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RECENT LITERATURE

Edited by Jerome A. Jackson

BANDING AND LONGEVITY

(see also 39, 58)

1. **Survival and natal dispersal of fledglings of Tengmalm's Owl in relation to fluctuating food conditions and hatching date.** E. Korpimäki and M. Lagerström. 1988. J. Anim. Ecol. 57:433–441.—In northern Europe, vole populations (*Microtus* and *Clethrionomys*) are cyclic with peaks every 3–4 y. The vole cycle strongly influences the breeding performance of Tengmalm's Owl (*Aegolius funereus*): nesting density, clutch size, and fledgling production are low in poor vole years and much higher in good vole years. Clutch size and fledgling production are also influenced by the timing of nesting: early clutches are larger and produce more fledglings than do late ones. This paper examines (1) whether there are differences in survival and natal dispersal of young produced in different phases of the vole cycle, and (2) whether hatching date affects survival and natal dispersal distance of young during their first year of life.

Data were collected at nest boxes in western Finland from 1964–1985. Hatching dates were known for 4311 of the 5768 fleglings banded. Fifty-three of these were re-encountered after their first winter, including 41 recaptured as breeding adults. Survival and recruitment into the breeding population of young produced during the increase phase of the vole cycle was significantly higher than that of young produced during peak, decrease, or low vole years. The vole cycle had no significant influence on natal dispersal distance. In contrast to the vole cycle, hatching date seemed to have no effect on survival or recruitment of young. Hatching date also had little effect on natal dispersal distance. The improved survival of young produced during the increase phase of the vole cycle suggested that food conditions during the post-fledgling and first winter periods were important for the survival of young Tengmalm's Owls. Although hatching date had no effect on fledgling survival, early laying might still enhance fitness because early clutches produce more fledglings and because early breeding may enhance adult survival by allowing them a longer post-breeding "break" before winter sets in.—Jeff Marks.

2. **Dispersal of Tengmalm's Owl *Aegolius funereus* in relation to prey availability and nesting success.** G. A. Sonerud, R. Solheim, and K. Prestrud. 1988. Ornis Scand. 19: 175–181.—This paper complement's Korpimäki and Lagerström's (see Review **1**) paper on vole/Tengmalm's Owl relationships. The study is based on re-encounters with 54 owls banded as nestlings and 32 females banded as breeders in Norway from 1961–1987. Sonerud et al. ask (1) Does the vole cycle influence natal and female breeding dispersal? (2) Is there a sex bias in natal dispersal? (3) Do females disperse farther after losing a nest than after nesting successfully? (4) Is natal dispersal greater than breeding dispersal? In general, the answers to these questions are "yes."

Most adult females dispersed <1 km during vole peaks and >5 km during vole lows. Natal dispersal for both sexes also was farther during vole lows than during vole peaks. Sex-biased natal dispersal (with males dispersing shorter distances than females) was evident only when a vole low occurred in the period between banding and recapture. Females dispersed significantly farther after nest predation than after nesting successfully. And finally, among females, natal dispersal was farther than breeding dispersal except during vole lows, when there was no difference in dispersal distance between adult and juvenile females.—Jeff Marks.

3. **Review of recoveries of ringed White Storks *Ciconia ciconia* in southern Africa.** T. B. Oatley and M. A. M. Rammesmayer. 1988. Ostrich 59:97–104.—White Storks banded in Europe and recovered in southern Africa are mapped and discussed. Most were banded in Germany and Poland, and most were recovered in Zimbabwe and eastern South Africa. Causes and timing of mortality, and longevity are discussed.—Malcolm F. Hodges, Jr.

MIGRATION, ORIENTATION, AND HOMING

(see also 3, 27, 35)

4. **1986 fall hawk migration over Vicksburg, Mississippi.** J. Battalio. 1987. Miss. Kite 17:17–22.—Diurnal raptor sightings (including vultures) made during an organized hawk watch over Vicksburg from September through mid-November 1986 are reported. The most numerous species by far was the Broad-winged Hawk (*Buteo platypterus*), with 7927 individuals seen.—Malcolm F. Hodges, Jr.

POPULATION DYNAMICS

(see also 1, 2, 3, 58)

5. **Spatial and temporal variation in Costa Rican fruit and fruit-eating bird abundance.** D. J. Levey. 1988. Ecol. Monogr. 58:251–269.—Levey censused frugivorous understory birds and fruits in closed forest, forest gaps, and second-growth forest from November 1982–October 1983. He found that fruits and birds vary seasonally and that they peak simultaneously in August–January. Crop sizes were larger and fruit was generally more abundant in second growth than the other two habitats, and fruit was more common in gaps than closed forest. Birds were most abundant in second growth and least in closed forest. A big increase in frugivores in October was (mostly) due to an influx of Nearctic migrants, but also included increases of local birds (probably) due to inter-altitudinal movements. Molts occurred during peak fruit abundance, but breeding was independent of this period, and probably tied to insect abundance.—Malcolm F. Hodges, Jr.

NESTING AND REPRODUCTION

(see also 1, 2, 5, 26, 29, 37, 43, 52, 54, 58)

6. **Parental care in Western Bluebirds during the nestling and fledgling periods.** K. A. With. 1988. Sialia 10:123–129.—Twenty-one Western Bluebird (*Sialia mexicana*) nests in boxes were observed in northern Arizona during two breeding seasons. Parents made an average of 12 feeding trips/h to broods with 5 nestlings, and 9 trips/h to broods with fewer than 5 nestlings. Adult males contributed an average of 50.4% of the total number of feeding trips to nestlings and 43% to fledglings. Parental feeding rates increased from an average of 3 visits/offspring/h during the nestling period to 5 visits/offspring/h during the fledgling period. Although these data suggest that parents were attempting to meet increased energetic demands of fledglings, other factors such as increased food availability and shorter commuting distances by parents may also have influenced feeding rates.—D. J. Ingold.

7. **Egg variability and conspecific nest parasitism in the *Ploceus* weaverbirds.** S. Freeman. 1988. Ostrich 59:49–52.—Intraspecific egg variability is high in some *Ploceus* weaverbirds and may be explained as an evolved response to either interspecific nest parasitism (INP) or conspecific nest parasitism (CNP). In order to test these hypotheses, the author quantified clutch sizes and several parameters of egg variability in 29 weaverbird species from museum collections. In two species, *P. intermedius* and *P. rubiginosus,* at least one clutch was found that was more than twice the mean size for the species sampled, inferring CNP. In addition, egg variability and clutches with non-matching eggs increased in colonial-nesting species (which would be predictably more susceptible to CNP). Conversely, the trend was less noticeable in species (whether solitary or colonial nesting) known to be parasitized by *Chrysococcyx* cuckoos. These data suggest that conspecific parasitic females may be constrained by their ability to find appropriate host nests.—D. J. Ingold.

8. **Use of artificial nest cavities along Ohio interstate highways by bluebirds (*Sialia sialis*) and mice (*Peromyscus* sp.).** M. Hsu and M. J. Humpert. 1988. Ohio J. Sci. 88:151–154.—This study examined the success of drilling a series of nest cavities in wooded fenceposts along Ohio interstate highways as a means to increase Eastern Bluebird (*Sialia sialis*) populations. Of 296 cavities examined, 52% were unoccupied in 1985 and 24.9% in 1986. Mice (*Peromyscus* sp.) occupied most of the cavities, increasing from 40% in 1985 to 62.6% in 1986. Eastern Bluebirds occupied only 2% of the cavities in 1985 and 3.7% in

1986, while other birds used the remaining cavities. In addition to the low rate of nest occupancy by birds, predation rates appeared to be relatively high at the occupied sites.

Despite the very poor success of this project, recommendations were provided to increase the use of these cavities by bluebirds. These recommendations included removal of mouse nests in early spring prior to the return of bluebirds, installation of predator guards to improve nest success and continued maintenance of only those cavities located in suitable habitats.—Bruce G. Peterjohn.

9. Male parental care and monogamy in Snow Buntings. B. E. Lyon, R. D. Montgomerie, and L. D. Hamilton. 1987. Behav. Ecol. Sociobiol. 20:377–382.—Parental care in Snow Buntings (*Plectrophenax nivalis*) was observed during 1982 and 1983. In 1983, 14 males were removed creating widows. Comparisons between the years indicate the significance of male parental care.

Paired males and females did not significantly differ in feeding visit rates. Widows had a higher feeding visit rate than the control females, but still did not deliver as much food as the control pairs. Reproductive success was higher in control pairs (2.7 chicks vs. 4.5 chicks).

The influence of male parental care on the evolution of monogamy is discussed. "Male Snow Buntings are useful in that they enhance female reproductive success but they are not essential for the rearing of at least some offspring, even in a year of poor food availability."—Lori A. Willimont.

10. Sociality and cooperative breeding of Red-cockaded Woodpeckers, *Picoides borealis*. M. R. Lennartz, R. G. Hooper, and R. F. Harlow. 1987. Behav. Ecol. Sociobiol. 20:77–88.—Thirty Red-cockaded Woodpecker groups on the Francis Marion National Forest in South Carolina were studied from 1976–1982 to (1) determine the demographic structure of groups, (2) identify the role helpers play in reproductive activities, and (3) investigate the selective pressures promoting sociality and helping behavior.

