J. Field Ornithol., 60(3):399–419

RECENT LITERATURE

Edited by Jerome A. Jackson

NEW JOURNAL

1. Journal of Louisiana Ornithology, published twice yearly by The Louisiana Ornithological Society [88 Egret St., New Orleans, LA 70124], $10/year for non-members.—This latest addition to the flock of state and regional journals began with the Fall 1988 (vol. 1[1]) issue. The premier issue includes 33 pages plus table of contents. It is typeset on glossy paper, includes both double- and single-column formats, includes black-and-white photographs, and will include articles, news and notes from the field, and literature reviews that may address questions of bird identification, seasonal or geographic distribution, behavior, ecology, conservation, or related matters. Manuscripts containing original research material will be refereed.—Jerome A. Jackson.

BANDING AND LONGEVITY

2. Records of the Pallas's Grasshopper Warbler *Locustella certhiola* from Japan. N. Kawaji and J. Abe. 1988. J. Yamashina Inst. Ornithol. 21: 107–110.—Two banded birds were recovered from Hokkaido, Japan (September 1985) and Kyushu, Japan (November 1987). These warblers breed in Siberia, middle and eastern Asia, to the Pacific coast, and winter in southern Asia from India to Sundas.—Andrea Dinep.

MIGRATION, ORIENTATION, AND HOMING

(see also 2, 41)

3. Initial orientation of homing pigeons: different sensitivity to altered magnetic fields in birds of different countries. S. Benvenuti and P. Ioale. 1988. Experientia 44: 358–359.—A group of Rock Doves (*Columba livia*) from Bavaria was reared with a group of Italian Rock Doves near Pisa under similar conditions and their responses to magnetic treatments during transport to the release site were evaluated based on the directions chosen by the birds at the release site. The initial orientation of the treated Italian birds was strongly influenced by the treatment, while the control birds and the treated Bavarian birds were unaffected. Because the two groups were reared together, the differences in sensitivity to randomly oscillating magnetic fields during transportation suggests a genetic difference between the two stocks.—Robert C. Beason.

4. Pigeon navigation: new experiments on interaction between olfactory and magnetic cues. F. Pape and P. Ioale. 1988. Comp. Biochem. Physiol. 91A:87–89.—The homing ability of young pigeons (*Columba livia*) (2.5–3 months old) reared near Pisa, Italy, with little or no homing experience, was subjected to various treatments enroute to the release site. Birds which were prevented from smelling during the outward journey were unable to select the correct homeward direction at the release site. Birds which were deprived of olfactory information and subjected to a sinusoidally varying magnetic field during the outward journey showed the same disorientation as birds deprived of olfactory information. Birds subject to magnetic treatment and which had access to olfactory information were incapable of homeward orientation, but showed a significant orientation in a preferred compass direction. These results indicate that magnetic and olfactory sources are not alternative or supplementary cues, but might be integrated into the same mechanism.—Robert C. Beason.

5. Pigeon homing: olfactory experiments with young inexperienced birds. A. Gagliardo, V. Fiaschi, and S. Benvenuti. 1988. Naturwissenschaften 75:211–213.—The objective of the experiments described in this paper was to replicate in Italy the results of Wiltschko and Wiltschko (1987, Naturwissenschaften 74:94) using Rock Doves (*Columba livia*) from Frankfurt. Young birds from the Italian lofts depended heavily on olfactory information for homing, rather than using the route reversal mechanism based on magnetic

information suggested by the Wiltschkos. Older birds showed better initial orientation than did young birds, also supporting the olfactory model. Clearly, more investigation needs to be done on this interesting problem of loft site or stock differences.—Robert C. Beason.

6. Avian mortality during spring migration at a north Mississippi television tower. W. M. Davis. 1987. Miss. Kite 17:5–7.—Eleven species of birds were collected 21 April 1984 near a tower in Lafayette County, Mississippi.—Malcolm F. Hodges, Jr.

POPULATION DYNAMICS

(see also 14, 15, 16, 18, 19, 20, 23, 24, 47, 56, 57, 79, 84, 85)

7. Recent changes in the numbers of some cliff-nesting seabirds on the Isle of May. S. Wanless and P. Kinnear. 1988. Bird Study 35:181–190.—Annual standardized plot and whole colony counts of nesting Guillemots (Common Murres) (*Uria aalge*), Razorbilled Auks (*Alca torda*) and Black-legged Kittiwakes (*Rissa tridactyla*) were conducted on the Isle of May from 1969 to 1986. Guillemot and razorbill censuses were carried out by counting individuals; kittiwakes were censused by finding nests attended by paired adults. Counts of individual Guillemots, razorbills, and kittiwakes were all significantly higher in 1986 than in 1969, with all three species experiencing the most rapid growth during the late 1970s and reaching plateaus during the 1980s. Similar declines during the 1980s have been noted in other seabird colonies bordering the North Sea. Food shortages and severe oil pollution were suggested as possible causes.—Robin J. Densmore.

8. The breeding ecology and decline of the Merlin (*Falco columbarius*) in Orkney. E. Meek. 1988. Bird Study 35:209–218.—All known Merlin nests were monitored between 1981 and 1987 in order to determine causes of population declines. The number of occupied sites dropped from 15 (42%) in 1981 to 4 (14%) in 1986. Breeding success, measured as the proportion of pairs fledging at least one chick, fell from a mean of 48% during 1975–1981, to a mean of 29% during 1982–1986. Mean brood size fell from 3.3 during 1975–1980, to 2.5 during 1981–1987. Forty-eight percent of all nests failed during the incubation stage, and up to 54% of incubation failures were attributed to breakage. Levels of mercury in eggs were extremely high, with a mean concentration of 5.75 ppm; productivity decreased when levels exceeded 3 ppm. Degradation of habitat by burning and sheep grazing has greatly reduced available habitat. Between 1979 and 1986, the number of ewes on moorlands increased by 44%. Other possible factors contributing to population declines which were examined include disturbance, weather, predation, and organochlorine contamination.—Robin J. Densmore.

9. Reproductive consequences of El Niño-Southern Oscillation in Gray Gulls (*Larus modestus*). C. G. Guerra, L. C. Fitzpatrick, R. Aguilar, and B. J. Venables. 1988. Colonial Waterbirds 11:170–175.—This paper describes the disruption of the normal molting, reproduction, and lipid deposition patterns of Gray Gulls in northern Chile, associated with the August 1982–April 1983 El Niño-Southern Oscillation (ENSO). The gulls normally nest from October through February, but both molt patterns and gonadal development were abnormal during the 1982–1983 and 1983–1984 seasons. The birds failed to exhibit normal courtship behavior, and did not nest during the two seasons, and the 1984–1985 breeding season was delayed by a month or more. Lipid deposition significantly increased between the 1983–1984 and 1984–1985 seasons when conditions had returned to normal.

The gulls breed in the Atacama Desert, but forage along the coast where they feed principally on anchovies and sand crabs, species whose populations were seriously reduced by ENSO. The commercial catch of anchovies plummeted from 1981–1984. The authors thus suggest that the reproductive failures and low lipid reserves were caused by ENSO depression of gull food supplies. However, there was no ENSO-related pattern in adult mortality.

During the recovery season of 1984–1985, when anchovy densities were on the rise, two-egg gull clutches (compared to one-egg clutches) were significantly lower than in succeeding years when anchovies were abundant. The authors speculate that gulls may "bet-hedge" by altering their clutch size from zero in bad years, to one in better years, and two when food is abundant.—William E. Davis, Jr.

10. Density dependent regulation in the breeding flocks of the Feral Pigeon *Columba livia* forma *domestica*. (Die dichteabhangige Regulation im Brutschwarm der Strassentaube *Columba livia* forma *domestica*.) D. Haag. 1988. Ornithol. Beob. 85:209–224 [German].—Two feral Rock Dove flocks were studied for four years in Basle and its outskirts. The flock in town remained at a stable, high population density, with high nestling and egg mortality. The flock on the outskirts showed a constant increase in size with higher egg and nestling success. At high population densities, young survival is so poor, that adult mortality is not compensated.—Robert C. Beason.

11. Declines in midwinter counts of waders roosting on the Dee Estuary. J. R. Mitchell, M. E. Moser, and J. S. Kirby. 1988. Bird Study 35:191–198.—Count and observational data of wading birds wintering on Dee Estuary along the west-central coast of Britain were analyzed from 1975 to 1986. A 57% decline in total waders was largely the result of declines in three species. Numbers of Bar-tailed Godwits (*Limosa lapponica*) have declined by 99% with only 79 birds counted in 1985/86. This decline contrasts with an increase in godwit numbers nationally during this period. Red Knots (*Calidris canutus*) have declined by 79% to a record low of 10,150 birds in 1985/86; and Dunlins (*C. alpina*) have declined by 81% from 46,826 birds in 1975/76 to 8800 birds in 1985/86. Declines in the latter two species on Dee Estuary coincide with decreasing numbers of both species nationally. The data suggest that knots and Bar-tailed Godwits that formerly roosted on Dee Estuary now roost on nearby Alt Estuary. At least some knots that roost on Alt but continue to feed on Dee Estuary incur an extra 40 km round-trip flight between the locations. Such a flight may account for up to 14% of their daily energy expenditure. Declines in wading bird numbers on Dee Estuary are likely the result of increased levels of disturbance from walkers, dogs, hunters, and horse-back riders.— D. J. Ingold.

NESTING AND REPRODUCTION

(see also 8, 10, 20, 21, 22, 23, 25, 42, 47, 54, 57, 70, 71, 77, 83)

12. Paternal influence on growth and survival of Dark-eyed Junco young: do parental males benefit? L. Wolf, E. D. Ketterson, and V. Nolan, Jr. 1988. Anim. Behav. 36:1601–1618.—Recently the importance of male parental care to the survival of his young has been called into question for altricial species; removal experiments in a variety of species have produced variable results. This 4-year male removal study on Dark-eyed Juncos (*Junco hyemalis*) is an important contribution because it measures the effect of male care from hatch to return the following year.

