern of increased species richness with latitude was superimposed on the grazing effects. Grazing effects on bird density were more variable. Highest densities occurred on heavily grazed plots in the northern subregion; lowest densities were on heavily grazed plots in the shrubsteppe subregion. Horned Larks (*Eremophila alpestris*) and Western Meadowlarks (*Sturnella neglecta*) always comprised 19–61% of the population. Habitat specialists with restricted distributions included Mountain Plovers (*Charadrius montanus*) and Common Yellowthroats (*Geothlypis trichas*). General preferences of species for certain grazing

intensities are described. Knowledge of the effects of grazing on avian habitat use was necessary in order to interpret results of the classification.

This study is a nice example of the use of cluster analysis in community ecology to derive patterns from a large data set. The authors emphasize, and rightly so, that knowledge of species ecology is "mandatory" for the correct interpretation of multivariate analyses, particularly when such analyses are intended for use in developing conservation plans.—Richard A. Lent.

18. Aspects of the nesting ecology of Least Terns and Piping Plovers in central Nebraska. C. A. Faanes. 1983. Prairie Nat. 15:145–154.—This paper examines distribution, abundance, nesting habitat, land use impacts, and management strategies for *Sterna antillarum athalassos* and *Charadrius melodus circumcinatus* along the Platte River. The 2 species nested together (on river sandbars), but differed in several nest-site characteristics, a major one being that plovers tolerated more vegetation on the nest site than did terns. Loss of open sandbar habitat through vegetation encroachment threatens to eliminate Least Terns in this area. Clearing of riverbanks and increasing the flow of the river during spring floods is suggested as a way to prevent such habitat loss. Although plovers are somewhat tolerant of encroachment by vegetation, they may be affected by the same problems as Least Terns. The author states that, until habitat management is initiated, further population declines can be expected.—Richard A. Lent.

19. Breeding birds of wooded draws in western North Dakota. C.A. Faanes. 1983. Prairie Nat. 15:173–187.—In the extensive Great Plains grasslands, wooded draws are significant habitats for birds and other vertebrates. (My dictionary defines a draw as "a gully shallower than a ravine," and a ravine as being "larger than a gully but smaller than a canyon.") During May–July 1982, Faanes sampled breeding birds (line transects) and vegetation structure (.04-ha circular plots) in 30 draws distributed over a 5-county area. Green ash (*Fraxinus pennsylvanica*) and American elm (*Ulmus americana*) were the dominant trees with chokecherry (*Prunus virginiana*) and Juneberry (*Amelanchier alnifolia*) in the understory. Of the 47 bird species recorded, 22 were neotropical migrants, 20 were shorter-distance migrants, and 5 were permanent residents, in all representing 34% of the state's nesting avifauna. The most common species were Rufous-sided Towhee (*Pipilo erythrophthalmus*), Brown-headed Cowbird (*Molothrus ater*), House Wren (*Troglodytes aedon*), and American Goldfinch (*Carduelis tristis*). An annotated list of 70 species comprises the bulk of the paper. This seems like an ideal situation for a habitat island study (woods surrounded by prairie), but no data are given on habitat size.—Richard A. Lent.

20. Central Pacific seabirds and the El Niño southern oscillation: 1982 to 1983 perspectives. R. W. Schreiber and E. A. Schreiber. 1984. Science 225:713–716.—El Niño, the periodic appearance of anomalous warm water in the eastern Pacific Ocean off the coasts of Ecuador and Peru, is known to affect populations of seabirds along the west coast of South America. However, prior to this work, no influence of El Niño was known for more distant regions. The authors document a reproductive failure and disappearance of an entire seabird community (18 species; petrels, shearwaters, tropicbirds, boobies, frigate birds, terns, and noddies) on the equatorial atoll (Christmas Island) in the central Pacific. Baseline data gathered from the 1940s through June 1982 revealed no reproductive failure of any species during previous El Niños and provided estimates of the populations of each species, period of breeding, and the species' diet. On a visit to the island in November 1982 the authors discovered a total reproductive failure of all species present and a virtual disappearance of all individuals from the atoll. Periodic visits since then have shown a marked decrease in populations of most species and alterations in reproductive effort.

Major oceanic and climatological conditions were monitored in the Pacific region before and during the El Niño, indicating major changes in rainfall, currents, and thermocline. The authors believe that high sea levels and heavy rains during the El Niño either flooded the birds out of their nests or inhibited breeding behavior. Also, major changes in primary productivity in the surrounding ocean occurred. Depleted stocks and low growth and survival rates of adult and larval fish and squid resulted in a reduced food supply for the birds. As normal oceanic and atmospheric conditions returned, the few

surviving individuals of all species began to breed again. These findings extend the known sphere of influence of El Niño on vertebrate populations and indicate that anomalous abiotic factors serve as an evolutionary force on tropical seabird populations. Field biologists are admonished to realize that global atmospheric circulation patterns that undergo irregular anomalies may influence their study organisms far from marine ecosystems.—J. M. Wunderle, Jr.

21. Kleptoparasitism in gulls and the degree of aggressiveness in terns. (Kleptoparazitizm u chaek i stepen agressivnosti v osvetakh krachek.) V. A. Buzun. 1984. Zool. Zh. 63:874–881. (Russian)—Kleptoparasitism by gulls on terns is described for nesting colonies in the Black Sea. The small gulls direct their energies towards tern fledglings, but with low success: *Larus genei*—11%, *L. ridibundus*—27%. *Larus melanocephalus,* much larger than the preceding two and thought not to steal food, was observed harassing terns infrequently and with even lower success. *Sterna sandvicensis* was not aggressive towards marauding gulls and would not contest food theft, but avoided interactions. *Sterna hirundo* actively drove food thieves away, sometimes in group attacks. A few instances of conspecific kleptoparasitism by Common Terns were observed.—Douglas Siegel-Causey.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(see also 1, 18, 49, 50, 54, 55)

22. Ospreys, *Pandion haliaetus,* relocate nests from power poles to substitute sites. P. J. Austin-Smith and G. Rhodenizer. 1983. Can. Field-Nat. 97:315–319.—Osprey nesting on power line crossbraces poses a potential hazard to maintenance crews. In Lunenburg County, Nova Scotia platforms made from wooden cable spools set on 12.2 m poles were erected next to previously occupied crossbraces. Nests were moved from the crossbraces to the platforms during the winter of 1979–1980. In the spring of 1980, 6 of the 8 platforms were occupied by Ospreys, one Osprey nest was constructed on the nearest crossbrace, and the last platform was unoccupied as were all nearby crossbraces. Nests on platforms, crossbraces, and in trees were equally successful, thus substitute nest platforms effectively reduced Osprey use of power line poles without reducing productivity.—Edward H. Burtt Jr.

23. Simulating results of management actions on Mallard production. L. M. Cowardin, D. H. Johnson, A. M. Frank, and A. T. Klett. 1984. Forty-eighth North American Wildlife Conference:257–272.—A modeling sequence that uses nest data, habitat data, pair-wetland regression modeling, and stochastic production modeling has been developed based on previous data collected on *Anas platyrhynchos.* The model uses computer programs and manual procedures to digest large quantities of information and correlate it with regional or site specific problems. Data may be used to simulate conditions under the general management model or only sections of the modeling system.

The data base (15,000 nests) is designed to handle data collected over the past 20 years and data being collected presently. All data have been classified and coded.

The habitat data base has been designed to accommodate information from present conditions or as modified to cover a specific management recommendation. Sample plot sections are 10.4 km^2. Ten habitats are recognized: (1) grassland, (2) hayland, (3) planted cover, (4) cropland, (5) scrubland, (6) woodland, (7) wetland, (8) right-of-way, (9) other habitats, and (10) barren. Wetland data are further divided into temporary, seasonal, semipermanent, and permanent habitats. The data base is weighted in favor of ownership of private land and easements, since these are the areas where the majority of land aquisition occurs.

The pair-wetland regression model considers the number of breeding waterfowl attracted to an area and the amount of wetland habitat present. Types of water areas and size appear to influence the number of pairs present. The equations developed provide only approximate data and are most effective in predicting average numbers expected in ponds over several years.

The stochastic model is designed to predict estimates of recruitment rate and total recruits produced on each sample plot. It is based on area of each nesting habitat, average

nest survival rates for that habitat, and water conditions supplied by the user for the season in question. Recruitment rate is based on 500 hens to reduce random variation.

As an example, the model was used to assess waterfowl production in an area of Woodworth, N.D.—R. W. Colburn.

24. Ring-necked Pheasant movements, home ranges, and habitat use in west Texas. R. W. Whiteside and F. S. Guthery. 1983. J. Wildl. Manage. 47:1097–1104.—In the High Plains of Castro County, daily movements of 47 (31 female, 16 male) radio-tagged pheasants (*Phasianus colchicus*) were greatest in fall–winter, intermediate in spring, and lowest in summer. Home ranges were largest in summer and fall (means of 11.3 and 13.6 ha respectively), smallest in spring and winter (7.8 and 8.6 ha). Playas were heavily used as overwintering habitat. Pheasants shifted their habitat use to wheat and alfalfa fields in the spring, and used row crops, small grains, and playas during summer and fall, indicating an ability to adapt habitat use to available cover. Pheasant management practices amenable to prevailing local land use practices and economic constraints are described. The authors suggest that "pheasant management units in the High Plains of Texas need be no larger than 400 ha, or all land within a 1.13-km radius of a playa wintering area."—Richard A. Lent.