Their observations confirmed that the species is monogamous. Twenty of the 30 groups observed had helpers during at least one nesting season. The number of helpers was 1–3, most commonly only one. Helpers were usually males 1 or 2 yr old and progeny of one or both members of the breeding pair. Birds that served as helpers limited their association to their natal group. Averaged over 5 years, groups with helpers produced significantly more fledglings than did unassisted pairs.

Evidence suggested that the increase resulted directly from the action of helpers. Because Red-cockaded Woodpecker helpers are related to the young they help, kin selection and indirect fitness are discussed in relation to the evolution of helping behavior in this species.—Lori A. Willimont.

11. Cooperative breeding in Purple Gallinules: the role of helpers in feeding chicks. L. A. Hunter. 1987. Behav. Ecol. Sociobiol. 20:171–177.—The feeding of chicks from a population of cooperatively breeding Purple Gallinules (*Porphyrula martinica*) was monitored from January 1981–May 1982 in Costa Rica. The chicks hatched asynchronously and left the nest 1–2 days after the last chick hatched. They remained together away from the nest waiting for food to be brought to them or following feeders and begging. Helpers began bringing food to the nest as soon as the first chick hatched. All birds in the breeding group over the age of 2 months served as feeders and fed the chicks regularly. Generally one chick was fed per visit, occasionally 2–4 chicks per visit.

Helpers increased the amount of food being fed to chicks. In food delivery rates, number of visits, and time spent feeding chicks, breeders expended more effort than helpers and older helpers expended more effort than younger ones. Chicks in groups with helpers received more food and were accompanied for longer periods of time than were chicks in groups without helpers; either or both of these factors may have led to increased chick survival.—Lori A. Willimont.

12. Distribution and breeding biology of the African Skimmer on the Upper and Middle Zambezi River. M. P. Coppinger, G. D. Williams, and G. L. Maclean. 1988. Ostrich 59:85–96.—The authors looked for African Skimmers (*Rynchops flavirostris*) and evidence of their breeding in 1986 and 1987 along 1550 km of the Zambezi River in southern

Africa, excluding that within the borders of Angola. Thirty-five breeding colonies were found. Eggs measuring on average 39.6 mm by 28.4 mm were laid from August through October on bare sand in clutches of mostly 2–3. Both parents cared for the young, which stayed in the nest for two days, and were almost constantly shaded by the parents. The skimmer population of the area surveyed is estimated at 1428 birds. Cooling strategies, distraction displays, breeding habitats, and threats to this population are discussed.—Malcolm F. Hodges, Jr.

13. Sexual differences in reproductive effort: time-activity budgets of monogamous Killdeer, *Charadrius vociferus*. D. H. Brunton. 1988. Anim. Behav. 36:705–717.—Sexual differences in mating effort and parental care, as well as the necessity of biparental care, are often used to explain the evolution of mating systems. However, few studies have investigated these issues throughout the period of dependence in a precocial bird. Male Killdeer in this study allocated more time than females to mating effort and obtained more extra-pair copulations. Female Killdeer spent less time in parental effort than males.

Brunton provides evidence that the sexual difference in parental effort is a result of females being limited by time available for foraging, while males are not. First, the time-constraint on females is apparently caused by an energy deficit accrued during egg-laying (the cost of producing one egg is 262% of a female's basal metabolic rate). Second, during most stages, females spent more time foraging than did males, and males spent more time loafing than did females. Third, for females, foraging time was negatively correlated with time spent on parental care ($r = -0.54$, $P < 0.001$). However, males maintained constant foraging rates throughout the nesting attempt while increasing time spent on reproductive effort from 28% during pre-laying to 73% during late incubation. Thus, males were able to increase reproductive effort at the expense of loafing time, while females, operating under an energy deficit, could only increase reproductive effort at the expense of foraging time.

Removal experiments demonstrated that both experimentally deserted males and females increased parental effort over that of undeserted parents, but were unable to rear a brood to fledging. Thus, biparental care appears to be essential in Killdeer and is likely to favor a monogamous mating system. This study should call attention to the substantial, but frequently overlooked, costs of parental care in precocial species, and to their influence on the evolution of mating systems.—Susan L. Earnst.

BEHAVIOR

(see also 6, 9, 10, 11, 12, 30, 32, 41, 42, 44, 46, 47, 58)

14. Falsifiability and the information centre hypothesis. D. W. Mock, T. C. Lamey, and D. B. A. Thompson. 1988. Ornis Scand. 19:231–248.—This paper reviews much of the enormous literature on avian communal roosting as it pertains to Ward and Zahavi's (Ibis 115:517–534, 1973) "information center" hypothesis (ICH). Mock et al. argue that ". . . the hypothesis contains important hidden assumptions . . . and that very few of the studies claiming to document the ICH have made a strong case."

Using data from a nesting colony of solitary-foraging Great Blue Herons (*Ardea herodias*) and flock-foraging Great Egrets (*Casmerodius albus*), Mock et al. tested 5 predictions of the ICH: (1) unsuccessful birds should follow conspecifics when leaving the colony, (2) unsuccessful birds should follow any "ecologically similar" bird species when leaving the colony, (3) highly successful birds should be followed more often than unsuccessful individuals, (4) unsuccessful birds should spend more time in the colony per visit, and (5) unsuccessful birds should fly at higher altitudes when leaving the colony. For both species, none of these predictions were supported by the data.

Herons that use stealth to capture fish are probably poor candidates for support of the ICH. The strongest available data are for vultures, swallows, and Ospreys (*Pandion haliaetus*), which have documented most of the component steps of the ICH. Despite the data from these species, "widespread acceptance of the ICH is still premature."—Jeff Marks.

15. Song and plumage effects on aggressive display by the European Robin (*Erithacus rubecula*). D. F. Chantrey and L. Workman. 1984. Ibis 126:366–371.—The traditional understanding that the red breast of a male European Robin elicits an aggressive display from conspecific territory-holders has been altered to include the song of the intruding male. By observing the reactions of territory-holders to model birds Chantrey and Workman found that song elicits aggressiveness regardless of the color of the intruder's breast. The researchers emphasize that singing by an intruder is a sign of aggressiveness. Males that feed in neighbors' territories do not sing and flee when threatened. These data suggest that robin aggression depends on the red breast of the intruding bird and also the bird's song.—Laura McMahon.

16. Territorial behaviour and breeding numbers in Norwegian Willow Ptarmigan: a removal experiment. H. C. Pedersen. 1988. Ornis Scand. 19:81–87.—Pedersen assessed the influence of territoriality on breeding density of Willow Ptarmigan (*Lagopus l. lagopus*) by removing 14 territorial males from a 2-km^2 study area in central Norway. Ptarmigan were shot during the winter of 1985–1986 and breeding density measured the following spring. Body size, condition (body mass/wing length), reproductive status, and mating success of replacements were compared with data obtained from same-age residents over the previous seven yr.

Removal of residents did not reduce the breeding density of male ptarmigan; in fact, breeding density increased following the removals, and all winter vacancies were occupied by replacements. Young males made up a higher proportion of the replacements (91%) than of the removed residents (27%). Removed birds had significantly longer wings than did replacements, but condition, reproductive status, and mating success were similar between residents and replacements.

Pedersen concludes that territorial behavior does limit breeding density in this population of ptarmigan, and that body size might be an important factor in territory acquisition. He also suggests that differences in the "quality" of resident and replacement males ". . . were of little importance when hens selected breeding partners."—Jeff Marks.

17. Female Pied Flycatchers choose territory quality and not male characteristics. R. V. Alatalo, A. Lundberg, and C. Glynn. 1986. Nature 323:152–153.—Female Pied Flycatchers (*Ficedula hypoleuca*) prefer males that arrive in nesting areas early. Early males tend to be older and blacker. Authors sought to experimentally differentiate between females' nonexclusive alternatives of choosing between either male or territorial quality. They did this by randomly placing nest-sites (pairs of nest boxes within 5–10 m of each other, presumably in the same habitat). Subsequent pairs of nest boxes were not set out until previous sites were occupied. In this way, females chose males that were randomly spaced throughout the woodlot: "No arriving male had a choice of territories because only a single vacant site existed at any one time. In this way we distributed 37 males at random sites relative to territory quality in the four woodlots." The experimental procedure also manipulated the timing of nest-site occupation by individual males. Females, that had settled before last males, were removed, then the order in which females occupied territories was recorded. Females visited several male territories before mating and "clearly chose between males." In two of four woodlots, all females were then removed, and a second round of female occupation was recorded. Settling orders of the two sets of females were correlated, suggesting a consistent sequence of female choice. Analyses of "nest sight" features revealed that females tended to initially select nest-sites high on thick trunks in low tree-density (birch) areas. Female settlement order did not correlate with either male arrival order or with male characteristics (age, coloration, wing and tarsus length, mass, song repertoire, song phrase length). Another aspect of territory quality was shown to influence female choice: larger holed (older) nest-boxes were given to successful males and smaller holed newer ones were given to previously unsuccessful males. All females were removed. During resettlement by females, previously unsuccessful males were mated earlier than previously successful males. This interesting demonstration of female choice involves a habitat feature that was not a factor in the previous experiment. The potential effects of removing so many females (particularly early ones) and of manipulating the timing of males' nest-site occupations leave unanswered questions, as does the apparent lack of reproductive utility of male attributes, such as song repertoire and coloration.—W. A. Montevecchi.