Unaided females suffered higher rates of partial brood loss throughout the nestling stage (29% vs. 19%), and their nestlings had lower survival during the first half of the nestling period (37% vs. 74% for brood size 3, and 59% vs. 71% for brood size 4) than did those of two-parent broods. This effect was produced by a higher rate of death from starvation and exposure (most of which occurred early in nesting and resulted in partial nest loss) in female-only broods than in two-parent broods.

During the period from fledging to independence, female-only broods had consistently lower survival than two-parent broods (0% vs. 32% for brood size 3, and 12% vs. 33% for brood size 4). Unaided females raised fewer than half the number of young to independence than did two parents. Male care may be especially important during the post-fledging stage because young probably require more food than during the nestling stage, and the fledglings are spatially scattered. During the period from independence to return the following year, female-only broods and two-parent broods differed slightly, but not significantly, in the survival of young (6% vs. 10%, respectively).

This study demonstrates that male parental care in Dark-eyed Juncos confers a survival advantage to young during the nestling and fledgling stages which probably results in more young being recruited into the breeding population by monogamous males who care than by monogamous males who do not. Only 2 out of the 17 male-removal studies reviewed by the authors measured offspring survival throughout the fledgling stage in altricial species, both studies obtained results similar to those of this study.—Susan L. Earnst.

13. Infanticidal and anti-infanticidal strategies in the swallow *Hirundo rustica*. A. P. Moller. 1988. Behav. Ecol. Sociobiol. 22:365–371.—In the European Swallow, *Hirundo rustica,* and in the conspecific North American Barn Swallow, unmated males visit the nests of neighbors and attempt to remove nestlings. Because unmated males are not successful in extra-pair copulations and because they have a high probability of dying before the next breeding season, an unmated male's best reproductive strategy may be infanticide, and subsequent renesting with the female victim.

In this study of the European swallow, each of 14 observed cases of infanticide involved first broods (14 of 298 first and 0 of 179 second broods), thus allowing sufficient time for renesting. In every case, the infanticidal male subsequently mated with the female victim, and in 12 of the 14 cases, the new pair renested. All 12 renesting attempts produced fledglings.

Nest-guarding, a behavior performed by both parents, deterred infanticide. In a male-removal experiment, and in the non-experimental setting, lone females were less able than pairs to defend against infanticide, and nest-guarding was significantly less intense at nests which eventually suffered infanticide than at other nests.

Infanticide was a high cost of coloniality in this species. The frequency of infanticide increased as the proportion of unmated males in the colony increased (partial $r = 0.74$), and both increased with increasing colony size ($r = 0.40$ and $r = 0.70$, respectively). Furthermore, in the male-removal experiment, widowed females in colonies suffered infanticide more frequently than widowed females nesting solitarily (4 of 10 vs. 0 of 10).

This study should stimulate interest in the complex interactions among infanticide, parental care, mate-guarding, and extra-pair copulations in colonial species.—Susan L. Earnst.

14. Dispersal, nest site selection, and age of first breeding Peregrine Falcons released in the upper Midwest, 1982–1988. H. Tordoff and P. Redig. 1988. Loon 60: 148–151.—Marked Peregrine Falcons (*Falco peregrinus*) were reintroduced to the upper Midwest region through their release from towers along the Mississippi River and from tall buildings in two Minnesota cities. The objectives of this study were to learn more about nest site selection, movement, and breeding age in order to aid in the maintenance of healthy Peregrine Falcon populations. Type of release site influenced choice of nest site. Availability may have also influenced nest site selection, and distance from release site may have influenced availability. The range of dispersal of 23 territorial paired birds was 0–563 km, the majority of which dispersed 40 km or less. Females generally moved farther than males. Most of the nesting known-age birds in this study were two years and older. The one-year-olds that nested were thought to have hatched before June 1.—Robin J. Densmore.

15. Co-operative breeding by Long-tailed Tits. N. W. Glen and C. M. Perrins. 1988. Br. Birds 81:630–641.—The breeding behavior of a color-banded population of Long-tailed Tits (*Aegithalos caudatus*) was studied near Oxford, England between 1980–1983. This species is very sedentary. Family groups maintain winter territories averaging 25 ha in size. The males in each flock establish their breeding territories within this winter territory, while females disperse to new territories each spring.

Initially, Long-tailed Tits breed as discrete pairs. Their breeding success is poor, however, with only 16% of the nests producing fledged young. While some failed breeders will renest, those failing later in the season are more likely to help at another nest. In every case where relationships were known, the helper was related to the male parent at the nest, suggesting that the cooperative breeding was not random but an example of kin selection. These helpers significantly improved breeding success, with 38% of the young fledging in the cooperative nests as compared with 22% in nests without helpers.

The development of cooperative breeding benefited the winter flocking behavior of this species. When failed breeders helped their kin to raise young, the sizes of the winter flocks were larger, which increased the entire family group's chances of surviving the inclement conditions until the next breeding season.—Bruce G. Peterjohn.

16. First records of roof nesting by Ring-billed Gulls and Herring Gulls in Ontario. H. Blokpoel and B. Smith. 1988. Ontario Birds 6:15–18.—While roof nesting has been documented for Herring Gulls (*Larus argentatus*) in Great Britain, Ireland, and along the Atlantic Coast in North America, the first records for the Great Lakes region are described from Ontario. This nest site preference was unknown in Ring-billed Gulls (*L.*

delawarensis) until a roof nesting colony was established in Ontario during 1985 and 1986. The establishment of these colonies reflects a shortage of suitable conventional nest sites. This new nesting behavior is a cause for concern. Should it become a widespread practice, populations of both species would continue to increase and exacerbate the problems caused by their burgeoning numbers in this region.—Bruce G. Peterjohn.

17. Clutch size and the cost of incubation in the Bengalese Finch (*Lonchura striata* var. *domestica*). R. M. Coleman and R. D. Whittall. 1988. Behav. Ecol. Sociobiol. 23:367–372.—The cost of incubation as clutch size increases was studied in captive Bengalese Finches. Clutch size was manipulated to study incubation costs and other costs of reproduction. Parents incubating large clutches ate more food and the first egg hatched later than for birds with small clutches. As clutch size increased, incubation costs also increased.—Lori A. Willimont.

18. Nesting ecology and microhabitat of the Eastern Phoebe in the central Appalachians. S. R. Hill and J. E. Gates. 1988. Am. Midl. Nat. 120:313–324.—The authors, using fledging success as a measure of habitat quality, evaluated the suitability of buildings, bridges, and rock outcrops as nesting structures for Eastern Phoebes (*Sayornis phoebe*) on the Appalachian Plateau in western Maryland. Most active nests were on natural rock outcrops near forests. Phoebes reused old nests, from previous seasons for raising broods, and there was no significant difference in reuse of nests among the three nesting structures. Egg laying was initiated by the second week of April. The average size for 84 clutches where incubation began was 4.44. A total of 229 nestlings was fledged from 84 active nests, an average of 2.73 fledglings per nest. There was no difference in overall fledging success among the nesting structures. Significantly fewer nestlings fledged in nests on buildings and rock outcrops early in the season (before 1 June) versus late in the season. Overall fledging success of statant nests (nests supported by a small shelf; 58.2%) was lower than that of adherent nests (nests supported by mud placed on the side of a structure; 73.4%). However, this disparity is the result of differences between nest types late in the season, suggesting that early nesting is beneficial regardless of the nest type. Nest losses attributed to predators amounted to 70.1%, and most of this predation (55.6%) was by small mammals including the eastern chipmunk (*Tamias striatus*).

Stepwise discriminant function analysis was used to distinguish between microhabitats of high success (>60%) and low success (<60%) phoebe nests. High-success nests were associated with a higher percent evergreen canopy cover and more open understory. Phoebes with higher nests were more successful than pairs with lower ones. Microhabitat variables with no differences among nesting structures, and therefore probably important in overall nest-site selection included height of rock outcrop or other structure at the nest location, height to nest rim, width of shelf used for support of nest, height of understory trees, and percent canopy cover. Since Eastern Phoebes nest in such a wide variety of habitats on a variety of structures, factors other than nest-site microhabitat must also contribute to phoebe nestling success.—D. J. Ingold.

19. Breeding behaviour of the Long-tailed Cuckoo on Little Barrier Island. I. G. McLean. 1988. Notornis 35:89–98.—*Eudynamys taitensis* breeds only in New Zealand and mainly parasitizes the Whitehead (*Mohoua albicilla*). The rates of parasitism vary with altitude, being greatest (36%) above 250 m, which gives a strong advantage to those Whiteheads nesting early in the season, before the cuckoo's arrival. So far, it has been impossible to separate the sexes of cuckoos in the field. However, McLean suggests that the species is polygamous and that calling males congregate in ephemeral and fluid leks.—J. R. Jehl, Jr.

BEHAVIOR

(see also 3, 12, 13, 14, 15, 19, 74, 75, 76, 77, 78, 79, 80, 81, 83, 84)

20. Extra-pair copulations in Black-capped Chickadees: the role of the female. S. M. Smith. 1988. Behaviour 107:15–23.—In monogamously mated birds, it is generally assumed that extra-pair copulations (EPC's) occur when an intruding male gains access to a female despite her mate's attempts to guard her, and when the female is physically unable

to thwart the attempt or chooses not to resist due to the risk of injury. Less attention has been given to the possibility that EPC's benefit the female.

Smith documents 13 cases of EPC's in Black-capped Chickadees (*Parus atricapillus*) and explores their potential benefits to females of this species. Three benefits to a female bird have been proposed in the literature: increased genetic variability of her offspring, ensured fertilization, and "better genes" than those available from her mate.

Smith's data strongly suggest that females were actively seeking EPC's and that the probable benefit of EPC's was the "better genes" of males more dominant than her mate. In all 13 cases observed, the female copulated with a male that ranked higher than her own mate. In 70% of the cases, the female left her mate's territory and moved into the more dominant male's territory where the EPC occurred. In 12 of the 13 cases, the EPC occurred very near dawn (conversely within-pair copulations occurred at all times of day), the time of day when the female's mate was most likely to be singing at a high rate, leaving the female free to seek EPC's.