25. Canada Goose restoration in North Dakota: goslings vs. yearlings. M. Johnson, C. Schroeder, F. Lee, and L. Schoonover. 1983. Trans. Canada Goose Symp. (M. A. Johnson, editor), North Dakota Chapter, The Wildlife Society.—Costs involved in rearing a hypothetical flock of 1000 *Branta canadensis* from gosling to yearling stage were estimated. The estimate was $20,838 or $20.84 per bird. Based on this expense and on survival estimates, the best restoration technique is releasing goslings (without first rearing them to the yearling stage) in areas where hunting is controlled.—Richard A. Lent.

26. Canada Goose management techniques and experiences. L. Kirsch. 1983. Trans. Canada Goose Symp. (M. A. Johnson, editor), North Dakota Chapter, The Wildlife Society.—*Branta canadensis.* "Some advice based on thirty plus years in the field are included with little hope that it will influence anyone."—Richard A. Lent.

CONSERVATION AND ENVIRONMENTAL QUALITY

(see also 4, 20, 22)

27. Massive wreck of seabirds in eastern Britain, 1983. L. A. Underwood and T. J. Stowe. 1984. Bird Study 31:79–88.—From 7 February to 6 March 1983, 34,026 beached birds were reported from the north and east coasts of Scotland and Britain. Most of these birds were Razorbills (*Alca torda,* 53%) and Common Murres (*Uria aalge,* 30%). Smaller numbers of Atlantic Puffins (*Fratercula arctica,* 5%) and Dovekies (*Alle alle,* 4%) also were recovered along with 48 other species of birds. The greatest density of beached birds occurred from extreme southeast Scotland to Suffolk in southeast England.

The number of days of continuous gales, average wind speed, and wind direction data collected from Shetland were used in a linear regression analysis to determine the relationship of these variables to the occurrence of beached birds during the years 1972 to 1982. Wind direction provided the best fit to beached bird data for Razorbills and Common Murres, but none of the wind measures used was able to accurately predict the exceptional seabird wreck of February 1983. A non-linear analysis may have provided a better fit of alcid mortality to the wind speed data.

Most of the carcasses recovered during the wreck were emaciated. Evidence of disease or toxic chemicals was not found and the frequency of oiled plumages was low. The major causes of the wreck appear to have been a combination of factors that included food shortages, an inability to feed during prolonged rough weather, and the displacement of birds from normal foraging grounds by persistent high winds.—Stephen R. Patton.

28. Origins and ages of auks wrecked in eastern Britain in February–March 1983. R. Hudson and C. J. Mead. 1984. Bird Study 31:89–94.—More than 90% of the banded Razorbills (*Alca torda*), Common Murres (*Uria aalge*), and Atlantic Puffins (*Fratercula arctica*) recovered during the 1983 seabird wreck were banded in Britain. Most of the Razorbills

and murres had their origin in northern and western Scotland. By contrast, most of the banded puffins recovered during the wreck originated in North Sea colonies near the Firth of Forth and Northumberland.

Among the Razorbills, adults suffered greater mortality than younger age classes when the number of birds at risk in each age class was taken into account. By contrast, murres less than a year old were recovered at a greater rate than adults. Additionally, murres were not particularly affected by the wreck as their mortality rate was similar to rates in other years. The authors suggest that this wreck will not have a noticeable effect on the size of nesting colonies (see review **31**).—Stephen R. Patton.

29. Physical condition of auks beached in eastern Britain during the wreck of February 1983. P. H. Jones, C. F. Barrett, G. P. Mudge, and M. P. Harris. 1984. Bird Study 31:95–98.—Razorbills (*Alca torda*) collected and weighed during the 1983 seabird wreck had no age-related differences in weights. Comparable data for healthy Razorbills in winter are scanty, but point to substantially lower weights of Razorbills collected during the wreck. Moderate fat deposits were present in only 16% of the individuals and 25% of the birds had moderate body cavity fat.

Mean weights of beached Common Murres (*Uria aalge*) were 30 to 40% less than weights of healthy wintering murres. Only 6% and 3% of over 400 birds examined carried thick to moderate amounts of subcutaneous and abdominal fat, respectively. Atlantic Puffins (*Fratercula arctica*) also were underweight; dead adults weighed 76% of the weight of puffins returning to the Isle of May in spring. This evidence, along with data indicating that the guts of most beached birds were empty supports the hypothesis that the deaths of beached birds were proximally caused by starvation.—Stephen R. Patton.

30. Pollutants in auks from the 1983 North Sea bird wreck. D. Osborn, W. J. Young, and D. J. Gore. 1984. Bird Study 31:99–102.—Atlantic Puffin (*Fratercula arctica*), Dovekie (*Alle alle*), Razorbill (*Alca torda*), and Common Murre (*Uria aalge*) carcasses from the seabird wreck were examined for heavy metals (Cd, Pb, Hg), organochlorines, and PCB residues. Metal concentrations were similar to those reported from other alcids and were unlikely to have contributed to mortality in these birds. Organochlorine concentrations in these alcids were too low to consider them as contributors to the wreck of seabirds. Organochlorine levels in Razorbill and murre carcasses of the 1983 wreck were lower than recorded in carcasses of these species from the 1969 wreck in the Irish Sea. PCB's were implicated as possibly contributing to the 1969 wreck of seabirds. PCB levels in puffin carcasses were higher than levels normally found on live birds caught at the Isle of May and St. Kilda, but were still too low to be implicated as a cause of death in puffins from the 1983 wreck.—Stephen R. Patton.

31. The effect of the wreck of seabirds in February 1983 on auk populations on the Isle of May (Fife). M. P. Harris and S. Wanless. 1984. Bird Study 31:103–110.—Mortality of Atlantic Puffins (*Fratercula arctica*) during the wreck occurred independently of age, but survival of banded birds was significantly lower than in the six previous winters. Survival rates of banded Common Murres (*Uria aalge*) were not different than recorded in previous years. From a small sample of banded Razorbills (*Alca torda*, n = 28) only 19 returned to the colony following the wreck in 1983. This is indicative of high overwinter mortality in this species.

In spite of higher than normal mortality rates in puffins and Razorbills, reductions in the size of their respective breeding populations were not observed in 1983. Occupied puffin burrows increased by 6% in 1983 and there was essentially no change in the number of breeding Razorbills. Murres also increased by 5% at their breeding colony in 1983. Proportionately fewer Razorbills were non-breeders in 1983, which suggests that these birds were recruited into the breeding population at higher than normal rates following the February wreck.

Reproductive success of the three alcids in 1983 did not differ from other years. In short, this "disastrous" wreck of seabirds apparently had little short term effect on the three alcids, all of which have experienced an expanding breeding population during the last decade. It remains to be seen if this wreck will slow the rate of increase.—Stephen R. Patton.

32. Comparison of Great Blue Heron, *Ardea herodias*, reproduction at Boot Island and other Nova Scotia colonies. T. E. Quinney. 1983. Can. Field-Nat. 97:275–278.—Marine islands along the coast of Nova Scotia are ideal heron rookeries, free of human disturbance, with few predators, and close to abundant, accessible food. Fledging rates of 2.6–3.1 young per pair are the highest recorded in North America and well above replacement, indicating a healthy population.—Edward H. Burtt Jr.

33. Origins of organochlorines accumulated by Peregrine Falcons, *Falco peregrinus*, breeding in Alaska and Greenland. A. M. Springer, W. Walker II, R. W. Risebrough, D. Benfield, D. H. Ellis, W. G. Mattox, D. P. Mindell, and D. G. Roseneau. 1984. Can. Field-Nat. 98:159–166.—Differential productivity among populations of Peregrine Falcons breeding across arctic North America are closely associated with DDE levels in the membrane lipids of eggshells and unhatched eggs. Differences in DDE load may reflect differences in DDT encountered on the wintering grounds, differences in the contamination levels of migrant prey consumed on the breeding grounds prior to egglaying, or differences in the proportion of "clean," resident prey consumed as compared to contaminated migrant prey. Despite the complex variation in DDT contamination, there has been a general trend toward decreasing levels of DDE residues coinciding with reduced use of DDT in South America.—Edward H. Burtt Jr.

34. To what extent are changes in abundance of passerines related to their pattern of migration? (In hoeverre kunnen aantalsveranderingen van zangvogels in verband gebracht worden met hun trekgedrag?) D. F. Wammes, G. C. Boere, and S. Braaksma. 1983. Limosa 56:231–242. (Dutch, English summary).—For many species migrating to Africa, the great drought and connected ecological disaster in the Sahel is often mentioned as a cause for the population decline in their European breeding range. The authors used regression analysis to examine 22 African migrants and 20 species wintering in Europe. Trends in 6 different kinds of data, including ringing and census information, were used. The results were compared to pattern (cluster) analysis. Wammes et al. found no clear trend for species wintering in Africa compared to European residents, nor for species in which the Sahel is an important feeding area during migration.—Clayton M. White.