18. Social behaviour of the Southern Giant Petrel. V. Bretagnolle. 1988. Ostrich 59:116–125.—Bretagnolle observed Southern Giant Petrels (*Macronectes giganteus*) in Antarctica from December 1984 through February 1986. Here he summarizes their social behaviors, describing elementary acts, vocalizations, and social displays. "Stimulus-response" sequences of behaviors were analyzed according to sex, behavior type, and distance between interacting birds. Meanings were ascribed to behaviors, and comparisons made to the behavior of other members of the Procellariiformes.—Malcolm F. Hodges, Jr.

19. Orientation of chick embryos in static magnetic fields. K. Saali and J. Juutilainen. 1988. Ann. Zool. Fennici 25:187–189.—Chicken eggs were incubated in a vertical position with the air space down. After 70–75 h the pointed end of the egg was opened and the orientation of the embryo determined with a transparent compass. Embryos were oriented non-randomly. In a natural magnetic field most embryos had a mean angle of orientation of 110° with a second, less defined cluster of embryos around 210°–300°. In an artificial field that rotated the horizontal component of the magnetic field −90°, the embryos had an angle of orientation of 31°. Not all embryos orient, however. The authors suggest that the embryo, which generates a weak electric current along the primitive streak, acts as a magnetic dipole with the north-south axis perpendicular to the embryo's head-tail axis. Because embryos that orient in unusual directions develop normally, the function of orientation to the geomagnetic field is unclear.—Edward H. Burtt, Jr.

ECOLOGY

(see also 5, 12, 17, 34, 35, 36, 43, 44, 48, 49, 58)

20. Fish-flamingo-plankton interactions in the Peruvian Andes. S. H. Hurlbert, W. Loayza, and T. Moreno. 1986. Limnology and Oceanography 31:457–468.—The authors quantified zooplankton and flamingo (*Phoenicopterus chilensis*) populations of 20 lakes (3700–4700 m) in the altiplano of southern Peru. Twelve of these lakes had fish: 11 of them had cyprinodonts (*Orestias* spp.), seven had introduced rainbow trout (*Salmo gairdnieri*), and 3–4 had introduced Argentinian silverside (*Basilichthys bonariensis*); the remaining eight lakes had no fish. Lakes with fish had sparse zooplankton populations dominated by small microcrustaceans (cyclopoid copepods and chydorid cladocerans), whereas fishless lakes were shallower, more saline, and had abundant zooplankton dominated by larger microcrustaceans (calanoid copepods, daphnid cladocerans), and brine shrimp (*Artemia salina*).

P. chilensis was either absent or scarce on lakes with fish, apparently due to reduced food supply, but present in large numbers on fishless lakes, where food supply was greater. Fish presence was correlated with lake depth and salinity; high salinity and shallowness (and indirectly periodic drying) tended to be negatively correlated with fish presence, but causality was difficult to establish as zooplankton species were also affected by these variables. Flamingo abundance tended to be positively correlated with zooplankton abundance, but vegetation acted as a refuge for zooplankton in some lakes with fish, thus increasing food availability for the flamingos. On the other hand, in lakes with low counts of zooplankton, the flamingos did not feed in the shallow areas where they frequently waded, but in the deep areas of the lakes, actually swimming to reach for presumably concentrated food resources.

Based on this evidence, Hurlbert and co-workers suggested that the distribution and abundance of flamingos in altiplano lakes (and perhaps in South America) is determined primarily by the distribution of fish, with which the flamingos compete for invertebrate prey. If so, introduction of exotic fish may become an important threat for *P. chilensis*. This study provides an interesting explanation of the different abundances reached by flamingos in lakes that look similar in all general aspects.—Fabian M. Jaksic.

21. Calculating and miscalculating density: the role of habitat geometry. Y. Haila. 1988. Ornis Scand. 19:88–92.—This thoughtful review stresses the importance of using an ecologically meaningful size and shape of sampling area when calculating bird densities. It includes a discussion of the superiority of density vs. presence/absence data in evaluating effects of habitat fragmentation on bird distribution and also identifies area-related problems in assessing density compensation and the edge effect. The paper is laced with examples of studies that have interpreted density estimates improperly. All of this makes for interesting reading.—Jeff Marks.

22. Ice edges and seabird occurrence in Antarctica. W. R. Fraser and D. G. Ainley. 1986. Bioscience 36:258–263.—From the human vantage point, the sea may seem both two-dimensional and uniform at its surface. Fraser and Ainley argue persuasively that to a seabird, it is anything but. This paper reviews the evidence (rapidly accumulating) that distinct seabird communities orient rather precisely to distinct areas of sea. To the birds, the sea is quite heterogeneous. The authors discuss two antarctic seabird communities: that of the pack ice, and that of the open seas surrounding Antarctica. Pack ice may be unsuitable for soaring seabirds because the presence of the ice alters the soaring environment. Beyond aerodynamics, however, it is unclear how birds orient to specific areas of ocean. The authors ask if it is direct availability of prey or particular prey types or physical features (associated with prey richness) to which the seabirds orient? The overall conclusion rests on the hypothesis that food is the major variable in determining seabird distribution, and that food resources are patchily distributed in the world's oceans, thus so are seabirds. Seabird assemblages are organized both by physical conditions (as they relate to dynamic soaring) and prey availability.—John C. Kricher.

23. Habitat choice of Vermilion Flycatchers wintering in Mississippi. W. M. Davis, J. T. Fulton, and G. E. Alexander. 1987. Miss. Kite 17:14–16.—The authors describe habitats used by wintering Vermilion Flycatchers (*Pyrocephalus rubinus*) in western Mississippi, where the species is of casual occurrence.—Malcolm F. Hodges, Jr.

24. Bird use of eastern Kentucky surface mines. D. B. Claus, W. H. Davis, and W. McComb. 1988. Kentucky Warbler 64:39–43.—This is an annotated list of birds seen at two strip mines incidental to a study of Eastern Bluebirds (*Sialia sialis*) during spring and summer 1987. Thirty-three bird species were observed. Plant species present and general topography are also discussed.—Jerome A. Jackson.

25. Some aspects of hawk and small mammal ecology in southeast Alabama. D. J. Drennan. 1988. Alabama Birdlife 35:1–8.—This 18-mo study in a 1050 ha area of the lower Piedmont Plateau of Alabama involved censusing of small mammals by trapping and diurnal raptors by strip counts. Nine mammal species were captured, the dominant species being the cotton rat (*Sigmodon hispidus*). Mammals were said to be most abundant in old field habitats, although statistical tests suggested no significant differences in numbers among habitats. The dominant raptor present was the Red-tailed Hawk (*Buteo jamaicensis*), and this species is treated separately in tables. Six other raptors are lumped as "other hawks" (including the American Kestrel, *Falco sparvarius*). The author found no correlation between "hawk" numbers and small mammal numbers per trap night. Although there was some "number-crunching," discussion and meaningful results are generally lacking.—Jerome A. Jackson.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(see 8, 16, 33, 44, 52, 58)

CONSERVATION AND ENVIRONMENTAL QUALITY

(see also 12, 20, 33, 52, 58)

26. Organochlorines and mercury in eggs of coastal terns and herons in California, USA. H. M. Ohlendorf, T. W. Custer, R. W. Lowe, M. Rigney, and E. Cromartie. 1988. Colonial Waterbirds 11:85–94.—Observations of chick mortality in Caspian Terns (*Sterna caspia*) and declining numbers and chick developmental abnormalities in Great Blue Herons (*Ardea herodias*) prompted the inclusion of Blair Island, San Francisco Bay, California in a study of organochlorine and mercury contamination. Caspian Terns from Elkhorn Slough in Monterey Bay were also studied. Caspian Terns and Black-crowned Night-Herons (*Nycticorax nycticorax*) were the principle species studied because of their large numbers, and other tern and heron species were examined for comparison. Collected eggs were analyzed for eggshell thickness, DDT, DDE, DDD, Dieldrin, PCBs, and six other organochlorine residues. Random samples of eggs were collected for early and late season, as well as eggs that failed to hatch, or were dumped outside the nest or abandoned. Blair

Island DDE samples were significantly higher in Caspian Terns than in other species, but no significant differences were found among species for any other organochlorine residues, some of which were in such low concentrations that comparisons were not meaningful. DDE, PCBs and *trans*-nonachlor were the most frequently occurring residues, and the highest DDE concentration was in a Black-crowned Night-Heron egg from a nest containing 3 eggs, all dented, none of which hatched. Concentrations of DDE were negatively correlated with eggshell thickness in Black-crowned Night-Herons. Measurable mercury concentrations were found in all eggs of Caspian Terns and night-herons, and were highest in the tern eggs.

The authors document the occurrence of potentially harmful levels of organochlorines on the California coast. They suggest that DDT found in some tern and heron eggs may have come from the Monterey Bay area. Wintering locality differences may account for some of the observed concentration differences among species. The San Francisco Bay Caspian Terns winter in western Mexico, while Black-crowned Night-Heron are apparently non-migratory. The authors considered the DDE contaminants most important because they were found in 10% of the Black-crowned Night-Heron eggs at levels higher than those associated with impaired reproductive success.—William E. Davis, Jr.