Although obtaining "better genes" is the most parsimonious explanation of the data, the benefits of increased genetic variability of offspring and higher likelihood of fertilization are not ruled out. Also, Smith proposes an additional advantage: a female chickadee that has engaged in EPC's with a dominant male may be more able to pair with him in the event of his current mate's death. This argument is supported by observations of divorce; in five of the seven known cases, a lower-ranking female deserted her mate and paired with a recently widowed alpha male.

Smith's careful observations have revealed a surprising female strategy. As more researchers watch for and follow females leaving their mate's territory, we will be able to evaluate the frequency and evolutionary benefits of this strategy in primarily monogamous species.—Susan L. Earnst.

21. Food and the deceptive acquisition of mates by polygynous male harriers. R. E. Simmons. 1988. Behav. Ecol. Sociobiol. 23:83–92.—Male Northern Harriers (*Circus cyaneus*) may pair polygynously with 2–5 females which then occupy separate nests in contiguous home ranges. Monogamous females and the first females to settle on a male's territory (alpha females) receive more food from their mate and raise more young than later settling polygynous females. Simmons addresses the difficult questions of what cues are used by females in choosing mates and why females mate polygynously. Polygyny is especially puzzling because females that mated monogamously produced many more young than females that settled at the same time but mated polygynously (3.25 vs. 0.88, $P < 0.01$).

Of four potential mate choice cues, the rate at which males provided food was most highly correlated with brood success ($r = 0.72$, $P < 0.001$). Male provisioning rate was also highly correlated with female settling order and was therefore apparently used by females in mate choice. The other potential cues were either not correlated with success (male predator defense and territory quality) or were not correlated with female settling order (nest site quality).

Simmons tested four models of why polygyny exists: (1) cooperative harems; (2) skewed sex ratios; (3) sexy-sons; and (4) polyterritoriality. According to his interpretation of the data, none of the models sufficiently explained polygyny in Northern Harriers. Rather, he hypothesized that females chose already mated males only because they were deceived by high provisioning rates during courtship. Simmons provided evidence that males provisioned all females equally during courtship, but provisioned polygynous females proportionately less during brood-rearing. Unfortunately, Simmons inferred courtship feeding rate from clutch size rather than quantifying it directly.

Additional analyses might have helped to reject the alternative models more conclusively. For example, it is not clear that becoming a male's second female had the same costs and explanations as becoming the male's third or fourth female. Thus, it would have been useful to compare second and subsequent females to alpha females and to concurrently settling monogamous females, and to examine the number and provisioning rates of unmated males available when each female chose a mate.—Susan L. Earnst.

22. Parent-offspring aggression in moorhens. M. L. Leonard, A. G. Horn, and S. F. Eden. 1988. Behav. Ecol. Sociobiol. 23:265–270.—Parent-offspring aggression was stud-

ied in Common Moorhens (*Gallinula chloropus*). Three hypotheses were given as possible explanations of the function of aggression in rails: (1) brood division, (2) sibling competition, and (3) weaning. Evidence is discussed to support the latter two hypotheses.—Lori A. Willimont.

23. Parent-offspring relationships in wintering Barnacle Geese. J. M. Black and M. Owen. 1989. Anim. Behav. 37:187–198.—This is one of the few studies that has quantified costs and benefits of parental care throughout autumn, winter, and spring in a species with long-term care. The results suggest a surprising, positive relationship between duration of parent-offspring association and the parent's subsequent reproductive success.

Attached *Branta leucopsis* goslings fed undisturbed for longer periods than did unattached goslings during autumn ($P < 0.05$) and winter (ns). Similarly, profile indices indicated that attached goslings were in better condition as late as May. Although attached goslings spent slightly more time feeding (ns) and less time vigilant (ns) than did unattached goslings during autumn and winter, the opposite was true during the spring (ns). Concurrent with this increase in offspring vigilance was a decrease in parental vigilance.

Parents devoted significantly more time to vigilance and aggression, and less time to feeding, than did non-parental pairs, especially during autumn and winter. However, other data suggest that the costs of parental care were not long-lasting. First, profile indices did not differ among parents and non-parents. Second, being a parent in one year did not decrease the probability of surviving to, nor returning with young, the next year. And third, parents that maintained care of the young until spring were *more* likely than other parents to return with young the following year (females, $P < 0.01$; males, $P < 0.1$), thus suggesting a positive relationship between duration of care and subsequent reproductive success.

The apparent relationship between duration of parent-offspring association and the parents' subsequent success could be explained if offspring contributed to their parents' success in some way. By spring, young remaining in families exhibited sufficient levels of vigilance and aggression that parents may have benefited from their presence. Thus, parents may have been more successful than non-parents in replenishing nutrient reserves critical for successful reproduction. Although the data do not adequately reject alternative explanations, the authors have suggested an intriguing consequence of parent-offspring association in species with prolonged parental care.—Susan L. Earnst.

24. The role of kinship in helping decisions among White-fronted Bee-eaters. S. T. Emlen and P. H. Wrege. 1988. Behav. Ecol. Sociobiol. 23:305–315.—The role of kinship in three helping "decisions" was examined in the cooperatively breeding White-fronted Bee-eater (*Merops bullockoides*). The three decisions considered were "(1) whether or not to become a helper, (2) whom to help, and (3) how much help to provide." In the first two decisions, but not in the third, kinship was a prominent factor. Comparisons were also made with other species.—Lori A. Willimont.

25. The influence of relatedness and display effort on the mate choice of captive female American Kestrels. J. R. Duncan and D. M. Bird. 1989. Anim. Behav. 37:112–117.—Captive female American Kestrels (*Falco sparverius*) were given the opportunity to choose between a sibling male and an unrelated male of the same age and breeding experience. Mean values of female interactions including nest-box inspections, copulations, and food transfers with siblings versus non-siblings were not significantly different ($Z < 1.96$). There was no significant difference ($P = 0.558$) in the proportion of females that chose brothers for those birds reared in the presence or absence of their siblings. Male display efforts were recorded on the basis of nest-box inspection rates. Significantly more females chose the more active mate ($P = 0.007$). A paucity of suitable nest cavities limits the reproductive success and breeding densities of American Kestrels. Thus, kestrels have probably experienced little, if any, selection pressure to develop a mechanism of kin recognition to avoid inbreeding. However, the intensity of display by male American Kestrels may serve as an indirect indicator of their genetic quality, and females may choose mates on that basis.—D. J. Ingold.

26. Dominance relationships between juvenile and adult Black-billed Magpies. P. E. Komers. 1989. Anim. Behav. 37:256–265.—The impact of sex and age on the nature of dominance hierarchies was examined in 11 unisexual groups each with 10 captive Black-

billed Magpies (*Pica pica*), and in 32 mixed-sex groups each with 5 captive magpies. The linearity of dominance hierarchies among all 9 groups of males was significant ($P < 0.05$) with few reversals. Reversals in the hierarchies of female groups were common and often associated with pair formation; linear relationships in female hierarchies were not significant. Among mixed-sex groups, males were dominant, ranking as the alpha bird in all 32 groups. Females ranked as the omega bird in 29 groups. Among males, juveniles were dominant in the groups of 5, ranking most frequently in the alpha category (in 23 of 32 groups). Potential asymmetries between adults and juveniles in foraging efficiency and familiarity with the environment, postulated to explain differences in dominance status between the age cohorts, were excluded in the captive situation. Thus, these hypotheses cannot be invoked to explain why juveniles dominated older males. The apparent contradiction between dominant juvenile males and their lack of reproductive success is discussed.—D. J. Ingold.

ECOLOGY

(see also 15, 18, 19, 50, 54, 64, 72, 73, 74, 77, 79)

27. Unusual Snow Goose mortality in southwestern Louisiana. K. Ouchley. 1988. J. La. Ornithol. 1:27–28.—An estimated 200–300 *Chen caerulescens* were found dead on 27 January in a 3 km × 8 km area of Jefferson Parish, La. Autopsies could not confirm cause of the mortality although evidence suggested that the birds died in flight. Violent updrafts associated with heavy thunderstorms are suggested as the cause of death.—Jerome A. Jackson.

28. Habitat selection and differential predation by *Athene cunicularia* on rodents of agrarian ecosystems. [Selección de hábitat de caza y depredación diferencial de *Athene cunicularia* sobre roedores en ecosistemas agrarios.] M. I. Bellocq. 1987. Rev. Chil. Hist. Nat. 60:81–86 [Spanish].—Rodent availability in two agricultural habitat types (cultivated cores versus uncultivated edges) was assessed by means of traplines in eastern Argentina. The composition of rodents in the two habitats was compared to that in the diet of sympatric Burrowing Owls (*Athene cunicularia*). The owls preyed disproportionally highly on two rodent species that dwelt mainly on the edge of field crops. The author argues that owls were not exactly selecting prey: their use of primarily perch hunting rendered captures of edge-inhabiting rodents more likely than captures of core-dwelling rodents. In addition, the two species most preyed upon on the edges displayed some ecological features that rendered them more vulnerable than others to the owls, such as climbing behavior and use of open areas. The interesting thing here is that a passively hunting owl, that opportunistically preys on whatever is easier to catch, using any electivity index would appear as effecting prey selection.—Fabian M. Jaksić.