35. A die-off of seabirds in the Bering Sea. A. R. DeGange and J. V. Rosapepe. 1984. Murrelet 65:15–19.—Dead seabirds (see reviews **27, 28, 29, 30, 31**) totaling 69 murres (*Uria aalge* and *U. lomvia*), 4 Northern Fulmars (*Fulmarus glacialis*), 1 Crested Auklet (*Aethia cristatella*), and 37 unidentifieds were observed north of the Pribilof Islands in July 1979. All were associated with slicks of white, waxy particles that had characteristics of natural lipids. Birds showed signs of acute hypothermia and of death from drowning. The slicks may have resulted from an intense plankton bloom.—Jeffrey S. Marks.

36. Qualitative and quantitative study of the avifauna in a montane tourist area: Aletsch (Valais). (Etude qualitative et quantitative de l'avifaune dans une région touristique en montagne: l'Aletsch (Valais).) B. Renevey. 1984. Nos Oiseaux 37:261–283. (French)—Tourism has increased substantially in the mountains of Aletsch, Switzerland, in recent years due to the construction of ski areas, chalets, and systems of enclosed cable cars. As a result, the landscape has changed with repercussions on the region's avifauna. Renevey determined the nesting birds associated with major types of habitat in the Aletsch region, identified areas endangered by human activities, and proposed ways of minimizing further damage to them. His species lists are based on quantitative surveys of the avifauna on 18 open and semi-open plots (173.3 ha total area) between Mörel and Riederfurka and on qualitative surveys of the birds in two forests. The surveys were done in April–July 1982.

Renevey found 80 nesting species which he presents in a table with information about their abundance (absent, <10 pairs, 10–50 pairs, >50 pairs) and status (on the wane, migratory, endangered, etc.). Unfortunately, only the common names of the species are presented here (and frequently elsewhere) in the text.

Renevey also comments about the status of selected rare or endangered birds of Aletsch. Black Grouse (*Tetrao tetrix*), Rock Partridge (*Alectoris graeca*), and Whinchats (*Saxicola rubetra*) have been adversely affected by intensive agricultural practices and tour-

ism around Aletsch. Black Grouse, for example, had a major lek near Riederfurka where 30–40 cocks regularly advertised in 1966. It disappeared in 1968/69 when the ski slope opened there. In comparison with censuses conducted in the 1950's, Renevey's data show that marked or local declines have occurred in populations of Whinchats, Common Wheatears (*Oenanthe oenanthe*), and Rock Pipits (*Anthus spinoletta*) on the Riederalp-Greicheralp plateau. Densities of Rock Thrushes (*Monticola saxatilis*) in the cliffs below the plateau are half what they were in the 1960's. In contrast, Snow Finches (*Montifringilla nivalis*) now nest regularly at Bettmeralp; and populations of Carrion Crows (*Corvus corone*), Ravens (*C. corax*), and House Sparrows (*Passer domesticus*) are expanding thanks in part to garbage dumps in the area.

Species abundance and richness decrease with elevation at Aletsch. Semi-open areas host more species and breeding pairs than open areas. Small villages such as Mörel support more species than tourist centers such as Breiten. Tourism has been especially damaging to ground-nesting forms such as pipits and Whinchats, but has caused the expansion of anthropophilic ones such as House Sparrows.

Renevey identifies seven zones that are particularly sensitive to human activity and makes recommendations for their protection. He does not propose excluding tourism in Aletsch, but does say that it should be curtailed somewhat to bring human interests into line with those of the native avifauna. Among his suggestions are: (1) stop dumping refuse on the xeric rocky slopes at the bottom of the valley, (2) keep fallow areas brush-free and cultivated, (3) stop construction at the upper edge of the forest, (4) keep the forest on the north slope natural, (5) restrict hikers and skiers to specific trails and well-marked footpaths, (6) preserve small villages, and (7) increase potential nest sites in tourist centers by planting trees and native shrubs.—Michael D. Kern.

37. The North Island Kokakoe (*Callaeas cinerea wilsoni*) in the western King Country and Taranaki. C. F. J. O'Donnell. 1984. Notornis 31:131–144.—Though widespread in the study area, the range of this New Zealand endemic is continuing to shrink on North Island, mainly as a result of habitat loss. It occurs on ridges at low altitudes (300–500 m) in native forest. Some birds are found in areas as small as .5 ha., but individuals are long lived and may merely be persisting there as non-reproductives.—J. R. Jehl, Jr.

38. The Weka on Macquarie Island. N. P. Brothers and I. J. Skira. 1984. Notornis 31:145–154.—Goats, sheep, rats, cats, and rabbits have been shown to affect native birdlife on many islands. To this list, apparently, we can add the Weka (*Gallirallus australis*), which was introduced on Macquarie as food for sealers in the 1870's. By the 1890's they had become plentiful. They are said to have had a "disastrous effect on the native fauna," and the extermination of Blue Petrels (*Halobaena caerulea*) and Common Diving-petrels (*Pelecanoides urinatrix*) on the main island and the extirpation of Antarctic Prions (*Pachyptila desolata*) from the tussock grass community are attributed to Wekas. However, domestic cats and rabbits are also abundant, so that one is not certain where the blame actually lies. Regardless, efforts are being made to eliminate the 500 or so Wekas, as well as cats, and to deplete the rabbits. This study was undertaken to document the biology of the Weka population prior to its hoped-for demise. It gives standard data on breeding, habitat, and food. Morphometric data are presented but, strangely, are not compared with the mainland stock from which the population was derived. This paper is one of an increasing number that uses "to predate" as the verbal form of predation. Whatever happened to "to prey," which antedates the former. Let us pray for an end to unnecessary verbification.—J. R. Jehl, Jr.

39. Avian use of forest habitats in the Pembina Hills of northeastern North Dakota. C. A. Faanes and J. M. Andrew. 1983. U.S. Dept. of the Interior, Fish and Wildl. Service Resource Publication 151, Washington, D.C.—The authors present descriptive data on forest habitat associations of breeding birds "needed to assess the potential impact to the area of the Pembilier Dam, proposed by the U.S. Army Corps of Engineers to control floods downstream on the Pembina River." The proposed reservoir would permanently flood "at least 3.2 km² of woodland," which is scarce in North Dakota.

Birds were spot-mapped and vegetation sampled in 1981 in 5 major wooded habitats:

bur oak (*Quercus macrocarpa*) forest, quaking aspen (*Populus tremuloides*) forest, lowland forest, willow (*Salix*) shrubland, and serviceberry (*Amelanchier alnifolia*) thicket. Vegetation of each habitat is described in detail. The bird population included 79 breeding species, Yellow Warblers (*Dendroica petechia*) being the most abundant (19.4% of the breeding population). Willow shrub supported the highest density of breeding birds (2207 pairs/km^2). Aspen forest had the lowest density (723 pairs/km^2), but the greatest number of species (38). An annotated list of 131 species is included that will be of interest to workers in this region. The theory of island biogeography is invoked on page 11 (a popular practice these days), leading to this conclusion: "To maintain maximum species diversity among North Dakota forest birds, large tracts such as the Pembina River gorge deserve protection."—Richard A. Lent.

PHYSIOLOGY

(see also 29)

40. Incubation water loss by Pied-billed Grebe eggs: adaptation to a hot, wet nest. T. A. Davis, M. F. Platter-Reiger, and R. A. Ackerman. 1984. Physiol. Zool. 57:384–391.—Successful hatching by avian embryos appears to require that approximately 15% of the initial mass of the egg be lost by diffusion of water vapor during incubation. The rate of water loss is determined by eggshell conductance to water vapor, which has apparently evolved in conjunction with the humidity of the nest microenvironment to ensure appropriate loss of water vapor. This study is the first to identify adaptations of eggshells to humid microenvironments. Eggs of Pied-billed Grebes *Podilymbus podiceps* sit in pools of water in nests of sodden, decaying vegetation. The moisture of these materials and heat produced by the decaying vegetation combine to produce a very high humidity in the nest cup. However, water loss during incubation falls in normal ranges (16.4% of initial mass) due to a 3-fold increase in the number of pores in the shell, relative to the number predicted on the basis of egg mass and incubation period. The increased density of pores results in a 2.7-fold increase in conductance which compensates for the high ambient humidity.—Cynthia Carey.

41. Energetics of embryonic development in the Megapode birds, Mallee Fowl *Leipoa ocellata* and Brush Turkeys *Alectura lathami*. D. Vleck, C. M. Vleck, and R. S. Seymour. 1984. Physiol. Zool. 57:444–456.—This study concerns energetics of embryonic development of Megapode birds, which are unique among birds because they incubate their eggs in pits or mounds where heat is supplied by microbial respiration, the sun, or geothermal heat. The incubation periods of Mallee Fowl (62 days) and Brush Turkeys (49 days) are unusually long and the hatchlings are among the most precocial of any birds. They require no parental care after hatching and can fly within a few days. Cost of both embryonic maintenance and growth are therefore higher than for most birds, but these costs are supported by provisioning of the egg with yolk that comprises more than 50% of fresh egg contents. Since the egg temperature is barely above that of the substrate, little water vapor escapes during incubation and no air cell forms. Metabolism is solely supported by chorioallantoic respiration until hatching and pulmonary respiration begins suddenly when shell membranes are torn. Following hatching, the chick must dig out of the mound. The costs of this activity may add 8–33% to the total energy expenditure during incubation before the chicks reach the surface.—Cynthia Carey.