27. Conservation strategy for migratory species. J. P. Myers, R. I. G. Morrison, P. Z. Antas, B. A. Harrington, T. E. Lovejoy, M. Sallaberry, S. E. Senner, and A. Tarak. 1987. Am. Sci. 75:19–26.—This article reviews the migration ecology of long distance shorebird migrants, focusing on their unique vulnerability to habitat deterioration. Species such as the Red Knot (*Calidris canutus*) and Sanderling (*Calidris alloa*) may spend up to seven months of the year in migration. As they migrate they congregate in masses at relatively few traditional staging areas, such as Copper River Delta in Alaska, Grays Harbor in Washington, Delaware Bay, and parts of the Bay of Fundy. These areas, many of which are heavily used by humans, provide essential lipid-rich foods that enable the shorebirds to continue their migrations. A dramatic example is the spring migration along the shores of Delaware Bay, when Red Knots, Sanderlings, and Ruddy Turnstones (*Arenaria interpres*) feed on the eggs of horseshoe crabs, whose synchronized breeding occurs at precisely the time when the shorebirds are migrating north. Any disruption to this ecosystem at that critical time would be potentially disasterous to the migrating shorebirds. Delaware Bay is heavily trafficked by oil tankers and the possibility of a major oil spill is ever present. After reviewing migrant shorebird life history characteristics, staging areas where shorebirds congregate, energy requirements and timing in migration, and human-caused habitat threats, the authors present a "conservation strategy" for preservation of the essential habitats along the migratory routes. The essence of the strategy is the creation of the Western Hemisphere Shorebird Reserve Network (WHSRN). Over 90 essential sites along migration routes have been identified, divided between hemispheric and regional sites. Hemispheric sites serve more than 250,000 birds, or at least 30% of the flyway population for a given species. Regional sites have more than 20,000 birds, or 5% of the flyway population. The authors acknowledge that many sites are in heavy use by humans and such use is unlikely to change. Such areas require monitoring to detect any changes adverse to migrant shorebirds, while such changes might be correctable. Fortunately, some shorebird staging areas are under protection. The overall goal is to protect as much shorebird habitat as possible, including restoring damaged areas. Active management is often called for in addition to mere protection. The article illustrates well the need for integrated global conservation efforts.—John C. Kricher.

28. Restoring the Bald Eagle. T. Simons, S. K. Sherrod, M. W. Collopy, and M. A. Jenkins. 1988. Am. Sci. 76:253–260.—The concept of "trickle down" conservation focuses on reintroduction and/or preservation of top carnivore "glamour species" whose conservation assures adequate habitat for many other species less notable in the public eye. Simons et al. detail the reintroduction of the Southern Bald Eagle throughout the southeast. Using eggs obtained from Florida nests, the researchers successfully reared chicks and reestablished the birds by hacking. Bald Eagles are philopatric and thus reluctant to colonize new habitats even though such areas may be ecologically suitable. For this reason, it is doubtful that Bald Eagles will "naturally" expand into areas from which they have been extirpated. Hacking, however, can be a successful tool in reintroduction because it involves imprinting site fidelity in the introduced birds. Eagles are evolutionary K-selected species. Population models indicate that such species are particularly sensitive to adult survival rates and less so to juvenile survival. Variation in annual reproductive success is generally tolerated in K-selected species. Therefore, healthy populations may be used as sources for eggs for artificial propagation, and reintroduction must be accompanied by vigorous educational efforts to protect adults from human disturbance. Simons et al. also point out the need to consider local population genetics in the reintroduction process, to assure that racial adaptation is not compromised. This is an important paper that shows the need for highly collaborative efforts in species restoration. This successful program should serve as a model of how ecological theory can be put to practice in conservation biology.—John C. Kricher.

PHYSIOLOGY

(see also 13, 58)

29. Incubating female passerines do not let the egg temperature fall below the "physiological zero temperature" during their absences from the nest. S. Haftorn. 1988. Ornis Scand. 19:97-110.—Most of what is known about embryonic development in birds comes from data on domestic chickens. These data indicate that the temperature range for optimum development of embryos is narrow, lying between 37-38 C. Chicken embryos do not survive continuous temperatures above 40.5 C nor below 35 C. The "physiological zero temperature" (PZT), below which embryonic development ceases, is considered to lie between 25-27 C. Yet, embryos can withstand temperatures well below PZT for "fairly long periods." Very little data on PZT are available for wild passerines. Toward filling this gap, Haftorn poses the question "How far does the female allow the egg temperature to fall before she returns to the nest and continues the interrupted incubation?"

Using a thermistor or thermocouple placed 1 mm below the egg surface, egg temperatures were recorded at 1-5 min intervals at 42 nests of 14 species of passerines. The statistic of interest was the mean minimum egg temperature (MET) measured while the female was off the nest (only females incubated for all species studies). Regardless of ambient temperature, females usually returned to the nest and resumed incubation before eggs had cooled to "suggested" PZT. The most complete data sets (14 nests of 6 species) yielded an average MET of 30.4 C, whereas the average value for all 42 nests was 31.2 C. Haftorn suggests that the PZT of passerine eggs lies close to that of domestic chickens.—Jeff Marks.

30. Testosterone and aggression in birds. J. C. Wingfield, G. F. Ball, A. M. Dufty, Jr., R. E. Hegner, and M. Ramenofsky. 1987. Am. Sci. 75:602-608.—Testosterone levels and aggressive behavior tend to be strongly correlated in birds (and other vertebrates). This article reviews the complexity of the testosterone-aggression interaction. Environmental cues such as changes in daylength or the presence of other males stimulate the anterior pituitary to secrete luteinizing hormone, which stimulates testosterone production at a time when male birds are competing to secure territories and/or mates, and thus when aggressive behavior would likely be adaptive. In social hierarchies, dominant males tend to have higher plasma levels of testosterone than do subordinate males. Polygynous males tend to have higher testosterone levels than do monogamous males. Once territories and dominance hierarchies are established, testosterone levels tend to decline. However, the presence of a strange male can immediately induce aggression, *followed* by (rather than preceded by) increase in testosterone. Thus, testosterone does not always induce aggression, but sometimes follows from it. In such a case, testosterone may be playing a facilitative role for the neurons involved during extended periods of aggression. To do this, testosterone may act directly and rapidly on the central nervous system through membrane receptors, but such a mechanism is yet unconfirmed. Though testosterone has been shown to influence formation of song control nuclei in the brain, its exact physiological role in aggressive behavior is not yet totally understood.—John C. Kricher.

31. Energy expenditure during incubation in four species of sub-Antarctic burrowing petrels. C. R. Brown. 1988. Ostrich 59:67-70.—Brown measured incubating metabolic rate (IMR) in four species of burrowing petrels: White-chinned (*Procellaria aequi-*

noctialis), Great-winged (*Pterodroma macroptera*), Kerguelan (*Lugensa brevirostris*), and Blue (*Halobaena caerulea*) petrels. He measured oxygen consumption by placing birds and eggs in metabolic chambers in the laboratory; for two species, he also measured basal metabolic rates (BMRs) by placing nonbreeding birds in the same chambers. BMR data for the other two species were available from a previous study. Brown contended that, although the differences between BMRs and IMRs for each species were not significantly different, that IMR tended to be lower. Judging from the low sample sizes, high standard errors, and closeness of IMR/BMR ratios to unity, it may be wisest to say only that the two rates are equal until further study. The author theorizes that maintenance of IMR at basal levels may allow these birds to conserve energy during long incubation bouts.—Malcolm F. Hodges, Jr.

MORPHOLOGY AND ANATOMY

(see 58)

PLUMAGES AND MOLTS

(see also 5, 37, 38, 58)

32. **Birds doing it the octupus way: fright moulting and distraction of predators.** Å. Lindström and J.-Å. Nilsson. 1988. Ornis Scand. 19:165–166.—When I read the first clause of the title, I thought this paper was about copulatory behavior. It isn't. "Fright molt" (or "Schreckmauser") is the common term for the simultaneous shedding of feathers during threatening situations. This form of autotomy is thought to be an antipredator strategy in which an attacking predator is left with nothing in its grasp but a bunch of feathers. This paper suggests an additional way in which fright molt enables birds to escape predators.

Over a year, the authors observed a European Sparrowhawk (*Accipiter nisus*) pursuing a Chaffinch (*Fringilla coelebs*), and a Northern Goshawk (*A. gentilis*) chasing a Wood Pigeon (*Columba palumbus*). In each case, the bird being chased released a small "cloud" of body feathers when the hawk was very close but had not made contact. Both hawks failed to catch their quarry.

The authors conclude that the birds dropped their feathers to confuse the hawks—much like a fleeing octopus emits a cloud of ink. Thus, fright molt may function (1) to confuse an attacking predator, and (2) as a last resort to escape when already caught. The authors suggest that in the first case, it would be best to drop small body feathers to create a "cloud effect," whereas in the second case, it would be best to drop the tail.—Jeff Marks.

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 3, 12, 55, 57, 58)

33. **1988 Boreal Owl survey in Cook County.** W. H. Lane. 1988. Loon 60:99–104.—Surveys along five routes in northeastern Minnesota were conducted to locate singing male Boreal Owls (*Aegolius funereus*) from late March through mid-May 1988. Singing males were identified at 37 locations, and at three locations, more than one male was heard from a single listening post. At 10 locations, singing-perches were located, all in the crowns of mature conifers. At 3 locations, males were observed in potential nest cavities, all in old quaking aspens (*Populus tremuloides*). These data help to define the distribution of this species in northeastern Minnesota and suggest that current federal management guidelines regarding the nesting habitat of Boreal Owls (which call for the maintenance of 200-acre tracts of mature conifers) may be in need of revision in order to maintain a breeding population of the species in this region.—D. J. Ingold.