29. The predation of tern chicks by sheep. R. Furness. 1988. Bird Study 35:199–202.—Predation on Arctic Tern (*Sterna paradisaea*) chicks by sheep occurred in the dry heath habitat on the island of Foula off the Shetland mainland. Damage to chicks often appeared in the form of severed wings, legs, and sometimes heads. Attacked chicks were of all ages and conditions. Sheep predation has been observed on three occasions. The first observation was of decapitation. The second two were leg amputations, where the sheep rolled the chicks onto their backs, bit off their legs, and left the rest of the chicks' bodies intact. Small numbers of tern chicks have been found with severed limbs and heads since 1970, but in 1975 over 200 chicks were found in this condition; this season was also the most successful experienced by the colony, 4000 chicks were fledged. Over 600 chicks with sheep-inflicted wounds were found between 1975 and 1979, which constituted 8% of the colony. Years in which the colony experienced little success were attributed to food shortage and human disturbance, sheep predation was not thought to be a likely cause. The author compared these circumstances with a similar case in which Red Deer (*Cervis elaphus*) ate Manx Shearwater (*Puffinus puffinus*) chicks on the island of Rhum. Nutrient deficiency was suggested as the possible cause in both cases.—Robin J. Densmore.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(see also 14, 29)

30. The provision of food and the use of bird feeders in suburban gardens. R. Cowie and S. Hinsley. 1988. Bird Study 35:163–168.—The objectives of this study were to assess the types and amounts of foods that were being provided to wild birds in suburban areas, the manner in which foods were provided, the species which used the provisions, and the peak periods of usage. Questionnaires were sent to randomly chosen households and the results showed no significant difference in types of food presented in summer and winter. The most common type of food was bread, provided by 90% of the responding households. The majority of food placement was on the ground, but 30% used feeders and peanut holders. Just over half of the households provided water.

Rate of peanut consumption was measured at four feeders, and usage by different species was monitored at one of these feeders. Peak consumption periods occurred in the beginning of December and the latter half of March. Female House Sparrows (*Passer domesticus*) were prevalent in late March and early April, indicating the importance of food provision during the onset of the breeding season. Consumption was lowest from mid-May through mid-July. House Sparrows were the most common species attending feeders, especially in autumn. Great Tits (*Parus major*) were most common in August and Blue Tits (*P. caruleus*) were most common from August through the winter months. Thus food provision was also important during August and September because this was when high attendance by juveniles occurred.—Robin J. Densmore.

31. Colonial waterbird management in North America. J. F. Parnell, D. G. Ainley, H. Blokpoel, B. Cain, T. W. Custer, J. L. Dusi, S. Kress, J. A. Kushlan, W. E. Southern, L. E. Stenzel, and B. C. Thompson. 1988. Colonial Waterbirds 11:129–169.—Conservation of colonial waterbirds traditionally focused on protecting birds and eggs, but there is now a need for active management at population, food web, and breeding and foraging habitat levels. The authors review the problems facing colonial waterbirds, management techniques, and implementation, and suggest research and educational needs. Birds included in the review are members of the Procellariiformes, Pelicaniiformes, Anseriformes, Ciconiiformes, and Charadriiformes.

The authors present a history of colonial waterbird management, including prey species management and wetlands protection. The major threats to colonial waterbirds are from reduction of habitat quality and quantity resulting from increased demands for agricultural land, forest products, and recreational areas, and from toxic materials. Environmental contaminants, including petroleum, affect some bird populations by directly causing mortality, while organochlorine, organophosphate and metal contaminants affect reproductive success or degrade feeding habitat. Food web alteration by man is exemplified by cases of overfishing. All of the problems are not man made, however, as the high densities associated with colonial activity promote the spread of diseases such as avian cholera. Colonial waterbirds often face nest-site competition and predation from species which have rapidly expanding populations (e.g., many gull species). The high densities of birds living in colonial conditions also increases the risks associated with human disturbance and weather related problems.

Solutions to some of these problems include construction of dredged-material islands for colony sites, shallow impoundments to enhance foraging opportunities, improvement of the environment by eliminating oil-field brine evaporation pits, and cutting back the use of organophosphate pesticides. Controlling human disturbance at breeding colonies is critically important, and posting, fencing, and patrols are advised. Birds which reach pest proportions (usually due to human activities) or threaten other colonial nesting birds should be controlled. New colony creation and old colony restoration have been effected by a variety of methods, including social attractants such as decoys and tape recordings, and transplantation of chicks to new or abandoned sites.

The authors describe the history of the legal basis for state and federal protection and management of birds in Canada and the United States. They assess the role of the Canadian Wildlife Service, the U.S. Fish and Wildlife Service, and numerous private organizations such as Ducks Unlimited and the Canadian Wildlife Federation.

Recommended directions for research include more effective monitoring programs, and assessments of reproductive success. There is a need for more education of the general public since funding is largely dependent on public concern.

The intended readership for this comprehensive review paper includes land managers, policy makers, developers, and conservation officers, but its nearly 350 references make it indispensible for any one interested in conservation or management of colonial waterbirds. This report is sponsored by the Colonial Waterbird Society, and reprints may be purchased for $4.00 U.S. from the Treasurer of the Society: Iola M. Price, 563 Fairview Ave., Ottawa, Ontario K1M 0X4 Canada.—William E. Davis, Jr.

CONSERVATION AND ENVIRONMENTAL QUALITY

(see 7, 8, 11, 16, 29, 31, 51, 55, 56, 60, 62, 63, 74, 86)

PARASITES AND DISEASES

(see 31)

PHYSIOLOGY

(see also 4, 5, 9, 17, 34)

32. Axonal delay lines for time measurement in the owl's brainstem. C. E. Carr and M. Konishi. 1988. Proc. Natl. Acad. Sci. 85:8311–8315.—The ability of Common Barn-Owls (*Tyto alba*) to localize their prey in the dark depends on the owl's ability to measure interaural time differences. Intracellular recordings from afferents of the magnocellular cochlear nuclei show orderly changes in conduction delay associated with their vertical location within the nucleus. It appears that these afferent axons act as delay lines and provide the basis for the neuronal map measuring interaural time differences, which in turn allow the owl to locate its prey.—Robert C. Beason.

33. Fluid mechanical valving of air flow in bird lungs. D. O. Kuethe. 1988. J. Exp. Biol. 136:1–12.—The unidirectional flow of air through the avian lung is affected by the structure of the major bronchi and the pressure difference between the cranial and caudal air sacs. The pressure difference around Hazelhoff's dam in the primary bronchus, along with the air's inertia, may partially explain why air does not enter the medioventral bronchi during inhalation, which in turn results in a unidirectional air flow through the lung.—Robert C. Beason.

34. Evaluation of a nondestructive method for determining fat stores in small birds and mammals. G. E. Walsberg. 1988. Physiol. Zool. 61:153–159.—The adaptation of an instrument to measure the body fat of small birds and mammals is described. The instrument (produced by Dickey-John Medical Instrument Corp.) was developed to measure fat content in ground meat. While the models tested by the author are no longer being manufactured, modified versions are being developed and similar ones may be available from other manufacturers. The technique of electromagnetic determination of body electrical conductivity will allow analyses of temporal variation in fat and nonfat tissues in individual animals. Because the instrument is portable and can be powered by an inverter connected to a battery, it will be useful in the field as well as the laboratory. This technique is much more accurate than use of the ordinal scale used by many field ornithologists, and does not require killing the animal to extract the fat.—Robert C. Beason.

35. Extra-renal salt excretion in Clapper and King rails. G. L. Conway, M. R. Hughes, and R. R. Moldenhauer. 1988. Comp. Biochem. Physiol. 91A:671–674.—Salt gland secretions of King (*Rallus elegans*) and Clapper (*R. longirostris*) rails were analyzed in freshly captured and sea-water acclimated birds. Newly captured Clapper Rails produced a greater quantity of more highly concentrated salt gland fluid than did King Rails. Acclimation to sea water raised King Rails to Clapper Rail levels. After acclimation to sea water both rails produced salt gland secretions that were similar in concentration, but not in quantity, to that of marine birds. As a result, rail chloride secretion was about 10% of that of marine gulls.—C. R. Blem.

36. Body water and water flux in fresh water and sea-water acclimated Clapper Rails, *Rallus longirostris*. R. L. Hammons, M. R. Hughes, and R. R. Moldenhauer. 1988. Comp. Biochem. Physiol. 91A:539–541.—Total body water and water flux were measured in Clapper Rails (*Rallus longirostris*) by means of tritiated water. Total body water was not affected by acclimation to sea water, but water flux was slightly reduced after sea water acclimation. The Clapper Rail essentially responds physiologically in a manner similar to that of other birds possessing salt glands.—C. R. Blem.

37. Energy cost of whole-body protein synthesis measured *in vivo* in chicks. Y. Aoyagi, I. Tasaki, J. Okumura, and T. Muramatsu. 1988. Comp. Biochem. Physiol. 91A: 765–768.—The energetic cost of protein synthesis was measured in living, whole chicks by comparing the changes in protein synthesis and heat production before and after the administration of cycloheximide, an inhibitor of protein synthesis. The energy cost of whole-body protein synthesis was calculated to be 5.4 kJ per g of protein, which is similar to the average heat of combustion of protein in general.—C. R. Blem.

38. Responses to cold stress in two species of Australian quail, *Coturnix pectoralis* and *Corturnix chinensis*. J. T. R. Roberts and R. V. Baudinette. 1988. Comp. Biochem. Physiol. 91A:543–548.—Body temperature, oxygen consumption, heart and respiration rates, and intensity of shivering of Stubble Quail (*Coturnix pectoralis*) and King Quail (*C. chinensis*) were measured over a range of ambient temperature of −3 to 30 C. The responses of the two species were similar. The authors point out that hypothermia does not occur in the temperature range tested, although it is not obvious why birds of 50–125-g body mass should have any problem with −3 C. The authors seem not to realize that simple analyses of ratios without mathematical transformation is dangerous and apparently express ratios without accounting for variations in mass; their comparisons of the species are suspect as a result. They also point out that non-shivering thermogenesis does not exist in the Stubble Quail, thus perpetuating the apparent myth that *any* bird has NST.—C. R. Blem.

39. Thermoregulatory responses of the pigeon (*Columba livia*) to selective changes in the inspired air temperature. C. Bech, W. Rautenberg, and B. May-Rautenberg. 1988. J. Comp. Physiol. B 157:747–752.—Increasing the temperature of the inspired air when the ambient temperature is 5 C resulted in a significant decrease in metabolic rate. Lowering the temperature of the inspired air when the ambient temperature was 25 C caused a significant increase in metabolic rate, but raising the inspired air temperature had little influence. The authors conclude that there is a peripheral thermoreceptor in the head which monitors the temperature of the inspired air and causes metabolic rate compensations.—Robert C. Beason.