MORPHOLOGY AND ANATOMY

(see also 16, 53)

42. Selection for reduced male size in raptorial birds: the possible roles of female choice and mate guarding. C. Safina. 1984. Oikos 43:159–164.—In many predatory birds, males are smaller than females. A variety of explanations have been offered previously and most relate to small males being able to best provide food for incubating females and chicks (see review by Andersson and Norberg, Biol. J. Linn. Soc. 15:105–130, 1981). Here Safina offers three more possibilities that would operate at the time of

pairing: (1) sexual selection for maneuverability as evidenced by hunting proficiency during courtship, (2) selection for frequent courtship feeding to achieve reproductive synchrony, and (3) selection for being able to hunt near the nest and thus thwart cuckoldry. In all cases, the selective pressures are presumed to operate because smaller raptors are more maneuverable than larger raptors and hence capture small prey that are more abundant, hence available than large prey. Safina's ideas are logically sound, but no data were gathered and none exist that permit differentiation among the several possibilities. In the absence of data, one cannot help but wish that Safina had more fully developed his ideas by presenting guidelines for critical experiments that could be done to distinguish at least his own alternative hypotheses if not also among his and others presented previously.—A. John Gatz, Jr.

43. A comparative analysis of the acoustic centers of medulla oblongata in the Alcidae (Aves). (Sravnitel'nii analiz slukhovyx tsentrov prodolgovatogo mozga chistikovyikh ptits Alcidae.) L. I. Barsova. 1984. Zool. Zh. 63:411–420. (Russian)—In this pioneering study, Barsova described the neuronal organization of the medullar acoustic centers primarily for *Uria lomvia*. She found the magnocellular nuclei of the cochlea to be made up of unique neurons with 1–4 dendrites, otherwise of simple form. Two types of neurons form the laminary nuclei: spindle neurons with contact spines and polygonal-shaped neurons.

The neuronal organization of the upper olivary nucleus is described for the first time in birds. It is composed of about 3400 long-axon neurons, usually with 2–4 dendrites, rarely a single dendrite. Three forms of neurons can be recognized: (1) Neurons with 1 dendrite; these are found in the central portion of the olivary nucleus, 17–19 microns in diameter, 140–150 microns in length. (2) Neurons with 2 dendrites; two types were observed. The first type have long (200–240 microns in length) dendrites, twice the diameter of the first form, with 4–5 synapses. The second type have very short dendrites with few synapses. Both types of this second form are found usually at the base of the olivary nucleus. (3) Neurons with 3–4 dendrites; found in the central part. The fourth dendrite is usually rudimentary.

The medullary acoustic neurons are characterized by primitive dendritic branching and similar synaptic endings, regardless of form or functional load. These observations were found to be similar for *Cepphus grylle, Fratercula corniculata,* and *Aethia pusilla.* Barsova concludes that alcids have a relatively weakly developed acoustic system.—Douglas Siegel-Causey.

PLUMAGES AND MOLT

(see also 54, 55)

44. Onset and pattern of primary moult in the Lesser Black-backed Gull *Larus f. fuscus*—a comparison with the Herring Gull *L. argentatus*. M. Hario. 1984. Ornis Fenn. 61:19–23.—*L. f. fuscus* does not begin wing molt at the breeding site, as do other gulls, but rather delays molt until arrival on the wintering grounds. *L. f. fuscus* is a long-distance migrant and may rely on periodic stepwise molt to maximize aerodynamic efficiency rather than the "normal" descendant molt of other *Larus* species. Hario collected shed primaries on a breeding site in the Gulf of Finland and found that some individuals started the primary molt while they were still feeding young. He calculated that 12–34% of the *L. f. fuscus* population commenced molt while breeding. In about 20% of these cases, that molt had been a stepwise periodic molt, as determined by relative feather wear. *L. f. fuscus* interrupted molt for the migration after losing inner primaries 1–3; *L. argentatus* began molting at the colony and continued molt uninterrupted until completion. High chick mortality for *L. f. fuscus* did not appear to influence the timing or duration of the molt.—Lise A. Hanners.

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 2, 15, 17, 19, 61, 62, 66, 67)

45. Use of the Bay of Mont Saint-Michel by Anatidae—phenological patterns. (Phénologie du stationnement des anatidés en Baie du Mont Saint-Michel.) V. Schricke.

1984. Alauda 52:1–30. (French, English summary.)—The Bay of Mont Saint-Michel is an ecologically diverse area of 37,000 ha containing tidal flats, polders, wet meadows, and marshes. This article describes annual (for 1967–1982) and bimonthly (for 1980/81 and 1981/82) changes in the abundance of waterfowl there. Annual censuses were done in mid-January. Techniques were ground counts from standardized points and aerial surveys.

Overwintering Anatidae, which are present during December and January, include (1) those that regularly use the bay in numbers of 1000 or more: Mallard (*Anas platyrhynchos*), European Wigeon (*A. penelope*), Black Scoter (*Melanitta nigra*), Common Shelduck (*Tadorna tadorna*), and Brant (*Branta b. bernicla*); (2) those that are regular visitors in numbers less than 500: Green-winged Teal (*A. crecca*); and (3) those that appear at the bay irregularly and in very small numbers (<50): Gadwall (*A. strepera*), Northern Pintail (*A. acuta*), Northern Shovelers (*A. clypeata*), Common Pochard (*Aythya ferina*), Tufted Duck (*Aythya fuligula*), Greater Scaup (*Aythya marila*), Common Eider (*Somateria mollissima*), Bean Goose (*Anser fabalis*), Graylag Goose (*Anser a. anser*), and White-fronted Goose (*Anser a. albifrons*). Migratory species, present during August–November and January–March, include wigeons, pintails, shovelers, Garganeys (*A. querquedula*), and Graylag Geese. The only migratory species that overwinters and nests at Mont Saint-Michel is the shelduck. The only migratory species that spends the summer and winter at the bay is the scoter.

In addition to these, a few geese and swans appear in the bay during cold spells: Barnacle Geese (*Branta leucopsis*), Brant of the race *hrota*, and Mute, Whooper, and Tundra swans (*Cygnus olor, C. cygnus,* and *C. columbianus*).

The bay serves as (1) a wintering area for Mallards, wigeons, teal, shelducks, Brant, and scoters, (2) a stopover point during migration for Pintails, shovelers, Garganeys, wigeons, and Graylag Geese, (3) a molting area for scoters, (4) a nesting area for shelducks, and (5) a refuge during cold weather, especially for wigeons, Mallards, and White-fronted Geese. It is the only regular wintering area of White-fronted Geese in France since the marshes along the Seine and at Vilaine have been removed.

The author presents bimonthly changes in density in detail for what he calls the "principal species" at Mont Saint-Michel, i.e., species that inhabit the bay for at least 6 consecutive months each year. However, for "secondary species," i.e., waterfowl present irregularly and in small numbers, there are only sketchy notes.

Annual, as well as bimonthly, variations in the abundance of principal species were often extremely large. For example, European Wigeons numbered 0 in 1972/73 and 25,000 in 1982; and, Mallards numbered 970 in October 1981, but 7900 in January 1982. Schricke attributes these large-amplitude changes to such things as hunting pressure, unusually cold weather, changes in the availability of food, the movement of individuals between closely-spaced wintering areas, changes in the water level in the marshes around Mont Saint-Michel, the escape of captive birds, and the direction of prevailing winds. Garganeys, for example, stayed at the bay from February until June (5 months) during 1981 when the wetlands around Mont Saint-Michel were under water and prevailing winds were from the E/NE; however, they were at the bay for only 2 months the following year when the water table was extremely low and the S/SE winds favored their departure for wintering areas in the African tropics. Brant of the race *hrota* normally spend the winter in Ireland, but appeared in the bay during January 1982 apparently because of unseasonably cold weather in the British Isles.—Michael D. Kern.

46. The Flycatcher *Terpsiphone atrochalybea* (Thompson 1842) endemic to São Tomé Island. (La moucherolle endémique de l'Ile de São Tomé, *Terpsiphone atrochalybea* (Thomson 1842).) R. de Naurois. 1984. Alauda 52:31–44. (French, English summary)—The São Tomé Paradise Flycatcher (*Terpsiphone atrochalybea*) is the only Muscicapidae (subfamily Monarchinae) found on São Tomé Island (Gulf of Guinea, West Africa). Here it is widely distributed, occupying dense forests and shady plantations, as well as the edges of forests and savannahs. Only two constraints limit its distribution on the island: it cannot live in savannahs unless they are heavily wooded, and for climatic reasons it isn't found at elevations above 1400–1500 m. It was abundant (about 1 pair/km^2) until 1971, but has since declined in areas where insecticides are used extensively (at low elevations and on the eastern side of the island).

It occupies the understory of forests, 6–8 m above ground, where it forages in groups

(called "rounds") of 5–6 individuals. It has shrill alarm calls ("tiz" or "teez"), postures, and movements similar to those of other *Terpsiphone.* It feeds primarily on beetles.