34. **Status of Le Conte's Sparrow, *Ammodramus leconteii* (Emberizidae), wintering in western Texas.** T. C. Maxwell, D. E. Madden, and R. C. Dawkins. 1988. Southwest. Nat. 33:373–375.—The most recent summaries of the status of Le Conte's Sparrows (published in 1984) regard it as casual to rare in the southwestern portion of its range. In order to update this status, an extensive effort was made to capture Le Conte's Sparrows in March 1984, October–April 1984–1985, and October–December 1986, in Tom

Green County. Sixty-seven birds were captured (using mist nets), all in ephemeral and narrow successional zones near the margins of reservoirs. These data suggest that the Le Conte's Sparrow is a fairly regular and sometimes common winter resident in western Texas.—D. J. Ingold.

35. **Recent transatlantic vagrancy of landbirds and waders.** N. Elkins. 1988. Br. Birds 81:484–491.—The pattern of autumn vagrancy of Nearctic birds to Great Britain and Ireland was the subject of this long-term study. The appearance of Nearctic passerines is fairly predictable and associated with fast moving fronts crossing the North Atlantic. Depending on the timing of the frontal system and bird movement patterns in North America, these conditions may produce a trickle of several species or a small flight involving only one species. For example, the appearance of several Gray-cheeked Thrushes (*Catharus minimus*) during late October 1986 was correlated with the rapid passage of a front across the North Atlantic on 18–19 October. Similar conditions produced a flight of Blackpoll Warblers (*Dendroica striata*) in early October 1976. The appearance of these single species flights was theorized to occur when a migratory wave of northern-breeding overseas migrants became involved with a very mobile frontal system.

The pattern of Nearctic shorebird vagrancy is more complex with little correlation between sightings and the passage of frontal systems. Significant correlations between the total numbers of shorebird sightings and greater than normal westerly airflows exist for September, but not for other autumn months. Shorebird records are also widely scattered across both countries as opposed to passerines which are concentrated in the southwestern counties of Great Britain and Ireland. This different pattern of vagrancy was attributed to the shorebirds' greater flight capacity, more complex migratory routes, different origins of the vagrant species, greater variability in reproductive success, and the increased likelihood of their survival for extended periods of time after they cross the Atlantic.—Bruce G. Peterjohn.

36. **Breeding status of the Gadwall in Britain and Ireland.** A. D. Fox. 1988. Br. Birds 81:51–66.—The expansion of Gadwall (*Anas strepera*) within Great Britain and Ireland corresponds with similar range expansions in portions of Eurasia and North America. While introduced pairs were released in Great Britain as early as the 1850s, their numbers did not noticeably increase until the 1960s. From an estimated 260 pairs in the early 1970s, their numbers increased at an annual rate of 5% to the present estimate of 500–600 pairs. The rate of expansion was greatest on man-made reservoirs. However, smaller increases on natural lakes and coastal wetlands indicated that the breeding pairs were not shifting from one habitat to another, but were expanding more rapidly on the artificial reservoirs. Their present breeding distribution is described in considerable detail as is the timing of their expansion into various counties in both countries.

While this population was largely derived from introduced stock, there is interchange between British Gadwall and continental populations. The contribution of wild Gadwall to this expanding population cannot be determined. Their present distribution reflects the origins of releases and availability of suitable vegetated lakes and wetlands. Although certain local populations have apparently stabilized in eastern Great Britain, their numbers are still expanding in most areas and will undoubtedly continue to increase.—Bruce G. Peterjohn.

SYSTEMATICS AND PALEONTOLOGY

(see also 52, 56, 58)

37. **Juvenile Hen Harriers showing "Marsh Hawk" characters.** J. P. Thorpe. 1988. Br. Birds 81:377–382.—Differences between the North American race of Northern Harrier (*Circus cyaneus hudsonius*) and Eurasian race (*C. c. cyaneus*) have been the subject of controversy in recent years. While most adult males can be differentiated, separating other age classes has proven more difficult. Juveniles have been distinguished by their underpart coloration, rufous and unstreaked in *hudsonius,* but pale brown and streaked in *cyaneus.* Juvenile *hudsonius* also have darker heads and necks, giving a hooded effect not evident in *cyaneus.* Recent sightings have questioned the validity of these characteristics.

Among the small breeding population of Northern Harriers on the Isle of Man, a typical pair of *cyaneus* adults produced two offspring with unstreaked chestnut underparts and dark head markings identical to the *hudsonius* race. Several additional juvenile harriers exhibiting similar characteristics were also observed on the island. Since there was no Mendelian segregation of these *hudsonius* characteristics, the author concluded they were all under the control of a single dominant gene which is very rare in *cyaneus* but found in most, if not all, *hudsonius*.

These observations raise some intriguing questions. Do these *hudsonius*-type juveniles develop the adult characteristics of *cyaneus* or *hudsonius*? If they develop *hudsonius*-type adult features, then the subspecific distinction would appear to be based on frequency differences of only one gene. If *hudsonius*-type harriers are rarely produced by *cyaneus* parents, do *hudsonius* harriers in North America occasionally produce *cyaneus* juveniles? North American observers could significantly contribute to the resolution of this question by providing detailed descriptions of juvenile and adult harriers at or near nests, paying particular attention to the characteristics used to distinguish *hudsonius* from *cyaneus* individuals.—Bruce G. Peterjohn.

38. The Yelkouan Shearwater *Puffinus* (*puffinus*?) *yelkouan*. W. R. P. Bourne, E. J. Mackrill, A. M. Paterson, and P. Yesou. 1988. Br. Birds 81:306-319.—The taxonomy of the Manx Shearwater (*Puffinus puffinus*) superspecies has been the subject of debate for more than a century. Several taxonomic schemes have been proposed based on various morphological characteristics. Unfortunately, none of these schemes has proven to be entirely satisfactory and the classification of most forms is still in doubt.

The authors have attempted to make order out of this confusion by proposing another classification scheme based on breeding chronology, plumage similarities, migration patterns, and timing of molt. North of the equator, this group was divided into two species. The black-backed species tends to nest later in spring in inland mountains, feed far out at sea, and molt during winter. This species was called Manx Shearwater (*P. puffinus*) and included the Manx Shearwater (*P. p. puffinus*) of the Atlantic Ocean and Newell's Shearwater (*P. newelli*) and Townsend's Shearwater (*P. auricularis*) in the Pacific Ocean. The brown-backed species nests earlier in spring on offshore islets, feeds inshore, and disperses to higher latitudes to molt during summer and early autumn. This latter species was recognized as the Yelkouan Shearwater (*P. yelkouan*) and incorporated the Levantine Shearwater (*P. p. yelkouan*) and Balearic Shearwater (*P. p. mauretanicus*) of the Mediterranean and Black-vented Shearwater (*P. opisthomelas*) of the eastern Pacific Ocean. Two Australasian forms which breed during the austral spring and have noticeably different plumages were treated as distinct species, the Fluttering Shearwater (*P. gavia*) and Hutton's Shearwater (*P. huttoni*).

While this scheme presents an admirable attempt to sort out this taxonomic chaos, it probably will not be the final word on this subject. For the most part, this scheme is consistent with our present knowledge of these species. However, the nesting chronology of many of these forms is imprecisely known as are their migration patterns. Additional studies could result in different conclusions concerning the relationships of the various forms. Perhaps the most obvious inconsistency is the inclusion of Townsend's Shearwater within the Manx group. While Townsend's Shearwaters have black backs, they nest in early spring off the coast of Mexico, appear to be sedentary, and may deserve recognition as a full species.

As the authors correctly recognized, additional studies are required before the relationships within this complex group are completely understood. In particular, investigations of the biochemical relationships and vocalizations would be enlightening. Until these studies have been completed, the ultimate classification of this group will remain the subject of debate.—Bruce G. Peterjohn.

39. Characters and taxonomic position of Basra Reed Warbler. D. J. Pearson and G. C. Backhurst. 1988. Br. Birds 81:171-178.—The taxonomic status of the Great Reed Warbler (*Acrocephalus arundinaceus*) complex has been debated for decades. Presently, most forms in this complex have been elevated to full species, although the Basra Reed Warbler (*Acrocephalus a. griseldis*) is considered to be a race of the wide ranging Great Reed Warbler.

The Basra Reed Warbler is a poorly known form, breeding in Iraq and wintering in east Africa. This form was studied on its African wintering grounds with the plumage characteristics and measurements recorded from more than 700 individuals banded since the 1970s. Characteristics separating this warbler from the Great Reed Warbler are discussed with the greatest emphasis placed on differences in bill shape, upperpart coloration in fresh plumage, and the supercilium. These taxa can be separated by wing and tail measurements in the hand. They also prefer different wintering habitats, with the Basra Reed Warbler occupying brush and thickets while Great Reed Warblers were restricted to tall grasses. Based on consistent differences in their plumages, measurements, and vocalizations, the Basra Reed Warbler appears to be as dissimilar from the Great Reed Warbler as were the other species in this complex. The authors concluded that this warbler deserves recognition as a full species.—Bruce G. Peterjohn.