40. Thermoregulation in four species of arctic seabirds. G. W. Gabrielsen, F. Mehlum, and H. E. Karlsen. 1988. J. Comp. Physiol. B 157:703–708.—Resting metabolic rates (RMR), thermal conductance, and body temperature were recorded from 16 Black-legged Kittiwakes (*Rissa tridactyla*), 16 Fulmars (*Fulmarus glacialis*), 13 Black Guillemots (*Cepphus grylle*), and 11 Guillemots (*Uria lomvia*). For the kittwake, RMR = 1.64 O_2/g h, TC = 0.0466 O_2/g h C, and BT = 40.2 C; for the fulmar, RMR = 1.00, TC = 0.0336, BT = 38.7; for the Black Guillemot, RMR = 1.59, TC = 0.0475, BT = 39.9; and for the Guillemot, RMR = 1.11, TC = 0.0282, and BT = 39.6. The lower RMR values of the fulmars were similar to those of Procellariiformes, and may be an adaptation to surviving long periods of fasting. The higher RMR values in the other three species are probably the result of low ambient temperatures and the high activity levels of the birds. The relationship between metabolism and temperature is not linear over the entire range of temperature studied, but shows a thermoneutral zone which starts 1–9 C depending on the species.—Robert C. Beason.

41. Olfactory deprivation in pigeons: Examination of methods applied in homing experiments. H. G. Wallraff. 1988. Comp. Biochem. Physiol. 89A:621–629.—The effectiveness of three techniques used for olfactory deprivation or impairment in Rock Dove (*Columba livia*) homing experiments were tested using unconditioned cardiac acceleration. When the nostrils were plugged, the intensity of the stimulus was reduced to 20–30% of its original level. The ability of the pigeon to detect odors seemed unimpaired. Sectioning both olfactory nerves and bending them backwards irreversibly blocked sensitivity to weaker

stimuli, but response to high concentrations continued at a reduced level. This residual sensitivity probably is due to sensitivity of the trigeminal system. Treating the nasal cavities with a local anesthetic blocked most sensitivity to odors, but the effect was variable depending on which anesthesia was used and how it was applied. With the doses prescribed by the manufacturers, Gingicain was less effective than Xylocain. The anesthesias did not always reach maximum effectiveness within the 5 min used in homing experiments. The results of these experiments should provide some useful guidelines for future experiments on olfactory deprivation in homing experiments.—Robert C. Beason.

42. Eggs of Leach's Storm Petrel: O_2 uptake, water loss, and microclimate of the nest. H. Rahn and C. E. Huntington. 1988. Comp. Biochem. Physiol. 91A:519-521.—Oxygen consumption and water loss of Leach's Storm-Petrel (*Oceanodroma leucorhoa*) were measured during natural incubation. The values determined were similar to those of other seabirds, and it is not clear why the authors made these measurements as no hypothesis was tested nor was any real point established by the measurements.—C. R. Blem.

MORPHOLOGY AND ANATOMY

(see also 33, 68, 69, 73, 75)

43. Sex determination in Manchurian Crane *Grus japonensis* by discriminant analysis. K. Murata, T. Suzuki, M. Yasufuku, and W. Yoshitake. 1988. J. Yamashina Inst. Ornithol. 20:101-106. (Japanese, English summary.)—Measurements of tail length (TL), wing length (WL), tarsus length (LL), and bill length (BL) were taken on eight males and 14 females. The following discriminant function was obtained:

$Z = 0.16887TL + 0.01329WL - 0.21827LL + 1.06610BL - 15.35077$ where $Z > 0$ indicates male, $Z < 0$ indicates female. The mean difference of scores between the sexes was significant ($df = 20$, $t = 9.144$, $P < 0.001$). The ease of this method makes it useful for zoo and field use. Additional data on these and other body measurements are needed to improve accuracy.—Andrea Dinep.

44. Two examples of upper bill abnormality in woodpeckers, *Dendrocopus major* and *D. kizuki*. K. Ishida. 1988. J. Yamashina Inst. Ornithol. 20:111-115.—Two woodpeckers feeding on prepared and natural foods from a hole in the side of a plastic container, and kept in wire mesh cages showed changes in length and shape of their bills. Bill morphology of woodpeckers may be altered by foraging behavior.—Andrea Dinep.

45. On the allometry of wings. E. Morgado, B. Günther, and U. González. 1987. Rev. Chil. Hist. Nat. 60:71-79.—Wing spans and weights of 70 specimens representing 51 Chilean bird species were obtained and related through the allometric equation $WS = a\ W\ \exp b$. If these variables were isometrically related, an exponent $b = 0.333$ should have resulted. Instead, the obtained $b = 0.394$, indicated that in the sample examined wing span was allometrically related to body mass. These results were compared to those obtained in similar studies using birds from the Northern Hemisphere, discriminating among four different bird models: passerines, shorebirds, hummingbirds, and ducks. In all cases the exponent b ranged from 0.39-0.53, thus lending support to the generalization that wing span in birds is allometrically related to body weight. I wonder whether this is a surprising finding. Further, apart from the predictive power rendered by an equation that relates body mass and wing span, I fail to find any value in predicting function, and much less, in predicting how the real birds fly.—Fabian M. Jaksić.

46. Shell mass, thickness and density of avian eggs derived from the tables of Schonwetter. H. Rahn and C. V. Paganelli. 1989. J. Ornithol. 130:59-68.—Regression analyses were performed in order to examine how shell thickness and shell mass vary as a function of egg mass in passerines ($n = 3929$) and non-passerines ($n = 3217$). High correlation coefficients indicate that both shell thickness and mass are a positive function of egg mass in both groups. These analyses also revealed that some members of the order Galliformes have unusually thick egg shells which can exceed 20% of the total egg mass. Shell density was obtained by dividing the shell mass of each species by the product of its shell thickness and shell surface area. Densities ranged from 2.3 g/cm in Rheiformes to 1.85 in Psittaciformes; Passeriformes had a mean density of 2.05 g/cm. The breaking strength of eggs was

related to shell thickness. Regression lines of skeletal and shell mass on body and egg mass had the same slopes.—D. J. Ingold.

PLUMAGES AND MOLTS

(see 67)

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 2, 7, 11, 19)

47. Breeding range expansion of Cliff Swallow in Louisiana. R. D. Purrington. 1988. J. La. Ornithol. 1:24–26.—*Hirundo pyrrhonota* has been found nesting in several areas of south Louisiana. All nests have been under the concrete portion of highway bridges over water; most have been near Barn Swallow (*Hirundo rustica*) nests. An addendum notes that in April 1988, two Cave Swallows (*H. fulva*) were seen in the swallow colonies over the West Middle Pearl River in southeast Louisiana.—Jerome A. Jackson.

48. The Carolina Parakeet in Louisiana: a history. D. McKinley. 1988. J. La. Ornithol. 1:1–13.—Add one more to the more than a score of McKinley's publications detailing the history of the Carolina Parakeet. This, the author states, is the last in his series of state and local accounts. In the Louisiana account, McKinley provides us with a review of, and excerpts from, early travel literature, the Carolina Parakeet accounts of Audubon, Wilson, and other naturalists, and a listing of specimens known or reputed to be from Louisiana.—Jerome A. Jackson.

49. The first specimen of Chinese Merganser *Mergus squamatus* collected from Japan. T. Kazama. 1988. J. Yamashina Inst. Ornithol. 20:116–118. (Japanese, English summary.)—A dead adult male was collected in February 1987 at the Agano River, Niigata Prefecture. This is only the second record of this species in Japan, the first being a photo record of a pair from the Kiso River, February 1986.—Andrea Dinep.

50. The Winter Roadside Raptor Survey in Tennessee: 1986–1987 results. S. Stedman. 1988. Migrant 59:14–21.—A winter roadside raptor survey has been completed for the first time in Tennessee. The objective of this survey was to collect data in a manner which would allow for comparison of data from future years. Data were collected on the basis of year, month (December, January, and February), and region. Number of birds of each species/100 km of road was surveyed in three west, middle, and east Tennessee. West Tennessee did not receive enough coverage to be compared with the other two regions. However, coverage was sufficient enough in middle and east Tennessee to produce reliable data for comparison of the abundance of common raptors and Loggerhead Shrikes (*Lanius ludovicianus*), as well as from month to month. More coverage is necessary to produce reliable data on less common species. Eleven species were included in this survey, five of which were common.—Robin J. Densmore.

51. Notes on the status and ecology of the Ogea Flycatcher *Mayrornis versicolor*. D. Watling. 1988. Bull. Br. Ornithol. Club 108:103–112.—The author visited Ogea, in the southern Lau Group of Fiji, in July and August 1986. He found the Ogea Flycatcher to be common on the three islands of the Ogea group, although the bird was previously known from only one of these. The species is an endemic forest dweller, and he estimates that about 2000 exist on the Ogea group. Watling sees no present threat to their existence, although phosphate mining may begin on one of the islands in the future. Behavior of the Ogea Flycatcher and possible hybridization with a congener are also discussed.—Malcolm F. Hodges, Jr.

52. Range extension of the Red-fan Parrot *Deroptyus accipitrinus* in Amazonian Brazil. L. Joseph. 1988. Bull. Br. Ornithol. Club 108:101–103.—Joseph uses personal records and specimen data to show that the Red-fan Parrot ranges farther west than the literature generally indicates.—Malcolm F. Hodges, Jr.

53. Birds of the inland mountains of western Dronning Maud Land, Antarctica. P. G. Ryan and B. P. Watkins. 1988. Cormorant 16:34–40.—Four species of birds were observed in the inland mountains and nunataks of western Dronning Maud Land by the

authors from December 1987–January 1988. Their findings, as well as unpublished data from other sources for the same area, are summarized in species accounts. The first known breeding of the Antarctic Petrel (*Thalassoica antarctica*) in this area is described.—Malcolm F. Hodges, Jr.