The nest of the Paradise Flycatcher is a neat cup, like that of other *Terpsiphone,* with thick walls, consisting of bark strips and plant fiber, that are ornamented with moss and lichens held in place by spider webs. The cup is lined with fine plant fibers. Nests are usually 1.5–3 m above ground and tied to hanging branches. The clutch consists of 1–3, usually 2 eggs which are pale yellow to yellowish white with a few brown spots girdling the large end. Breeding lasts only about 7 months (July–February), which is surprising since this flycatcher has no competitors on São Tomé, lives in the equatorial zone, and since other *Terpsiphone* nest year-round. Egg-laying, which is especially pronounced between October and December, is associated with the rainy season.

The all-black, metallic plumage of *T. atrochalybea,* together with its medium-sized crest and long supple tail, suggest that it is more closely related to *T. viridis* from the African mainland than to congeners from neighboring islands, e.g., *T. tricolor* from Fernando Po and *T. smithii* from Annobon, species that are red and black, lack crests, and have short stiff tails. de Naurois suggests that *T. atrochalybea* evolved from a small group of *T. viridis* that became isolated on São Tomé.

Other information about the São Tomé Paradise Flycatcher, e.g., the plumage of the adults and immatures, adult dimensions and weight, and dimensions of the nest, are also included in this article.—Michael D. Kern.

47. Status of the Oystercatcher (*Haematopus ostralegus*) at the Bay of Somme. (Statut de l'Hûitrier-pie (*Haematopus ostralegus*) in Baie de Somme.) F. Sueur. 1984. Alauda 52:51–55. (French, English summary.)—Between 1971 and 1982, Eurasian Oystercatchers (*Haematopus ostralegus*) were the most abundant avian species at the Bay of Somme. Yet, their breeding density of 15–20 pairs did not change in spite of the construction of a reserve just north of the Bay in 1968. Such lack of change is probably related to the species' low productivity (1 chick/pair annually) and increased human use of the bay, as a result of which oystercatchers no longer nest on sand dunes and sand dams, but in wet sunken meadows.

Pair formation takes place between 30 March and 25 June, with peaks in early April and again in early May. The time that a pair spends on its territory gradually increases and both individuals are more or less permanently installed there at the time of egg-laying.

The frequency of several action patterns changes while the birds stake out a territory. They spend more and more time foraging on the territory, but less and less time performing territorial defense and nest-related activities such as displaying. In contrast, displacement and comfort movements don't vary with territory formation in a consistent way.

Census data for 1970–1982 indicate that minimum numbers (500 birds of oystercatchers are at the estuary in May and maximum numbers (12,000) are present in January–February. Numbers increase between May and January and decrease after February. What little information is available for immatures suggests that their numbers are highest in April–July (71–95% of the total population) and October–November (100%), and lowest in March (17%).—Michael D. Kern.

48. Dynamics of the winter distribution of Rosy Finches, *Leucosticte arctoa,* in Montana. P. Hendricks and J. E. Swenson. 1983. Can. Field-Nat. 97:307–310.—When seed crops are abundant Rosy Finches overwinter in the grasslands adjacent to the western Montanan mountains regardless of the snow cover. When seed crops are less abundant, despite heavy snowfall the finches spread across the eastern prairies of Montana in search of food. Christmas Bird Counts provide a widely distributed, effective data base for this study.—Edward H. Burtt Jr.

49. Aquatic birds that nest at Brenne (Department of Indre). (Les oiseaux aquatiques nicheurs de la Brenne (Indre).) J. Trotignon. 1983. Oiseau Rev. Fr. Ornithol. 53: 13–41. (French, English summary.)—Brenne is a vast (146,000 ha) freshwater wetlands sprinkled with shallow interconnected ponds, wet meadows, and heather. It supports some of the largest breeding populations of Great Crested and Black-necked Grebes (*Podiceps*

cristatus and *nigricollis*), Common Pochards (*Aythya ferina*), Whiskered Terns (*Chlidonias hybridus*), Purple Herons (*Ardea purpurea*), and Marsh Harriers (*Circus aeruginosus*) in France. Its avifauna was first described in 1894, but aside from density estimates of the water birds in the early 1960's it has been largely ignored until now.

In this publication, Trotignon presents census data for aquatic birds that nested at Brenne between 1972 and 1979. His paper is divided into 2 chapters. In the first, he presents detailed information about 6 aquatic species with large breeding populations studied intensively between 1972 and 1977, i.e., about Great Crested and Black-necked Grebes, Purple Herons, European Pochards, Whiskered Terns, and Black-headed Gulls (*Larus ridibundus*). In the second chapter, he has compiled sketchy notes about an additional 32 species.

Many tables depicting annual fluctuations in density (often at specific ponds) accompany the species accounts in the first chapter. Estimates of the size and distribution of breeding populations appear here, as well as descriptions of how density has changed at Brenne since 1894. There is information about the nest site requirements of each species and about species that associate with one another while nesting. Trotignon also speculates about how current management practices (particularly mowing) have affected the distribution of aquatic birds at Brenne and about factors responsible for annual variations in the size of their breeding populations.

Many changes in the abundance of aquatic species at Brenne in this century reflect general changes taking place in occidental Europe. Species such as Black-necked Grebes, Pochards, Black-headed Gulls, Whiskered Terns, Gadwalls (*Anas strepera*), and Bearded Reedlings (*Panurus biarmicus*) have increased in number at Brenne, as they have throughout western Europe. Others, such as Little Bitterns (*Ixobrychus minutus*), Green-winged Teal (*Anas crecca*), and Marsh Harriers, are now less numerous in this wetlands than they were previously, as is also true throughout western Europe. However, for species, such as the Black-crowned Night Heron (*Nycticorax nycticorax*), Garganey (*Anas querquedula*), and Red Kite (*Milvus milvus*), abundance is about the same as it was in the 19th century. A few nesting species are recent newcomers to Brenne: Tufted Ducks (*Aythya fuligula*) first appeared in 1968, Gadwalls in 1970, and Fan-tailed Warblers (*Cristicola juncidis*) in 1974. Common Coots (*Fulica atra*), Common Moorhens (*Gallinula chloropus*), Northern Lapwings (*Vanellus vanellus*), and Black-headed Gulls number more than 2000 breeding pairs. On the other hand, there are only a few pairs of Black-winged Stilts (*Himantopus himantopus*), European Hobbies (*Falco subbuteo*), Black-tailed Godwits (*Limosa limosa*), and Short-eared Owls (*Asio flammeus*).

The above and other data in the two chapters of this publication are based on direct observations of individual ponds by the author and many of his colleagues. However, he neglects to say exactly how many ponds were actually examined. Since Brenne has 1270 ponds, this is an important oversight and makes statements such as "Black-headed Gulls nested on 9–16 ponds between 1972 and 1977" and "We found Great Crested Grebes on at least 165 ponds" both ambiguous and perhaps misleading. In fact, some of the tables in the first chapter of this paper suggest that only a small number of ponds were visited.—Michael D. Kern.

50. Maps of the distribution and abundance of selected species of birds on uncultivated native upland grasslands and shrubsteppe in the northern Great Plains. H. A. Kantrud. 1982. FWS/OBS-82/31:1–31.—Breeding bird censuses were conducted on 615 plots of uncultivated native upland grassland and shrubsteppe in a portion of the northern Great Plains region. The area (6 × 1000 km²) included parts of Montana, Wyoming, Colorado, North Dakota, South Dakota, and Nebraska. Areas of grassland in the mountains, badlands, sand deposits, and river valleys were not sampled.

Plot selection was based on the size of physiographic land forms, randomly selected (where possible). Agriculturally disturbed areas were rejected.

Censuses were conducted on each plot from 1974–1978 for a single bird species from sunrise to sunset when wind velocity was less than 24 km/h, the temperature less than 32°C, and no precipitation. Census dates were between May and July.

Comparison of five 3-h periods (0600–2100) indicated (1) of 29 species censused, peak densities for 1 or more species occurred during each of the 5 periods; (2) peak

densities for 11 species occurred between 0900–1200; and (3) total density of observed species decreased by 25% during counts conducted after 0600–0900 h. Single bird censuses were conducted on 65 ha plots using the "hollow square" technique. The author gives justification for single bird censuses. Routes on other sized plots were varied.

All species were identified on the basis of sight or sound, or both in the field. Primary emphasis was on the number of pairs indicated by territorial males of segregated pairs.

Maps are given for 20 of the 29 species censused. Nine species had too few records to be meaningful: Ferruginous Hawk, *Buteo regalis*; Northern Harrier, *Circus cyaneus*; Sharp-tailed Grouse, *Tympanuchus phasianellus*; Sage Grouse, *Centrocercus urophasianus*; Killdeer, *Charadrius vociferus*; Mountain Plover, *Charadrius montanus*; Mourning Dove, *Zenaida macroura*; Burrowing Owl, *Athene cunicularia*; and Common Nighthawk, *Chordeiles minor*.—R. W. Colburn.