EVOLUTION AND GENETICS

(see also 9, 10, 13, 14, 28, 48)

40. **European populations of the Rock Dove *Columba livia* and genotypic extinction.** R. F. Johnston, D. Siegel-Causey, and S. G. Johnson. 1988. Am. Midl. Nat. 120: 1–10.—Rock Doves and conspecifics known as feral pigeons are genetically differentiated but are not reproductively isolated in Eurasia. The authors propose that the remaining genetically pure populations of Rock Doves are in danger of being swamped by feral pigeons. In order to identify population traits of Rock Doves, three individuals from a captive flock in Italy were compared with 105 feral pigeons from Italy and North America, using morphometric and allozyme data. External and bony morphological data revealed subtle and inconsistent differences between the groups, with gene flow from feral to wild populations and loss of the genetic identity in the latter group difficult to detect. Data from protein electrophoresis showed that a number of genetic loci from feral birds had alleles not found in wild birds. Wild Rock Doves showed no unique or rare alleles common to the feral birds. Such heterozygosity in the feral group is undoubtedly the result of artificial propagation techniques induced by humans. Today, genetically pure populations of Rock Doves have an essentially insular distribution. The loss of genic specificity within these populations could be prevented by maintaining and regenerating geographic isolation between them and feral birds.—D. J. Ingold.

41. **Sexual selection in Pinyon Jays I: female choice and male-male competition.** K. Johnson. 1988. Anim. Behav. 36:1038–1047.—The author conducted experiments on captive Pinyon Jays (*Gymnorhinus cyanocephalus*) to determine which traits were advantageous in inter-male competition and those that distinguished winners from losers in female choice. Larger males with larger bills tended to be more successful in male-male competition, but were virtually ignored by females. Females mated nonrandomly with males that had bright feathers and large testes. It appeared that male dominance was not the major mechanism driving sexual selection in Pinyon Jays, although it appeared to confer an advantage.—D. J. Ingold.

42. **Sexual selection in Pinyon Jays II: male choice and female-female competition.** K. Johnson. 1988. Anim. Behav. 36:1048–1053.—Experiments on captive Pinyon Jays (*Gymnorhinus cyanocephalus*) were performed in order to determine which female phenotypes are influenced by which mechanism of sexual selection (intrasexual competition or mate choice). There was not a strong relationship between dominance in female jays and any single phenotypic character. However, dominant females usually had brighter malar feathers, and weighed slightly more than subordinate birds. Males most frequently chose dominant heavy females with thicker bills, although in general, male choice appeared to be a passive process. From this and another study, it appears that intrasexual competition and mate choice in Pinyon Jays favors specific phenotypic traits in males more strongly than in females. Thus, it appears that sexual selection is stronger on males.—D. J. Ingold.

FOOD AND FEEDING

(see also 1, 2, 5, 14, 20, 22, 25, 58)

43. **Red Crossbills breed at Highlands, North Carolina.** D. B. McNair. 1988. Migrant 59:45–48.—This paper provides numerous observations of crossbills (*Loxia cur-*

virostra) in the southern Blue Ridge Mountains. McNair suggests that nesting in late summer was timed such that fledging coincided with opening of white pine (*Pinus strobus*) cones in August and September. Crossbills were also observed feeding on open hemlock (*Tsuga canadensis*) cones and on the buds, twigs, and leaves of red maples (*Acer rubrum*), tulip poplars (*Liriodendron tulipfera*), and other similar foods.—Jerome A. Jackson.

44. Feeding ecology and White-faced Ibises in a Great Basin valley, USA. M. P. Bray and D. A. Klebenow. 1988. Colonial Waterbirds 11:24–31.—The authors studied feeding site selection and food habits of White-faced Ibises (*Plegadis chihi*) in relation to agricultural practices, particularly the effects of irrigation flooding. Much of the historic foraging habitat has been destroyed and ibises now commonly forage in agricultural fields. The study focused on the foraging patterns of 5000 breeding ibis pairs which foraged in fields 3–18 km from the colony on Carson Lake, Nevada. Censuses were conducted from mid-May prior to hatching through mid-August, 1985, shortly before dispersal. Physical parameters such as soil and crop type, presence or absence of standing water, and field size were recorded for fields used by foraging ibises. Nineteen ibises were collected for crop content analysis.

Ibises tended to congregate in larger fields closer to the colony and 99.9% foraged in fields with standing irrigation water. The ibises used the water to wash prey, and the water forced earthworms to the surface soils where they became available as prey. Earthworms were the most common item by weight and frequency in examined crops. Ibises showed a significant preference for alfalfa fields, which accounted for 86% of ibis usage in early summer and 100% in late summer. Pasture and grain fields accounted for the other 14%. Alfalfa was more favorable for earthworms since it had higher prey densities, and higher nitrogen produced increased growth and higher protein content in earthworm prey. Ibises used fields regardless of vegetation heights, preferred high clay soils which held standing water longer, and larger fields with longer irrigation periods.

The authors concluded with management recommendations for areas near nesting ibis colonies, which included flood irrigation of alfalfa fields of greater than 30 ha with low permeability soils.—William E. Davis, Jr.

45. The determination of prey captured by birds through direct field observations: a test of the method. F. Cezilly and J. Wallace. 1988. Colonial Waterbirds 11: 110–112.—To test the reliability of the widely used technique of direct observation to study diet in free-living wading birds, the authors had two experienced observers watch captive Little Egrets (*Egretta grazetta*) foraging in an enclosed pool, simulating field conditions. They recorded prey capture attempts, captures, and identified prey size and type. Three tests used sunperch, two mosquito fish, two shrimp, and one a mixture of tadpoles and water beetle larvae. All prey were 2–5 cm in length. Neither observer successfully identified more than 50% of the prey items. One observer had more than twice as many errors as correct identifications, and the other, although making only one misidentification compared to 37 correct, left more than half of the items unidentified. Similar numbers of items were either unidentified or misidentified. When the size of items was recorded, the estimate was always in the correct range. Fish and invertebrates were identified in about equal proportions. In studies where prey species identification is particularly important, for example when prey species of the same length class have substantially different shapes and biomass, misidentification could lead to substantial error. The authors suggest that researchers should test the reliability of direct observations through experimental foraging situations, or at least be cognizant of possible error in their analysis.—William E. Davis, Jr.

46. Diving and foraging in the Western Grebe. R. C. Ydenberg and L. S. Forbes. 1988. Ornis Scand. 19:129–133.—Birds that feed underwater need time on the surface to recover from the physiological effects of diving, and many biologists have noted a positive relationship between dive time and surface time following a dive. In this paper, the relationship between dive time and surface time was examined for Western Grebes (*Aechmophorus occidentalis*) nesting in southeastern British Columbia.

Regression analysis showed that surface time was positively related to length of the preceding dive ($n = 1416$). Using this regression equation, the authors calculated the deviation from expected surface time (DEVEST) for each new dive as the difference between surface time predicted from the equation and the observed surface time. Assuming that on average, grebes recover fully after each dive, the regression equation estimated the average time needed for recovery from a dive of given length. Negative DEVEST values suggest a deficit in recovery time and positive values a surplus. The relationship between DEVEST of the current dive cycle and that of the preceding cycle was curvilinear such that when DEVEST was negative, that of the following dive cycle was also likely to be negative. When DEVEST was ≥ 0, then that of the next dive cycle was likely to be near zero. This effect held through long series of dives, and DEVEST had a high positive serial correlation over at least five successive dive cycles. DEVEST had very little influence on dive duration.

The authors interpret these results in light of Western Grebe foraging ecology. Grebes hunt schools of fish that can be difficult to find. Once found, however, the schools yield many captures. Thus, many dives are made before the first capture, after which captures occur in quick succession. The observed patterns of dive and surface times could correspond to periods of heavy work (without full recovery) while grebes exploit fish schools interspersed with periods of light work (with full recovery) while grebes search for new schools.—Jeff Marks.

47. Foraging behaviour and selection of prey and perches by the Buffstreaked Chat *Oenanthe bifasciata*. A. Tye. 1988. Ostrich 59:105–115.—Tye studied non-breeding Buff-streaked Chats for a month in 1985 in South Africa. Three males and two females provided most of the data, with female behavior differing from that of males only in the amount of time they spent singing (16% of the males' time, very little of the females'). The birds spent 70% of their time foraging, and 20% resting. These chats occupied broadly overlapping home ranges, and spent more time on interspecific rather than intraspecific aggression. They foraged more often from perches 1.5–3 m high, from which they were more likely to make aerial sallies for flying insects than fly to the ground. Perches less than 1.5 m in height were more often used for foraging from the ground, and were more likely to be abandoned before a feeding attempt. Chats stayed longer on perches 1.5–3 m in height before giving up than on perches of other heights, but time spent on a perch before a successful prey capture was similar for perches 1.5–3 m high and ones less than 1.5 m high. Prey composition and preferences are detailed, and the species' foraging behavior is compared with that of others in the genus *Oenanthe*.—Malcolm F. Hodges, Jr.

48. The evolution of finch communities on islands and continents: Kenya vs. Galapagos. D. Schluter. 1988. Ecol. Monogr. 58:229-249.—Schluter studied finch communities in Kenya in 1983, 1985, and 1986. His aim was to compare this work with existing knowledge of finch communities on the Galapagos Islands, make generalizations about differences between archipelago and continental granivorous finch assemblages, and ultimately say something about the evolution of finch communities.

He surveyed the finches outside the breeding season at six locations in Kenya from the coast to the central highlands. He also collected information on their diets, both through observations of feeding birds, and capturing birds and forcing them to disgorge their crops. Schluter sampled seed abundance and variety, and used these and the diet data to compute niche breadth and overlap. Finally, he measured bill and body morphology of captured birds.