54. Whiskered Terns *Chlidonias hybridus* breeding in the southeastern Transvaal Highveld, South Africa. D. G. Allan. 1988. Cormorant 16:3–6.—The author found six breeding colonies of Whiskered Terns in January and February 1984. These terns bred in temporary wetlands which were the result of heavier than normal rains. The stage of breeding at discovery is described, as are nest construction, incubation behavior, and egg sizes. Habits of the present subspecies, *C. h. delalandii,* are compared with those of the nominate subspecies of Europe.—Malcolm F. Hodges, Jr.

55. The status of colonial waterbirds nesting at Hamilton Harbour, Lake Ontario, 1959–1987. R. Z. Dobos, J. Struger, H. Blokpoel, and D. V. C. Weseloh. 1988. Ontario Birds 6:51–60.—The harbor at Hamilton, Ontario presently supports the most diverse colony of waterbirds on the Canadian Great Lakes. Canada's only nesting record of Snowy Egret (*Egretta thula*) was established there in 1986. Expanding numbers of double-crested Cormorants (*Phalacrocorax auritus*) and Caspian Terns (*Sterna caspia*) have recently appeared in the harbor. In addition, this harbor hosts an important colony of the beleaguered Common Tern (*S. hirundo*) and sizable numbers of Black-crowned Night-Herons (*Nycticorax nycticorax*), Ring-billed Gulls (*Larus delawarensis*) and Herring Gulls (*L. argentatus*). The historic trends in the numbers of each species are described.

This colony presently occupies a relatively undisturbed location and its short-term prospects are promising. However, the site is slated for development within the next 15 years. Efforts are presently under way to establish a secure permanent site for these breeding birds within Hamilton harbor.—Bruce G. Peterjohn.

56. The 1987 Loggerhead Shrike survey. M. D. Cadman. 1988. Ontario Birds 6: 26–27.—A coordinated effort censused the Loggerhead Shrike (*Lanius ludovicianus*) breeding population in Ontario during 1987. Eighty-two adult shrikes were found at 53 locations, resulting in an estimate of 71 pairs and 58 apparently unmated individuals within the province. Population trends are not available, but this census will serve as a baseline against which future changes in the numbers of this declining species can be compared.—Bruce G. Peterjohn.

57. A summary of the breeding status of Hooded Warblers in Ontario. M. E. Gartshore. 1988. Ontario Birds 6:84–89.—The distribution and abundance of breeding Hooded Warblers (*Wilsonia citrina*) are described at the northern boundary of their range in southern Ontario. These warblers are found south of the Canadian shield, primarily in Carolinian Zone vegetation in areas with sandy soils. Habitat preferences are described and limited data are provided on their nesting biology. Based on known distribution patterns, Ontario presently supports an estimated 80–176 breeding pairs of warblers, with most in Elgin County and the Regional Municipality of Haldimand-Norfolk. While the numbers of known pairs have increased during the 1980s, most of this increase may be a result of better coverage by an expanding number of field observers. The long-term trends of this small population remain to be determined.—Bruce G. Peterjohn.

58. The breeding birds of North Ronaldsay, Orkney. M. G. Pennington. 1988. Scott. Birds 15:83–89.—A breeding bird survey was conducted in 1987 by the North Ronaldsay Bird Observatory. Forty-two species were found, all but two were confirmed breeders. With the use of past data the list increases to 51 breeding species, 34 of which currently breed regularly.—Lori A. Willimont.

59. A survey of the breeding bird species in major London woodlands, 1985–87. K. H. Palmer. 1987. London Bird Report No. 52:142–171.—This survey, conducted by the London Natural History Society, targeted three species: Wood Warbler (*Phylloscopus sibilatrix*), Redstart (*Phoenicurus phoenicurus*), and Tree Pipit (*Anthus trivialis*). Each of these species was censused in any area of continuous "woods" that was at least 10 ha in area. The first task was to identify such wooded areas within 32.2 km of St. Paul's Cathedral—an accomplishment that will certainly provide a basis for continued monitoring of

changes in the natural environment of the London area. In total, 363 such woods were identified and entered into computer data bases, although only 312 of the woods were visited by the 150+ observers. Results suggest that the Wood Warbler and Tree Pipit are holding their own, but that the Redstart is nearly lost as a woodland breeding species. Other species were recorded only as present or absent. The most species-rich woods were at a distance of 15–20 km from St. Paul's Cathedral. Larger woods supported a richer diversity, although the effect of size was less marked above 100 ha.

Local birding clubs should take note of this project and consider defining the current status of their home turf in terms of habitats available and species present. Only with such quantitative baselines can we truly come to grips with the progress of change.—Jerome A. Jackson.

60. Numbers of wintering Pink-footed and Greylag geese in north-east Scotland 1950–1986. M. V. Bell, J. Dunbar, and J. Parkin. 1988. Scott. Birds 15:49–60.—The fluctuations in numbers of Pink-footed (*Anser fabalis*) and Greylag (*A. anser*) geese since 1950 and 1960, respectively, in northeast Scotland are described. Numbers have been on the increase with numbers in 1986 their highest ever. Up to 40,000 Pink-footed and 30,000 Greylag roost in northeast Scotland (up to 30% of the British wintering populations of these species). Land use in this area is changing and could affect the wintering birds.—Lori A. Willimont.

61. Traditional orchards of canton Zurich and their birds. (Die Obstgärten und ihre Voglewelt im Kanton Zurich.) W. Muller, R. Hess, and B. Nievergelt. 1988. Ornithol. Beob. 85:123–157 [German].—This study is based on the avifauna of almost 2600 orchards, of which 1916 were studied in detail. The orchard avifauna is characterized by a large number of hole-nesting species and only a few ground-nesting species. Orchard size greatly influenced the number of breeding species. Small orchards (10 or fewer trees) never had more than one breeding species, while large orchards (100 trees or more) contained 9–16 breeding species. Some species, such as the Goldfinch (*Carduelis carduelis*) and Green Woodpecker (*Picus viridus*) were found only in the larger orchards.—Robert C. Beason.

62. The avifauna of molasse cliffs on the Bernese Plateau. (Zur Vogelwelt der Molassefelsen im bernischen Mittelland.) R. Hauri. 1988. Ornithol. Beob. 85:1–79 [German].—The molasse cliffs provide important habitats for many avian species. This area is sometimes the only area which has not been altered by human activity. Eight cliffs were closely studied for 50 years, but additional data go back to the 16th century. Avian communities are composed of up to 23 species. Of the three large species, the Eagle Owl (*Bubo bubo*) has disappeared from most sites; the Peregrine Falcon (*Falco peregrinus*) suffered a severe population low in 1955–1980, but is recolonizing the cliffs; and the Raven (*Corvus corax*) was extinct as a breeding species around 1900, but began recolonizing around 1950. The Stock Dove (*Columba oenas*) and the Jackdaw (*Corvus monedula*) were formerly widespread and common, but are now seriously threatened with extinction. Several other species occur only in specialized local habitats. Other species which breed in treeholes or buildings are also part of the regular community. The paper also contains some recommendations for conservation and management of the special communities.—Robert C. Beason.

63. The seabirds of Inaccessible Island, South Atlantic Ocean. M. W. Fraser, P. G. Ryan, and B. P. Watkins. 1988. Cormorant 16:7–33.—During two expeditions to Inaccessible Island in October 1982–February 1983 and September–October 1987, the authors recorded information on seabirds breeding on or using the island. Of 33 species of seabirds recorded, 30 were seen by the authors. Species accounts describe what is known of the status of all 33. Some birds were banded, and measurements (weights, linear data) were recorded. The most common breeder on the island (of the 13 species known to do so) is Great Shearwater (*Puffinus gravis*), with 1.5–2 million pairs breeding there. Inaccessible is one of only three major breeding localities for this species. The island is an important breeding locality for other species, and is notable for lack of a permanent human presence or introduced nest predators such as rats (*Rattus*). The authors propose that the island be officially protected.—Malcolm F. Hodges, Jr.

64. Red Crossbills breed at Highlands, North Carolina. D. B. McNair. 1988. Migrant 59:45–48.—Breeding of Red Crossbills (*Loxia curvirostra*) in the southern Blue

Ridge Mountains of North Carolina in late summer of 1986 is described. The author also (rather incoherently) discusses previous records and the timing of breeding to coincide with cone crops.—Malcolm F. Hodges, Jr.

65. Winter status of the Rufous-sided Towhee in Oklahoma. F. M. Baumgartner. 1988. Bull. Okla. Ornithol. Soc. 21:27–28.—Numbers of Rufous-sided Towhees (*Pipilo erythrophthalmus*) recorded on selected Christmas Bird Counts in Oklahoma from 1950–1983 are discussed. Towhees were much more numerous in the western half of the state than in the eastern half, possibly due to habitat differences. Numbers overall may have decreased gradually over this period, although no statistical analysis is indicated.—Malcolm F. Hodges, Jr.

66. The distribution and status of the Mandarin Duck (*Aix galericulata*) in Britain. A. K. Davies. 1988. Bird Study 35:203–208.—The distribution of Mandarin Ducks in Britain was reviewed using all available records from 1745 to 1987. These data were also compared to a subset of data from 1970 to 1987. Since 1745 Mandarin Ducks have been recorded at over 1000 sites in the British Isles in 397 10-km squares. Recent records do not reflect major changes in the overall range of distribution of the species since its introduction. Nor is there any evidence of a substantial change of distribution among seasons. However, Mandarins are far more widespread than records prior to 1970 suggest. This is likely the result of underrecording rather than a range expansion by the species in the recent past.—D. J. Ingold.

SYSTEMATICS AND PALEONTOLOGY

(see also 54)

67. Identification of Roseate Tern in juvenile plumage. K. Mullarney. 1988. Dutch Birding 10:109–120.—Appearance of Roseate Terns (*Sterna dougalli*) is compared with those of Common (*S. hirundo*) and Arctic (*S. paradisaea*) terns. The distinguishing characteristics of adult Roseate Terns include shorter wings, more rapid and shallow wing beats, and a long, slender bill. However, these characteristics do not hold true for juvenile birds. To distinguish among juveniles of these three tern species, identification cues include: extent of black on the head; pattern of markings on upper parts; width of white edge on folded wing tip; pattern of underwing, upperwing, and tail in flight; and color of bare parts. These five areas are discussed in depth in addition to voice and post-juvenile molts. Photos and color diagrams are included.—Robin J Densmore.