SYSTEMATICS AND PALEONTOLOGY

(see also 51, 55)

EVOLUTION AND GENETICS

(see also 13, 42, 63)

51. Genetic differentiation within the avian genus *Columba*. J. L. Ingold, L. A. Weigt, and S. I. Guttman. 1984. Comp. Biochem. Physiol. Pflanz 77B:427–430.—Twelve Band-tailed Pigeons (*Columba fasciata*), along with two Rock Doves (*C. livia*) and one Mourning Dove (*Zenaida macroura*) were examined using electrophoresis for 40 genic loci. For *C. fasciata*, genic heterozygosity, 6%, was in line with results reported for other non-passerine birds. The level of genic differentiation between *C. livia* and *C. fasciata*, .46, was quite large in comparison to previous results for non-passerine genera, and suggested to the authors that these pigeons are best placed in different genera. This conclusion is consistent with previous suggestions by several authors that Old- and New-World doves may represent different clades. It would seem worthwhile to pursue this topic with larger samples of individuals and more species of columbids.—George F. Barrowclough.

52. Chromosomal evolution of South American Columbiformes (Aves). E. J. De Lucca. 1984. Genetica 62:177–185.—Karyotypes were prepared for 14 species of columbids occurring in Brazil. Banding patterns of the nine macrochromosomes are described based on G- and C-staining. These histological techniques enable one to study the detailed structure and homology of the chromosome arms across species. Karyotypic change has been more pronounced in this family than in most avian taxa: evidence is presented for such events as multiple chromosomal fusions and inversions in the genera *Columba* and *Columbina*. The W chromosome (in non-Ratite birds males are ZZ, females are ZW) has undergone major evolution in these doves. Unfortunately, little in the way of systematic conclusions are made in this paper; a more quantitative analysis of the G-banding patterns would have been useful.—George F. Barrowclough.

53. Recurrent patterns of natural selection in a population of Darwin's finches. T. D. Price, P. R. Grant, H. L. Cibbs, and P. T. Boag. 1984. Nature 309:787–789.—During periods of moderate to high adult mortality a small population of Darwin's Medium Ground Finches (*Geospiza fortis*) were under direct selection to increase bill depth and body weight and to decrease bill width. The changes in bill depth and width indicate selection for changes in bill shape. The observed selection events are interpreted in terms of drought induced declines in seed supplies that yield an increased preponderance of large, hard seeds that in turn favor changes in bill morphology.—W. A. Montevecchi.

54. Plumage, morphology and hybridization of New Zealand Stilts *Himantopus* spp. R. J. Pierce. 1984. Notornis 31:106–130.—New Zealand is unique in having two forms of stilts, an all-black form (*Himantopus novaezealandiae*) thought to have been derived from a very early invasion, and a pied form (*H. h. leucocephalus*) that seems to have arrived in the early 19th century. (As there are no Black Stilts elsewhere in the world, one must assume that the original stock was pied and that melanism has been selected for subse-

quently.) Pied Stilts are now abundant. Even though hybridization between the two forms is not uncommon, Pierce argues that the Black Stilt, now numbering only 10–15 pairs, was not swamped out by the invading pieds, but was reduced largely by man-made habitat changes.

There has long been dispute about the taxonomic status of the stilts. Pierce argues that they are specifically distinct and that the black's habit of nesting early and in inland localities helps to isolate it from the commoner form. When given a choice, Black Stilts mate assortatively, and they even prefer hybrids to pieds. But the meager surviving population is heavily skewed to males, so choices are not always available and the black's days seem numbered.

Pierce describes plumage variation and morphology of the two species and compares the pieds with their Australian ancestors. He argues that several genes are involved in controlling the color pattern of the hybrids. Interestingly, hybrid phenotypes are very reminiscent of those resulting from crosses between black and pied species of oystercatchers (*Haematopus*).—J. R. Jehl, Jr.

55. Evolutionary genetics of flycatchers. I. Sibling species in the genera *Empidonax* and *Contopus*. R. M. Zink and N. K. Johnson. 1984. Syst. Zool. 33:205–216.—Electrophoresis was used to investigate the evolution and systematics of this morphologically uniform, speciose group of New World flycatchers. Zink and Johnson examined 214 specimens of 12 species of *Empidonax* and 3 species of *Contopus* (pewees) for 38 genetic loci. Genetic differentiation among the species was estimated using Rogers' distance. Several interesting results were obtained. Most surprising was the finding that the South American Euler's Flycatcher (*E. euleri*) is probably not allied with the other *Empidonax* flycatchers, but rather may be related to some strictly South American genera. The authors also discovered that, although Willow and Alder flycatchers (*E. trailli* and *E. alnorum*) and Eastern and Western wood-pewees (*C. virens* and *C. sordidulus*) are recently diverged species pairs, most of the branching events (speciation) in the *Empidonax–Contopus* assemblage occurred over a relatively brief period of time, perhaps one or two million years ago. Thus, the plumage similarity of these species does not imply recent common ancestry; rather it is inferred to be the result of long-term morphological stasis. This, then, is another example of discordant evolution of structural genes and morphology. Prior to this, few quantitative avian electrophoretic studies had included a sufficient number of the members of a taxonomic group to yield results of real interest to systematists. Many previous studies indicated potential for the technique; now some useful results are starting to appear.—George F. Barrowclough.

FOOD AND FEEDING

(see also 21, 47)

56. Notes about the food of the European Bee Eater (*Merops apiaster* L.) in a colony from central Spain. (Notes sur l'alimentation du Guêpier (*Merops apiaster* L.) dans une colonie du centre de l'Espagne.) C. Martinez. 1984. Alauda 52:45–50. (French, English summary)—The foods of European Bee Eaters (*Merops apiaster*) have been thoroughly studied for populations inhabiting Europe and Africa, but not Spain. Analyses of 100 regurgitated pellets collected (June 1980) at a colony of *Merops* in Berrueco, north of the province of Madrid, indicate that (1) 82% of the prey in the pellets were Hymenoptera, mostly *Apis mellifica* (85% of the Hymenoptera), (2) 14% of the prey items were Coleoptera, mostly Hydrophilidae (24%), represented by a single species, *Spaheridium scarabaeoides*, and Scarabidae (66%), (3) 3% of the prey were Diptera, (4) Odonata, Lepidoptera, and Dermaptera were minor in importance, and (5) Orthoptera and Hemiptera were absent altogether.

In general, the diet of this group of bee eaters did not differ significantly from that of bee eaters in other countries.—Michael D. Kern.

57. Dependence of Clark's Nutcracker, *Nucifraga columbiana*, on conifer seeds during the postfledging period. S. B. Vander Wall and H. E. Hutchins. 1983. Can. Field-

Nat. 97:208–214.—Clark's Nutcrackers depend exclusively on conifer seeds which they extract directly from ripening cones or recover from caches prepared during the previous cone season. Associated with their inability to locate caches made before they hatched, fully grown juveniles depend on their parents for food. With the maturation of a new seed crop juveniles begin to forage on their own, but are markedly less efficient than adults at extracting seeds. Their ability to remove seeds improves as the crop ripens, but during the early weeks of independence juveniles often obtain seeds by aggressive behavior toward foraging adults, suggesting that juveniles learning to forage are on the edge of starvation. As the crop ripens, seeds become easier to obtain, the ability of juveniles to extract seeds improves, and aggression toward adults disappears.—Edward H. Burtt Jr.

58. Nesting success and prey selection of Long-eared Owls along a juniper/sagebrush ecotone in southcentral Idaho. T. L. Thurow and C. M. White. 1984. Murrelet 65:10–14.—The juniper/sagebrush ecotone is important habitat for nesting Long-eared Owls (*Asio otus*). An intensive search for old corvid nests in 31 randomly chosen .5 km^2 blocks in the ecotone yielded 24 nesting pairs in 2 years (1.55 pairs/km^2) with a mean of 3.67 young fledged per nest (fledging defined as ready to leave the nest), and all nests successful.

Mammals constituted 95.2% of 1000 prey items. *Peromyscus, Microtus,* and *Dipodomys* were the most numerous prey. Data from concurrent small mammal trapping (judged reliable only for *Perognathus, Dipodomys, Reithrodontomys, Peromyscus,* and *Onychomys,* although the owls caught 10 mammalian genera) indicated that owls caught *Perognathus, Peromyscus,* and *Onychomys* in proportion to field abundance, whereas *Reithrodontomys* was under represented and *Dipodomys* overrepresented in owl diets. The authors offer several reasons for the apparent preference for *Dipodomys,* but fail to consider that (1) by using only 5 species in the analysis the proportions become artificially inflated, and (2) traps probably do not sample small mammals in a manner comparable with that of foraging owls. Comparisons of trapping data with food habits of raptors should be interpreted with caution.—Jeffrey S. Marks.

59. Food and foraging in five European *Larus* gulls in the breeding season: a comparative review. F. Gotmark. 1984. Ornis Fenn. 61:9–18.—The feeding habits of the Great Black-backed Gull (*L. marinus*), Herring Gull (*L. argentatus*), Lesser Black-backed Gull (*L. fuscus*), Common Gull (*L. canus*), and Black-headed Gull (*L. ridibundus*) were compared using literature for northwestern Europe from the past 40–50 years. Food eaten by gulls was influenced by the relative availability of different food types near the breeding site, the time of year, time of day, and perhaps also by individual specialization. *L. marinus* fed primarily on fish and birds; in all locations studied these gulls took more birds than any other species. *L. argentatus* concentrated on food supplied by man such as refuse from dumps, and fish offal from harbors and boats. Marine invertebrates were also significant in their diets. *L. fuscus* fed primarily on fish taken alive or from boats and also fed on earthworms and insects. Both inland and coastally breeding *L. canus* and *L. ridibundus* fed on terrestrial food much more than the other species. *L. ridibundus* consumed more insects than any of the other species.