Schluter found Kenya finches to differ from those on the Galapagos as follows: they exploited less available seeds overall, used less than the entire range of available seed sizes, and were less diverse morphologically than Galapagos finches. Birds in Kenya had diets restricted by habitat, microhabitat, and species of plant, rather than by size of the seeds. These taxonomic restrictions tended to reduce the correlation between bill and body morphology and diet.

Competition with other birds, rodents, and ants in Kenya has restricted niches available to granivorous finches, contended Schluter. In addition, predation pressure has forced finches to use less available habitat, further restricting available niches. Finches in Kenya were found to stay within a certain distance of suitable cover, and to underuse seeds on the ground in dense grasses.

Schluter believes competition and predation restrict the finch community in Kenya, while age and freer movement make it more diverse taxonomically. The greater variety of seed resources available in Kenya was not found to influence diversity of the finch community, perhaps due to the above-mentioned restrictions.

Schluter's clear, fluid writing style enhances the accessibility of this paper, and his conclusions are well-considered.—Malcolm F. Hodges, Jr.

SONGS AND VOCALIZATIONS

(see also 15, 18, 33)

49. Comparison of communication and signalling patterns of Whitebrowed Sparrowweavers and other gregarious Ploceid weavers. J. W. H. Ferguson. 1988. Ostrich 59:54–61.—White-browed Sparrow-Weavers (*Plocepasser mahali*) were observed from July 1982 to May 1984 in northwestern Orange Free State, South Africa. Their vocal repertoire is well developed and consists of at least nine discrete calls. Visual signals, associated mostly with mating and agonistic displays, appear to be less important. This is similar to other members of the genus *Plocepasser,* but contrasts with the gregarious Ploceine weavers, which have a wide repertoire of visual communication. These differences may be explained, in part, by differences in the habitats in which the taxa evolved. Sparrow-weaver auditory signals are very tonal, and not well suited to dense vegetation; thus, it is suggested that this system evolved in an open, arid environment.—D. J. Ingold.

50. Mixed singers and imitation singers among Short-toed Treecreepers. P. Clausen and S. Toft. 1988. Br. Birds 81:496–503.—The phenomena of mixed singing and imitation singing were described for the breeding population of Short-toed Treecreepers (*Certhia brachydactyla*) in Denmark. Mixed singing was defined as songs containing repertoires of both Short-toed and Common treecreepers (*C. familiaris*) but lacking a fully developed normal song phrase of the former species. Imitation singers were Short-toeds with fully developed songs mixed with phrases of the Common Treecreeper song. Sonograms depicted the normal songs of both species as well as the mixed and imitated songs.

In Denmark, mixed and imitated singing was restricted to Short-toed Treecreepers, by far the less numerous of the two species. Elsewhere in western Europe, these phenomena were mostly reported for Common Treecreepers where they are outnumbered by Short-toeds. Based on these observations, mixed singing was believed to evolve in areas of sympatry with the less numerous of the two species learning from the more abundant species. The authors speculated that imitation singing may be used to communicate with members of the other species where interspecific territories are maintained, but provided no evidence to support this claim.—Bruce G. Peterjohn.

PHOTOGRAPHY AND RECORDINGS

51. Voices of the New World nightbirds: owls, nightjars, and their allies. Revised edition. J. W. Hardy, B. B. Coffey, Jr., and G. B. Reynard. 1988. ARA Records, P.O. Box 12347, Gainesville, FL 32604.—This recording, produced in the Florida Museum of Natural History's Bioacoustic Lab, is an expanded version of the original released in 1980. This cassette tape contains recordings of 95–97 species of owls, nightjars, potoos, and oilbird (the number pending splits of some obvious species pairs, etc.), while 12–13 other species are announced on the tape, but we are told that no known recording of these exists.

Many of the cuts on the tape are of high quality, but overall they vary greatly. On some the calls resound with clarity, but on more than one cut I had to turn the volume up to hear the species in question, and then rushed to turn it down when the announcer boomed the next species' name.

I can forgive the use of less-than-superior recordings of little-known tropical owls or nightjars, some of which are here made available for the first time to the public. We are treated to recordings graced with the sound of sheep, or human voices, and frequently the incessant whine of insects nearly drowns out the calls of the subject species. The preparators were correct to include all available recordings, however, since this work is valuable as a reference, and should be as all-inclusive as possible.

I cannot forgive the use of inferior recordings of common North American species, such as the Eastern Screech-Owl. True, the sounds of this species are generally available elsewhere, but that denies the true value of this tape as a reference. The use of only one example of this species' calls, and that from southern Texas (hardly representative), is unfortunate, as is the quality of recordings of a couple of the other familiar species (such as Great Horned

Owl). However, there were certainly restrictions on the length and diversity of the cuts, since so many species are covered.

The tape is accompanied by a much-folded strip which lists species, locations and dates of recordings, recorders, etc. A section of notes at the end of the list provides some useful background on the ecology and systematics of certain species. The paper is too long to comfortably fit into the tape case in folded form. Some way should have been devised to include text on the outside in the form of a booklet; then, the notes could have been expanded and separated, so that they are not all run together in one paragraph.

Aside from the above objections, this tape should prove valuable both to ornithologists interested in vocalizations, and to birders intent on identifying night birds on trips to the tropics. I recommend it.—Malcolm F. Hodges, Jr.

BOOKS AND MONOGRAPHS

52. The parrots of Luquillo: natural history and conservation of the Puerto Rican Parrot. N. F. R. Snyder, J. W. Wiley, and C. B. Kepler. 1987. Western Foundation of Vertebrate Zoology, Los Angeles, California. 384 pp., 122 text figures, 65 tables, 36 appendices, 8 color plates. $29.50 (hard cover).—In this book, Snyder, Wiley, and Kepler present data and findings of the Puerto Rican Parrot (*Amazona vittata*) recovery program, which was initiated in 1986 as a cooperative program between the United States Fish and Wildlife Service, the United States Forest Service, and the Commonwealth of Puerto Rico. The Puerto Rican Parrot is the most critically endangered parrot in the Caribbean. This book deals not only with the efforts to save this parrot, but represents the most comprehensive field study undertaken to date, on any Neotropical parrot. Although parrots are commonly kept in captivity, their biology in the wild has been poorly studied and understood. The authors should be commended on their efforts to remedy this lack of psittacine knowledge.

The book is organized into 12 concise chapters, each with a summary. The format is easily readable, and the 36 appendices at the end of the book contain substantial and supplemental information. The tables and figures are very detailed, straightforward and comprehensible without the text. The photographs and color plates are exceptionally clear and precise; particularly noteworthy is Color Plate 3.3 which depicts the species of *Amazona* in the West Indies.

Too often, parrot books are merely a collection of beautiful color photographs with the text being secondary and almost incidental. This book is happily not of that ilk and sets a precedent for future parrot publications to follow. It contains methodologies which can be followed in future studies and, most importantly, the text contains life history data which can be compared with data from other ecological studies of parrots, and avian species in general.

Chapters one and two are introductory and discuss the various historical factors which were responsible for the decline of this species. The "Iguaca," as it was named by the Indians of Puerto Rico, has suffered greatly from man's impact on the forests of that island. Man destroyed the habitat of the parrot through logging and agricultural activities, but also removed dozens of young parrots from their nests for pets. These practices are not unique to Puerto Rican Parrots, and parrot populations everywhere today are affected by these same threats. The authors' discussion of these threats can be extrapolated to parrots in general. -

The origins and relatives of the Puerto Rican Parrot are explored in chapter three. The authors examined 369 specimens of Greater Antillean and Central American *Amazona* and did a systematic analysis which involved 18 mensural and color characters. Their data are presented in two appendices and are thus available to other investigators to use. They concluded that size was not a "meaningful indicator of relationship" and the "most probable origin of the Puerto Rican Parrot was either directly from the Jamaican Black-billed Amazon (*A. agilis*) or from the Hispaniolan Parrot (*A. ventralis*)." Although *A. ventralis* is geographically closer, color characters rather favor a close common ancestry with *A. agilis.* Since analyses of plumage coloration were insufficient to explain iguaca's ancestry, the authors recommend future study.

The remaining habitat of the parrot, the Luquillo Mountains forest, is extensively described in chapter four. Included is a discussion of the common breeding birds within the habitats of the forest.

Movements and feeding ecology of the parrot are treated in chapter five. The feeding data which came from 758 direct observations of parrots feeding (640 were collected by the Rodriquez-Vidal study in the 1950s and 118 were collected in the present study) are presented in various tables and four appendices. The authors examined the parrots' food sources in light of their availability and seasonality. Puerto Rican Parrots are generally frugivorous, feeding on fruits with a diameter greater than one centimeter and a main staple in their diet is the fruit of Sierra Palm (*Prestoea montana*). This chapter also includes a discussion of Puerto Rican Parrot vocalizations and the results of sonographic analysis are depicted.

Since the Puerto Rican Parrot is a secondary hole nester, the authors paid particular attention to nest sites. Chapter six is devoted to this topic and the data presented are exhaustive. Important comparative data for other West Indian *Amazona* species and woodpeckers are included in this chapter. The poor reproductive performance of this species in recent times has been attributed to a scarcity of optimal nest sites. Eighty-one percent of all parrot nests were in Palo Colorado (*Cyrilla racemiflora*) tree cavities but Palo Colorados accounted for only 59% of all the trees surveyed.