68. A re-examination of the Moa genus *Megalapteryx*. T. H. Worthy. 1985. Notornis 35:99–108.—At one time the moas were considered to include as many as 37 species. Joel Cracraft's re-analysis reduced this number to 13, and another species has since been invalidated. Worthy argues that the two species currently recognized in *Megalapteryx, didinus* and *benhami,* are merely size extremes of a common species, that varied both temporally and geographically. He suggests that some of the large size ranges described for other moa species may have a similar explanation.—J. R. Jehl, Jr.

69. Osteological differences between *Sula* and *Morus,* and a description of an extinct new species of *Sula* from Lord Howe and Norfolk Islands, Tasman Sea. G. F. Van Tets, C. W. Meredith, P. J. Fullagar, and P. M. Davidson. 1988. Notornis 35:35–57.—*Sula tasmani,* described from subfossil deposits on Lord Howe and Norfolk islands, was larger than other extant or fossil boobies. This discovery prompted a detailed osteological review of the Sulidae, which revealed consistent differences between *Morus* and *Sula,* supporting their separation as distinct taxa. Neither the time nor cause of *Sula tasmani*'s demise are known. The species may have lived into the late 1780s, or shortly after the first white explorers reached the region.—J. R. Jehl, Jr.

EVOLUTION AND GENETICS

(see also 3, 20, 21, 24, 25)

70. Genetic evidence of multiple parentage in broods of Cliff Swallows. C. R. Brown and M. B. Brown. 1988. Behav. Ecol. Sociobiol. 23:379–387.—Parentage in Cliff

Swallow (*Hirundo pyrrhonota*) broods was analyzed using allozyme variation in blood. Based on observations, intraspecific brood parasitism and extra-pair copulations occur commonly in this species. As indicated by the allozyme analyses, multiple parentage is common in Cliff Swallow broods. Allozyme analyses suggest that multiple parentage more often results from brood parasitism than from extra-pair copulations.—Lori A. Willimont.

FOOD AND FEEDING

(see also 9, 21, 28, 30, 32, 44)

71. Regional differences in the diet of Slaty-backed Gulls breeding around Hokkaido. Y. Watanuki. 1988. J. Yamashina Inst. Ornithol. 20:71–81.—On Teuri Island, chicks of the Slaty-backed Gull (*Larus schistisagus*) were fed sardines (*Sardinops melanosticta*), rock fish (*Sebastes* spp.), and seabird chicks, including conspecifics, Black-tailed Gulls (*L. crassirostris*), and Rhinoceros Auklets (*Cerorhinca monocerata*). On Daikoku Island, chicks were fed sardines. On Yururi Island, chicks were fed sardines and sandlances (*Ammodytes* spp.). Adults also preyed upon adults of Leach's Storm-Petrels (*Oceanodroma leucorhoa*) on Daikiku, Yururui, and Moyururi islands. Although densities of conspecifics were higher on these islands, the birds on Teuri Island preyed most heavily on conspecific chicks. Differences in gull diets are often due to differences in body size, but this was not the case. Rather, food availability best explained the differences.—Andrea Dinep.

72. Seasonal changes in foraging strategies of nesting Blackbirds (*Turdus merula* L.). J. Török and E. Ludvig. 1988. Behav. Ecol. Sociobiol. 22:329–333.—The foraging strategies of Blackbirds were modified on a seasonal basis when feeding nestlings. Different strategies were used during the early and late breeding periods. Relationships between type of food, searching time, travel distance, load size, and energy delivery rate are discussed.—Lori A. Willimont.

73. Plant-frugivore interactions in South American temperate forests. J. J. Armesto, R. Rozzi, P. Miranda, and C. Sabag. 1987. Rev. Chil. Hist. Nat. 60:321–336.—The authors examine the role of fruit-eating animals as seed dispersers in South American temperate forests. Apart from a fox, a deer, and a marsupial, the most important frugivores, in terms of species richness, abundance, and activity, are birds. Seventeen bird species are shown to eat fleshy fruits; most are omnivorous (feeding both on fruits and insects), but six are primarily frugivorous. Many of these species are migratory, but little is known of the extent of their migrations. Fruit color and size and bill dimensions were examined in relation to fruit consumption by birds. Most bird-dispersed fruits were either black or red, and their mean diameter (8.9 mm) closely matched the mean gape of frugivorous birds (8.6 mm). However, there were many large-sized fruits outside the range of the largest bird gapes, unlike the situation in tropical and north-temperate forests. The authors speculate that lack of birds with large gapes may be a result of their extinction, associated with Quaternary glaciations.—Fabian M. Jaksić.

74. Approaches to nectarivore-plant interactions in the New World. P. Feinsinger. 1987. Rev. Chil. Hist. Nat. 60:285–319.—This is an exhaustive review of the state-of-the-art of nectarivory research in the New World. The author describes the course of nectarivory research (heavily based on birds) over the last two decades. He highlights the following topics as of special interest: (1) coevolution between plants and pollinators, (2) plant/pollinator morphology and associated energetics of resource availability and acquisition, (3) role of nectarivores as agents of sexual selection among plants, (4) role of nectarivores as determinants of gene flow among plants, (5) territorial behavior, (6) foraging behavior, (7) social structure and associated niche characteristics, (8) competition and guild structure of nectarivores, (9) competition, facilitation, and associated patterns among animal-pollinated plants, and (10) inter-community comparisons. The author indicates that some major gaps in the understanding of nectarivore-plant interactions include: (1) interactions between hawkmoths and moth-pollinated plants, (2) relationship between foraging energetics and nectar availability, (3) ontogeny of foraging behavior, (4) dynamics of nectarivore guilds, and (5) relationship between processes and patterns. The author also proposes that more

efforts should be directed to agricultural research (e.g., animal-pollinated crop plants) and conservation (e.g., effects of habitat fragmentation). The literature cited is extensive and apparently exhaustive.—Fabian M. Jaksić.

75. Predator-prey relationships among terrestrial vertebrates: an exhaustive review of studies conducted in southern South America. F. M. Jaksić and J. A. Simonetti. 1987. Rev. Chil. Hist. Nat. 60:221–244.—As the title indicates, this is a comprehensive review of whatever has been done in Chile and Argentina on predator-prey interactions. Among other terrestrial vertebrates, birds are covered both as prey and as predators. In their first role, the presumed effects of predation on birds are reviewed with reference to habitat and time use, morphology and behavior, population and assemblage structure. The authors conclude that virtually nothing is known about the effects of predation on several of these features, although there are hints that some life history traits (particularly those related to breeding) are influenced by predation. They also point out that the structure of bird assemblages seems to be affected too, and that the view that those assemblages are structured exclusively by competition (as put forth by Martin Cody) should be re-examined. Birds as predators are also examined, and in this case comparatively much more is known. The authors examined the following topics: functional response and related phenomena (e.g., prey shifting), numerical response and migration, and assemblage structure of raptors. An historical account of predation-related research is given, and prospects for future research are proposed. The literature cited is extensive and indicates the state of the art as of August 1986.—Fabian M. Jaksić.

76. Diets and selectivity of two Chilean predators in the northern semi-arid zone. P. L. Meserve, E. J. Shadrick, and D. A. Kelt. 1987. Rev. Chil. Hist. Nat. 60:93–99.—Field availability of rodents (assessed with trapping grids) was compared with their incidence in the diet of Burrowing Owls (*Athene cunicularia*) in northern Chile; the other predator was a fox. Two rodent species were overrepresented in the owls' diet. They were among the largest in the area, and one of them was diurnal. In general, the owls preyed on most small mammals present in the area, regardless of their activity times. This may indicate that Burrowing Owls hunt throughout the day. The authors compared their results with those of other diet studies of Burrowing Owls, and found that northern Chilean owls were primarily rodent-eaters, whereas those in central Chile ate many more insects. Because the authors are trained mammalogists, they make some interesting comments on why some rodents may be more heavily preyed upon than others.—Fabian M. Jaksić.

77. Diet of Adelie Penguins during the incubation period at Cape Bird, Ross Island, Antarctica. Y. Van Heezik. 1988. Notornis 35:23–26.—Food samples of Adelie Penguins (*Pygoscelis adeliae*) at Cape Bird, obtained concurrently with the foraging studies of Davis et al. (review 78) indicated that *Euphausia crystallophorias* comprised 97.3% of the diet, and *E. superba* was barely represented. The results cannot reject the idea that penguins forage mainly beyond the edge of the continental shelf on larger krill, because most of the stomach contents had doubtless been accumulated shortly before the penguins returned to the rookery. But if food is so abundant nearby (the remains of over 41,000 krill were found in a single stomach), why do penguins forage so far away? Or are there problems in interpreting the telemetry data?—J. R. Jehl, Jr.

78. Foraging by Adelie Penguins during the incubation period. L. S. Davis, G. D. Ward, and R. M. F. S. Sadlier. 1988. Notornis 35:15–23.—Davis et al. used 50 g radio transmitters to study the at-sea behavior of Adelie Penguins (*Pygoscelis adeliae*) breeding at Cape Bird, Antarctica. Their movements were followed by land-based and helicopter-mounted antennae. The birds dispersed widely on going to sea and most were lost to radio contact after a few days, indicating that their foraging range from the rookery exceeded 100 km. Even though *Euphausia crystallophorias* is common in nearshore waters, the authors suggest that the Adelie's long movements may be to exploit *Eupohausia superba*, a larger form of krill that lives mainly beyond the continental shelf, 400–500 km distant (but see Van Heezik, review 77).—J. R. Jehl, Jr.

79. Winter foraging at carcasses by three sympatric corvids, with emphasis on recruitment by the raven, *Corvus corax*. B. Heinrich. 1988. Behav. Ecol. Sociobiol. 23: 141–156.—Heinrich watched the behavior of Common Ravens at carrion baits he set out in Maine and Vermont during winter from 1984–1988. Behavior of the other two corvids, American Crow (*C. brachyrhynchos*) and Blue Jay (*Cyanocitta cristata*), is used in this work mainly to illustrate points about raven behavior. Many ravens were marked with patagial tags during the last two winters of the study.