Gotmark suggested that the colonial breeding tendency for gulls is stronger when the foraging range is wide and food sources unpredictable. *L. argentatus* nests at smaller colonies and feeds on food which is predictable; the highly colonial *L. fuscus* feeds far from the colony on a more variable food source. These were the only two species for which he had data to substantiate his hypothesis. Gotmark further suggested that some differences in feeding habits are related to body size; the larger the species, the larger the prey.—Lise A. Hanners.

SONGS AND VOCALIZATIONS

(see also 11, 44)

60. Vocalizations of the Boreal Owl, *Aegolius funereus richardsoni*, in North America. S. Bondrup-Nielsen. 1984. Can. Field-Nat. 98:191–197.—Boreal Owls have six adult vocalizations: *Staccato Song,* a courtship song of the male; *Prolonged Stacatto Song,* a nest

location song of the male; *Moo-a Call,* a contact call; *Skiew Call,* a scolding or aggressive call; *Chuuk Call,* a response of the female to the subdued *Staccato Song* of the fledglings; and the *Peeping Call* of the female in response to the male's arrival with food. Young Boreal Owls have a unique *Chirp Call* used in begging and an equally unique *Chatter Call* to signal distress. Adult calls are similar to those of Tengmalm's Owl (*A. f. funereus*), although the reader cannot verify similarities as sonograms are presented only for vocalizations of the Boreal Owl.—Edward H. Burtt Jr.

BOOKS AND MONOGRAPHS

61. Wood Warbler's World. H. H. Harrison. 1984. Simon and Schuster, New York. 334 p. $19.95.—Here is a compilation of vignettes to be savored by the warbler enthusiast who will appreciate Harrison's vivid accounts, but who will appreciate the opportunity to lay down the book and recall his own favorite memories. Harrison has written a short account, based on his own experience, for each of North America's 53 species of wood-warblers. The accounts average 5–6 pages and are abundantly illustrated with black and white photographs of varying quality, usually including a general habitat shot and one or more pictures of a nest usually emphasizing the eggs and de-emphasizing nest shape and structure. Three color signatures strikingly portray most species. The text that accompanies each species depends heavily on Harrison's personal observations, which are interesting and will often recall similar observations among readers familiar with warblers. Nonetheless the species accounts are not consistently organized, so one cannot turn to a particular species to find a description of the winter range, the migratory pattern, the diet, or courtship. In this sense the book is not a substitute for A. C. Bent's **Life Histories of Warblers** nor is it a scientific source. However, I think Harrison intended to provide a collection of his favorite memories and anecdotes, intended to stimulate the pleasant memories of his fellow warbler-watchers, and in that he has succeeded. Turn to the account of your favorite species on a dreary autumnal evening and be transported to another time and place and the sprightly presence of your favorite wood-warbler. That is the success of Harrison's book.—Edward H. Burtt Jr.

62. Geographical ecology. Patterns in the distribution of species. R. H. MacArthur. 1984. Princeton University Press, Princeton. 269 p. $15.00.—Princeton University Press has provided a faithful reprinting of MacArthur's classic, final (1972) work. The writing is crisp and clear as one would hope for and expect in a synthetic book that encapsulated the key points of much of MacArthur's own earlier research as well as closely related work of others. Now, as when first published, the book challenges its reader "to do science . . . to search for repeated patterns . . . ." With the increase in availability of the book in reprinted form, a new generation of graduate students and naturalists can find ample stimulation to meet this challenge by critically testing the generalizations and predictions MacArthur presented.—A. John Gatz, Jr.

63. Sexual selection, lek and arena behavior, and sexual size dimorphism in birds. R. B. Payne. 1984. Ornithol. Monogr. No. 33. Am. Ornithol. Union, Washington, D.C. 52 p. $8.00 ($6.50 to A.O.U. members).—Darwin proposed 2 mechanisms of evolution: natural selection and sexual selection; however, as noted by Julian Huxley (Amer. Nat. 72:416–433, 1938), sexual selection was more vigorously attacked than any other theory proposed by Darwin. While some of this criticism was justified, it now seems clear that Darwin was correct in principle, and there has been considerable recent theoretical and empirical interest in sexual selection. Robert B. Payne is one of many orntihologists responsible for this surge in interest, and this monograph represents another significant contribution. Payne addresses three major subjects: the intensity of sexual selection, modes of sexual selection, and sexual dimorphism and sexual selection, and he uses data from a variety of species of birds to test five predictions of sexual selection theory. (1) Males in lekking species are subject to more intense sexual selection than are males in monogamous species. (2) Males are under more intense sexual selection than females in lekking and polygynous species. (3) Males in lekking species are more likely to compete intrasexually by combat and/or display than by alternative mating strategies. (4) Male competition

explains the success of males in attracting females. (5) The evolutionary results of sexual selection for sexual dimorphism in size are more pronounced in lekking than in nonlekking species.

Payne adopts a broad definition of leks that includes a continuum of male spacing patterns from "typical" leks, in which males display in close proximity to each other, to "exploded arenas," and he proposes that any analysis of sexual selection must first consider the "intensity" of sexual selection as the factor that sets the upper limit on a population's ability to respond to sexual selection. This view, based on R. A. Fisher's Fundamental Theorem of Natural Selection, assumes that the response to sexual selection is a function of the heritable portion of variance in the breeding success of individuals in a population. Payne then presents data from 16 families of birds, all of which are known to contain at least one lekking species, as well as data from some polygynous and monogamous species, to test his five predictions. In general, all five predictions are supported, although Payne notes several exceptions and attempts to discuss some of the obvious complicating factors, such as correlated genetic responses in the "unselected" sex (e.g., sexual selection for increased size of males, which produces an increase in size in females), physiological limits, phylogenetic history, and the importance of male aerial display.

This monograph is likely to become a standard reference for anyone interested in sexual selection. It presents the most unified view of sexual selection theory to date and is a treasurehouse of useful references. My only objections are minor, indeed. First, Payne is too efficient for some of his sources; many of the references are personal communications of unpublished data. Second, he has taken a rather narrow and traditionally Darwinian view of sexual selection as male-male competition and female choice of mate. There is little discussion of female-female competition and male choice of mate even though both of these mechanisms are consistent with the current view of sexual selection as depending on variance in mating and breeding success. However, in Payne's defense, I must point out that there are few data on these latter mechanisms, and they are likely to be less important than male-male competition and female choice in the systems Payne is investigating. On balance this is an excellent work and Robert Payne is to be congratulated.—Ken Yasukawa.

64. Proceedings from the symposium on tetraonid energetics. P. Rajala and H. Linden, eds. 1984. Finn. Game Res. 42:1–43 (available from Finnish Game and Fisheries Research Institute, Game Division, Pitkansillanranta 3 A, 00530 Helsinki 53, Finland).—The proceedings are from a symposium held 22–24 February 1982 in Tvarminne, Finland. The overall aim of the meeting was "to find a common language of tetraonid energetics" so that researchers could begin to study their animals on an individual, rather than population, level. A recurrent theme is the need to "study fitness in terms of energy."

Three research papers and 6 abstracts are presented by 14 authors on Willow Grouse (*Lagopus lagopus*), Capercaille (*Tetrao urogallus*) and Black Grouse (*T. tetrix*). Both field and laboratory studies are presented and include: seasonal changes in condition of Willow Grouse (R. Brittas); ecological energetics of captive Capercaille (H. Linden); sexual differences in Capercaille growth strategies (H. Linden, M. Milonoff, M. Wikman); mortality patterns of female Black Grouse (*P. Angelstam*); Capercaille hormone levels (R. Hissa); weather influences on foraging ecology of Willow Grouse (K. Erikstad, T. Spidso); roosting behavior of wintering Black Grouse (A. Marjakangas); effects of glyphosphate on growth of Capercaille chicks (T. Spidso, N. Hovik); and temperature regulation of Capercaille (R. Hissa).

Overall presentation of the papers is good except for citation of a statistical significance level without telling what test was used (page 7), and the confusion of regression with correlation (page 11). The only photograph (of holding cages, page 20) is unintelligible. The 3 full-length papers provide useful bibliographies to the current Scandinavian energetics literature.—Richard A. Lent.

65. The ecology of Wood Pigeon (*Columba palumbus* L.) and Stock Dove (*C. oneas* L.) populations on an island in the SW Finnish Archipelago. L. Saari. 1984. Finn. Game Res. No. 43:13–67.—Observations were made on the island of Aasla (ca. 15.55 km^2) off

the coast of Finland. Wood Pigeons and Stock Doves were studied from 1975–1979. Data on arrival dates, departure dates, migration routes, and the breeding cycle were collected and analyzed.

The main spring migratory period for Wood Pigeons is April, although some may be seen as early as late March. Flock sizes tend to be largest in April, August, and September in all years surveyed (the text appears a little confusing in describing these trends). Wood Pigeons appear to be most active a few hours before sunrise and then a few hours before sunset, with little or no activity during the middle of the day. Cooing is usually recorded shortly before sunrise and again shortly before sunset. Display flights were somewhat later in the season than cooing and stopped earlier than cooing. Juveniles were observed relatively late in the season (26 June). Cooing appears to drop off drastically in August.

Preferred food items of Wood Pigeons are cereal grains or peas when available (cultivated) or seeds in other fields (weed) or lacustrine meadows. They drink the brackish water of the seashore. This shift to cultivated grains instead of weed seeds is considered a factor in the increase of the Wood Pigeon.

Observations were made by transects of 5.1 m and all pigeons seen or heard cooing were recorded. The author states ". . . all territories located in this study were at most 500 m from the transect line, the auditory range being limited by rocks and woods." I question whether you may locate a territory by sound 500 m away from the transect line. The censusing was conducted for the most part in the early hours of the day so as to ensure a "successful census." The greatest number of birds was reported as being active in the morning. Speculation on the various sampling techniques and data fit is discussed. The author indicates that the techniques available most likely underestimate (5.1 m transect) or overestimate (3 m transect) the actual number of birds present and in reality the number is somewhere between the extremes. Indications are that the Wood Pigeon has extended its range about 200 km farther north during the past twenty years in western Lapland. The greater numbers observed and killed by hunters and the censusing data and observations by others suggest that the number of Wood Pigeons has increased. Migration routes are listed for the Wood Pigeon.

Stock Doves were far more abundant in the past than at present. They are annual breeding birds on the island, tending to use nest cavities of other birds and nest boxes put up for Common Goldeneye (*Bucephala clangula*) and Common Merganser (*Mergus merganser*). More birds are seen in the spring than in the fall. It appears that more birds are seen in areas of suitable feeding habitat and if food is clearly available, others may stop and join in, thus increasing flock size. Observations of Stock Doves indicate a preference for groves or broadleaved forests as territories. Availability of suitable nesting cavities appears to be more important than the actual habitat surrounding the nest site. Stock Doves are seen more often as single birds than in flocks and seldom are there more than four individuals together.

Stock Doves tend to migrate in large numbers to the area in late March (as soon as the snow starts to leave the roadsides) with peak numbers in April. Fall migration begins as early as August, but the bulk of the migration occurs in late September and early October. The migration pattern moves via the Aland archipelago and Sweden. The breeding season extends from April to September.

A number of reasons have been proposed for a decrease in the population of Stock Doves, but the author is convinced that the best explanation is the reduced availability of its preferred food—weed seeds—that is responsible. There appears to be a direct increase in Stock Dove numbers on the island which the author feels can be correlated with the recent shift to the growing of cereal grains and the abandonment of grazing livestock. Other parameters have remained relatively constant except for this change in agricultural practices.

In reading this monograph it is difficult to reconcile the numbers cited in the tables with those of the text (see p. 27 ". . . average flock size decreased from March to May/June"; looking at Table 6 it increases from March to April and then decreases from April to May). A number of the tables are not sufficiently labelled and appear to be misplaced. Deciphering the table on the number of active territories for Wood Pigeons leaves some doubt in my mind concerning the identification of territories.—R. W. Colburn.

66. Migration of birds in Asia. (Migratsii ptits v azii.) A. O. Tamliev. 1981. Ylym, Ashkabad. 276 p. (Russian). This volume is the sixth in a series sponsored by the Academy of Sciences of Turkmenistan on the recent investigations in the migration patterns of birds of Soviet Central Asia. Twenty-two articles by 34 authors cover faunal movements, generally through desert regions in the republics of Kirgiz, Uzbekistan, Turkmenistan, Tadzhikistan, Kazakhistan, and western Siberia. Both spring and fall censuses were made in a variety of habitats: desert oases, river valley confluences, high altitude steppes, lake shores, and some inhabitated areas. The primary importance of this volume to Western ornithologists will be the arrival and departure dates of migrating birds through these biogeographically important regions. The level of investigation is generally high quality and useful.—Douglas Siegel-Causey.

67. Birding in Ohio. T. Thomson. 1983. Indiana University Press, Bloomington. 265 p. $15.00.—The book is organized into four chapters with the first three describing more than 200 birding locations throughout the state. These areas vary in size from small city parks to national wildlife refuges. While these site guide chapters provide the best available treatment of Ohio's birding areas, they have significant shortcomings.

For the most part, the author covers the important birding areas within the state. Although I know of several additional locations that should have been mentioned, such omissions probably cannot be avoided in any book attempting to cover an area as large as Ohio. Unfortunately, not all portions of the state are treated equally. Since the author is most familiar with central Ohio birding areas, these areas receive the greatest amount of coverage. For example, he describes 23 sites from the Columbus area in Franklin County, but only 8 around Cleveland in Cuyahoga County, and 9 near Cincinnati in Hamilton County.

Since the book is primarily a bird-finding guide, it is unfortunate that the mapping is inadequate. Most areas are located only as hollow circles on blank county maps. Even where more detailed maps are provided, they are occasionally illegible such as the Cleveland area map (p. 19), or lack sufficient detail to adequately locate the birding areas. Hence, a birder is mostly dependent upon the written directions for finding the areas cited in the book. In many instances, these directions are too vague, inaccurate, or out-of-date. For example, a birder would never find Beaver Creek State Park (p. 126) from the directions, as the park is located along Beaver Creek several miles east of state route 7, not on the state route as described in the text. Similarly, one would have difficulty finding Gordon Park in Cleveland (p. 24), as Liberty Boulevard was changed to Martin Luther King Drive several years ago or the Ross-Pickaway County Line Road (p. 149), as the Cole Nursery sign was removed 10 years ago. These are just several examples of the numerous errors noted in many of the directions. Even more inexcusable is the inclusion of locations that are no longer in existence, such as White City Beach in Cleveland (p. 62–63) which was closed in 1978. Lastly, the author failed to mention access restrictions at several areas such as Stebbins Gulch (p. 59–60) which requires permission of Holden Arboretum before entering. Failure to mention these restrictions could cause serious problems between property owners and birders who do not realize they are trespassing.

If a birder is able to locate an area mentioned in the book, he or she will be disappointed with the bird finding information provided for each site. In most instances, Thomson only provides directions to entrances or visitor centers and repetitive lists of birds expected to be observed in the area. He seldom gives site-specific directions within each location. Since some of these areas are quite large, a birder could spend several days trying to locate the species cited in the text. Hence, this book may not be very useful for someone unfamiliar with an area who does not have the time to thoroughly explore each location.

Chapter 4 provides an updated annotated checklist of Ohio's birds, an attempt to provide a more comprehensive list than Trautman and Trautman (Ohio J. Sci. 68:257–332, 1968) by including photographic and sight records. These annotations generally consist of very brief discussions of present status, breeding distribution, and maximum numbers. The discussion of many species would have been enhanced by more detail on abundance and distribution and less emphasis on maximum numbers. Frequently, the cited numbers represent nothing more than normal daily concentrations and are not necessarily the largest numbers ever recorded in the state.

Unfortunately, erroneous and out-of-date information is present in this chapter as well. This chapter would have benefited greatly from review by other knowledgeable birders so that these errors could have been corrected before they appeared in print. In its present form, it does not represent an accurate list for the state. The status of a number of species reflects ranges and abundance of the 1960's and early 1970's rather than the 1980's. In addition, Thomson apparently did not attempt to edit sight records and included a number of very questionable sightings without checking into the details of each observation. These erroneous sightings include such obvious misidentifications as Christmas Bird Count reports of Swainson's Hawks (*Buteo swainsonii*), but also attributed a number of species to the Ohio list based on similar misidentifications. Hence, species such as Wilson's Storm-Petrel (*Oceanites oceanicus*), Ferruginous Hawk (*Buteo regalis*), Great Skua (*Catharacta skua*), Gull-billed Tern (*Gelochelidon nilotica*), Roseate Tern (*Sterna dougallii*), Violet-green Swallow (*Tachycineta thalassina*), McCown's Longspur (*Calcarius mccownii*), and Chestnut-collared Longspur (*C. ornatus*) have yet to be conclusively identified within the state. He also included a number of ridiculous sightings from several birders whose credibility has been totally discredited. These preposterous sightings such as 17 California Gulls (*Larus californicus*) and 100,000 Brewer's Blackbirds (*Euphagus cyanocephalus*) should never have appeared in print. The author's inclusion of records from the Ohio River is questionable since virtually all of the river belongs to Kentucky or West Virginia. Lastly, I noticed several factual errors within the species accounts including incorrect dates, locations, and numbers of individuals.

After reading the book, my impression is that it was written during the early 1970's with a minimal amount of updating prior to its publication in 1983. While a good bird-finding guide and updated annotated checklist are needed for Ohio, this book does not achieve either purpose. At best, it will provide a compilation of most of the birding areas within the state. As a result of the numerous inaccuracies within his annotated list, I suggest serious students of Ohio's ornithology use the Trautman and Trautman annotated checklist until a more recent revised list is published.—Bruce G. Peterjohn.