Heinrich found that ravens are scarce and spread out. If a resident territorial pair found the bait, they defended it. However, immature or sub-adult birds ("vagrant" ravens) coming to the same bait would advertise with special calls, drawing in more of their age class, and the resulting crowd would subdue the aggressive resident pair, allowing all to feed. About nine or more vagrants were required before they would attempt to take the bait from defending birds. Vagrants would feed alone, but in the presence of a territorial pair would do so only in groups.

Heinrich believes that recruitment by non-territorial younger birds, both at the bait and at the roost before leaving in the morning for known baits, is a means by which vagrant ravens may specialize in scavenging during the winter. Because their food source is patchy, ephemeral, and often defended by territorial adults, sharing of food or knowledge of food is necessary for the young birds to survive.—Malcolm F. Hodges, Jr.

80. Diving behavior and prey of the Humboldt Penguin (*Spheniscus humboldti*). R. P. Wilson, M. P. Wilson, D. C. Duffy, B. Araya M., and N. Klages. 1989. J. Ornithol. 130:75–79.—Humboldt Penguins diving in waters near Isle Chanaral and Isle Algarrobo off the coast of Chile behaved differently. Birds of the former group inhabited clear water and employed "bounce" dives in which they descended to a depth of about 15 m to the seabed, and then returned immediately to the surface. Birds of the latter group inhabited more turbid water, and employed shorter, shallower dives (to 1 m). Stomach-pumped penguins revealed that birds at both locations fed predominantly on pelagic schooling fish which had been seized from below. Short, shallow dives are suggested to be typical of traveling penguins. Alternatively, bounce dives should enhance the chances of foraging birds to detect surface-swimming prey fish.—D. J. Ingold.

SONGS AND VOCALIZATIONS

81. Situation-specificities of vocalizations in Leach's Storm-Petrel *Oceanodroma leucorhoa*. M. Taoka, T. Sato, T. Kamada, and H. Okumura. 1988. J. Yamashina Inst. Ornithol. 20:82–90.—The vocalizations of Leach's Storm-Petrel, a nocturnally-active seabird, were studied at a breeding colony on Daikoku Island, Hokkaido, Japan. Although most of this bird's communication must be acoustical, just three call types, chatter-call, purr-call, and screech-call, were recorded. Adult males and females made all three types of calls. Purr-calls were used in courtship duets between pairs on the ground or in breeding burrows. Screech-calls were always used in seemingly aggressive encounters between same-sex birds. Chatter-calls were less situation-specific. Flying birds used chatter-calls exclusively. But chatter-calls were also used in combination with the other two call types in some situations. Both purr-calls and chatter-calls showed sex-related differences.—Andrea Dinep.

82. Blue Jays mimic the calls of Red-shouldered and Broad-winged Hawks. R. D. James. 1988. Ontario Birds 6:11–14.—Known for their ability to mimic the calls of other birds, Blue Jays (*Cyanocitta cristata*) are particularly adept mimics of hawks. Spectrographs compared the calls of Red-shouldered (*Buteo lineatus*) and Broad-winged Hawks (*B. platypterus*) with similar calls produced by the jays. The frequencies of the hawk and jay calls were similar, but the jay calls were shorter and less pure in tone.

Why Blue Jays should want to mimic hawks has never been adequately explained. No particular value could be attributed to this mimicry, and the author concluded that they only represented sounds that the jays could easily learn.—Bruce G. Peterjohn.

83. Vocal and visual stimuli enabling copulation behavior in female buntings. M. C. Baker and A. E. M. Baker. 1988. Behav. Ecol. Sociobiol. 23:105–108.—Indigo and

Lazuli buntings (*Passerina cyanea* and *P. amoena*) were studied in the laboratory to see how male singing behavior affects the female's sexual response. Song alone was not enough to induce sexual behavior in the female of either species. The male must be present and singing. Also another soft vocalization by the male must be heard by the female. A similar soft vocalization is made by the female to elicit copulation.—Lori A. Willimont.

84. Vocal plasticity in captive Black-capped Chickadees: the acoustic basis and rate of call convergence. S. Nowicki. 1989. Anim. Behav. 37:64–73.—During the winter months, the "chick-a-dee" call of the Black-capped Chickadee (*Parus atricapillus*) varies significantly from flock to flock, and these differences appear to be perceived by the birds in the context of flock member recognition. In order to investigate within flock convergence of this call, the author examined detailed changes in the vocal behavior of a captive flock of five chickadees that were previously unfamiliar with each other. Spectral analyses revealed a significant convergence in the frequency difference between components 1 and 2 of the D-note ($P < 0.001$). Convergence was also observed at a slower rate in the D-note's band width which was highly correlated with the maximum frequency of the D-note. Although the data demonstrate that within a flock of Black-capped Chickadees, D-notes rapidly converge, it was not obvious that any single individual served as a model for other birds to copy. Rather, birds converged on a common mean. The rapidity of convergence in this study suggests that flock switchers in wintering chickadees might repeatedly modify their calls in order to acquire an appropriate flock dialect.—D. J. Ingold.

85. Repertoire size, territory acquisition, and reproductive success in the Song Sparrow. S. M. Hiebert, P. K. Stoddard, and P. Arcese. 1989. Anim. Behav. 37:266–273.—Repertoire size, time from hatching to first territory acquisition, territory size, territory tenure, and lifetime reproductive success in males of known-age Song Sparrows (*Melospiza melodia*) were measured in a resident population on Mandarte Island, British Columbia. One-year-old birds had significantly smaller repertoires than older birds ($P < 0.05$), but mean repertoire ranks of 2-, 3-, and 4-year-old birds were nearly identical. This was due to attrition of individuals with small repertoires rather than an increase in repertoire size associated with the age of individuals. Males with large repertoires spent less time floating before first-territory acquisition than males with small repertoires. Territory tenure as well as annual and lifetime reproductive success were greater for birds with large repertoires than for birds with small repertoires. Males with large half-hour repertoires also held territories longer and had greater relative and annual reproductive success. Half-hour repertoire size may represent a more ecologically appropriate measure of repertoire size as perceived by transient floaters. A floater may be able to assess the competitive ability of a singing male without listening to its entire repertoire.—D. J. Ingold.

BOOKS AND MONOGRAPHS

86.—Aldo Leopold: the professor. R. A. McCabe. 1987. Rusty Rock Press, Madison, Wisconsin. xii + 172 pp., 10 drawings by W. Schwartz, 73 photographs. $29.95.—This large, handsome, book (nearly 8.5 by 11 inches) is printed on light beige paper, with an attractive layout interspersing drawings and photographs throughout the text. I found only two typographical errors, and one bottom line repeated on a succeeding page.

In the *Preface* the author states: "The objective of this book is to present Aldo Leopold, the man I knew personally and close up." McCabe certainly achieved that end. The book is a highly personal and detailed account of A.L. (as McCabe refers to Leopold throughout the book). The narrative covers virtually every aspect of A.L.'s life and personality from the time the author first met him in 1939. McCabe was a graduate student of A.L.'s, and then his assistant at 424 University Farm Place, the old house which was home to the Department of Wildlife Management at the University of Wisconsin's Agricultural College, in Madison. The book begins with a detailed description of McCabe's first meeting with A.L., then a chapter, *The Man,* presents a "word picture which will accompany the photographs in this volume." The chapter details A.L.'s personality traits down to smoking habits and fingernail trim, and concludes with a description of "Mrs. L." The next chapter, on the Department of Wildlife Management, includes biographical sketches of each of the five secretaries who worked for A.L. at one time or another. Two chapters relate to A.L.

as a teacher, and include brief biographical sketches of his 26 graduate students. Other chapters detail A.L.'s professional life, describe his visitors and friends, discuss the "Shack" (A.L.'s farm retreat where he hunted, planted trees, and spent family weekends), and A.L. as a hunter, writer, and member of the Wisconsin Conservation Commission. The last chapter deals with the events surrounding A.L.'s death in 1948.

The tone of the book is commented on by the author in the *Preface*: My son Richard counseled me that my attitude and certain remarks bordered on blind hero worship and that my credibility might suffer as a result. My attitude and remarks are indeed those of hero worship—it could not be otherwise. Although it is blatant, it is not blind . . . ." In the *Epilogue* he states: "Mrs. L. inscribed my copy of *A Sand County Almanac* with the words, 'A son by affection to Aldo.' I certainly like to think so, as he was 'by affection' a father to me." The book has a deeply reverent and sentimental tone throughout, to which some readers may object, but I found that the further I read, the less it bothered me. Beneath the "highest moral fiber," "very kind, gentle, humble individual" epithets, lies an extremely detailed portrait of Aldo Leopold which is informative as well as touching. It is a strikingly personal portrait, replete with anecdotes, all of which present A.L. as a great, humble, and wise man in all of his dealings with people and in his broad ecological concerns. From the description of stopping at the Leopold ancestral home where A.L.'s mother, "Mumsy," is pictured holding A.L.'s hand, to the "Shack" with its outhouse named "The Parthenon" and the bleached cow skull which served as a wren house, the wealth of detail helps develop an empathy with the man who wrote the beautiful and profound essays of *A Sand County Almanac*.

About half of the photographs, many nearly full-page, are ecological portraits taken by A.L., with his brief descriptions followed by expanded commentary by McCabe. Together with the many photos of A.L. and his family, these portraits add yet another personal dimension to this biography, and provide further insight into his ecological focus and concerns.

Some readers will find the minutiae distracting, for example the personality quirks of A.L.'s hunting dogs or the scale diagram of the Shack, and certainly a stronger editorial hand could have blunted some of the sentimentality. But on the whole, I think that a very warm and refreshing portrait of Aldo Leopold emerges. It is somehow fitting that such a personal account of a man who worked so hard at preserving the land should be preserved for future generations.—William E. Davis, Jr.