An understanding of a species' reproductive biology is critical to the conservation of any endangered species. The authors made a major effort to achieve this understanding and as a result of their labors, the most comprehensive life history data ever collected for a neotropical parrot are presented in chapters seven and nine. These chapters not only include good, qualitative descriptions of parrot reproductive behavior, but also provide quantitative analyses of the data. Noteworthy are the discussion of clutch and brood size (pp. 167–171) and the life tables for the Puerto Rican Parrot (pp. 210–216). Appendix 33 presents productivity data for all documented nests from 1940 to 1985!

In chapter eight, the authors assess the impact of all known potential predators, except man, on the Puerto Rican Parrot. A thorough examination of the Pearly-eyed Thrasher (*Margarops fuscatus*) predation problem is included.

Conservation efforts in the wild and captive propagation are discussed in the remaining two chapters. The use of Hispaniolan Parrots as surrogates in the captive propagation program is an interesting and useful avicultural technique. The complementary effort of field study and captive breeding is shown by the practice of fostering captive-produced chicks into nests in the wild.

In their opening chapter, the authors commented that their study represented more than 20,000 h of observation from blinds and lookouts. The excellent data base contained in this book demonstrates this point effectively. This book should be required reading for any ornithologist working on parrots and for conservation biologists. As a researcher who studies Amazons and waited patiently for the publication of this book, I was not disappointed. In addition, I strongly recommend this book to field biologists, aviculturists, and anyone who is interested in avian natural history.—Rosemarie Gram.

53. **Bird finding in New England.** R. K. Walton. David R. Godine, Inc., Boston. 328 pages, maps, illus. $14.95 softcover.—In the finest traditions of James Lane and Olin Sewall Pettingill, Richard K. Walton has written an informative, useful, and often entertaining volume on seeking out Yankee birds. This field guide-sized book will make a welcome companion for birders venturing from Connecticut to Maine. Each state is given its own chapter in which Walton discusses prime birding locations. In a book of this size it is not possible to include every birding locale, and experienced birders may take issue with some of Walton's omissions, though he lists supplemental areas at the end of each chapter. However, each of his selections is without question worthy of inclusion and the total provides thorough coverage and good balance, with a mixture of coastal and inland locations as well as varied ecological regions. In addition to state-by-state chapters, Walton includes chapters on seabird finding (guest authored by Wayne R. Petersen) and hawk watching, two "specialty areas" of northeast birding.

Descriptions of birding sites include detailed directions, comments on seasonal changes, availability of lodging and food, and up-to-date species notes about what can be found where. Names and phone numbers are included where such information is vital to success (i.e., reserving boats, transportation to islands, etc.). In addition, Walton offers insights about regional history and tradition as well as considerable information on local ecology. Maps are well-drawn and easy to follow.

Walton's writing ability makes the book pleasurable reading. For instance, in his chapter on Vermont, he begins by introducing Molly Stark, wife of General John Stark, a hero of the Revolutionary War. Molly raised 11 children, organized and ran a field hospital, and occasionally socialized *without* her husband. This insight is Walton's way of familiarizing his readers with the Molly Stark Trail (route 9), an ideal route for birding the Green Mountains. Birders already experienced in New England will have fond memories rekindled by reading Walton's lively descriptions of such birding meccas as Block Island, Cape Ann, and Concord. Newcomers to the region will have a good guide at their fingertips. This book will not only get you to the birds you have in mind, it will help you enjoy and understand what you're seeing along the way.

The book concludes with brief species accounts of New England's most desirable birds (winter finches, alcids, wood warblers, etc.), including information on population trends as well as recommended locations for finding each species. Also included are appendices on state organizations, rare bird alerts, floral and faunal references, and journals and magazines. There is a good bibliography. The text is garnished with attractive black-and-white illustrations of such venerable Yankee species as Black Guillemot as well as regional newcomers such as the Carolina Wren.—John C. Kricher.

54. The Irish Dipper. K. W. Perry. 1986. Published privately, available from the author, 3 Limavady Road, Waterside, Derry, BT47 IJU, Ireland. 142 pages with maps, illustrations in color and b & w. $13.95 + postage (hardcover).—This strikingly illustrated volume is a tour de force in terms of what can be accomplished by dedicated amateurs in ornithology. Perry provides a thoroughly readable account of his research on virtually all aspects of Irish Dipper (*Cinclus cinclus*) biology. Chapters discuss distribution, plumage and molt, song, courtship and display, behavior, food, breeding biology, and nesting, including seven field studies of the nesting cycle. The Irish Dipper is a distinct subspecies from the dipper found in Britain and Europe (though it occurs in the western isles of Scotland and western parts of mainland Scotland). The Irish race lays fewer second clutches than birds of the British race, but Perry concludes that the Irish subspecies is more versatile in timing its breeding to coincide with peak food availability. Second clutches are avoided due to declining food supply. Over 80% of nestling Irish Dippers are successfully reared to at least 14 d. Perry is quite straightforward in his writing style and data presentation. The book is abundantly illustrated with Perry's photographs, which are of superb quality (included is an appendix on photographic techniques). Detailed distribution maps further enhance the clarity of the book. Perry's work provides a fine example of a thorough, rigorous field study. This book is the culmination of 25 years of field work. It was worth the effort.—John C. Kricher.

55. Annotated checklist of the birds of Kentucky. B. L. Monroe, Jr., A. L. Stamm, and B. L. Palmer-Ball, Jr. 1988. Kentucky Ornithological Society, Louisville. xi + 84 pp. $6.50.—This checklist provides the first comprehensive summary of the abundance and distribution of birds in Kentucky since Mengel's book was published in 1965. Its format is similar to annotated checklists published in other states. The brief introductory material includes definitions of terms, sources of information, two maps and an explanation of the bar graphs. Most of the text is devoted to the accounts of 340 species of birds that have been substantiated by specimens, photographs and written descriptions. For regularly occurring species, these accounts briefly summarize their relative abundance, statewide distribution patterns, and habitat preferences. For accidental and casual vagrants, all acceptable records were cited. The remainder of the checklist includes a brief hypothetical list, a short list of species which may be expected to appear in the future and bar graphs exhibiting the seasonal abundance of each species.

This thoroughly prepared publication represents an excellent source of current information on the status of Kentucky's avifauna. The introductory material is concise and adequately describes all information pertinent to the checklist. The species accounts are informative and appear to be accurate when compared with avian distribution patterns in surrounding states. The very few errors include the omission of a 1971 King Eider (*Somateria spectabilis*) specimen from the Ohio River and no mention of the fall status of Alder Flycatchers (*Empidonax alnorum*). Additionally, the discussion of identification problems obscuring the status of Northern Goshawks (*Accipiter gentilis*) could have been applied to other species.

These omissions are minor and should not detract from the overall value of the checklist, especially for most waterfowl, shorebirds, and gulls whose status have changed substantially since 1965. The bar graphs are clearly reproduced and generally easy to decipher although the regional status codes can be confusing. This checklist will undoubtedly prove to be valuable for anyone with an interest in the status of Kentucky's avifauna—an excellent update of Mengel's authoritative book.—Bruce G. Peterjohn.

56. Spanish names for Mexican birds. (Nombres en castellano para las aves mexicanas.) A. M. Sada, A. R. Phillips, and M. A. Ramos. Instituto Nacional de Investigaciones sobre Recursos Bióticos. P.O. Box 63, Xalapa, Veracruz, Mexico. 67 pp. 2 figures and bibliography.—In Mexico, as well as in other Latin American countries, single species of birds have different local names. This variety of names complicates the processes of training birdwatchers and/or promoting conservation campaigns in which a common name is needed. In this work, the authors provide a Spanish common name for most of the birds of Mexico.

The main purpose of the work is to give each Mexican bird an easy-to-learn common name that could also be used as the standard-official Spanish name. The format consists of an introductory section and a list of scientific names, with its Spanish and English common names. The work is intended to be used by the general public and professionals.

Most of the assigned common names are associated with morphological features of the species. In some cases, the authors had to relate the common name to geographical distribution, habitat, peculiar behavioral patterns, or to the Spanish translation of the scientific name.

Unfortunately the authors avoided providing a common name for each species that in the field is difficult to identify, given its similarity with others. As a consequence no particular common names are given to species of genera such as *Empidonax, Contopus, Puffinus,* and *Oceanodroma.* They give one or two names to all the species within these similar groups; for example, all Shearwaters and Petrels (Procellariidae) are named "Pardela." For the formal student and the professional, this presents a problem because only the scientific name will provide consistency in the identification of a bird on a report or a publication, or in educational activities such as conservation campaigns.

The authors try to select common names that are widely used in Latin America, like "zorzal" for thrush, but in some cases they do not use the most accepted Spanish name. For example, they use "Zorzal Pechirojo" for the American Robin, "Gavia" for loons, and "Mosquerito" for flycatchers, when "Petirojo," "Somormujos o Colimbos," and "Papamoscas," respectively, are more widely accepted in Spanish. Some of the common names they give to migrants are very regionalized or present confusion. For "Redstarts" they use the common name "Pavitos," when "Pavos" is usually used for turkeys. These problems void the use of the list in a more universal way.

Nevertheless, the work fulfills its main goal: offering an appropriate Spanish name for most of the birds of Mexico, particularly the endemics. The work fills a gap in Mexican ornithology and provides a guide for the unification of common names of the birds of South and Central America and the Caribbean Islands.—Raúl A. Pérez-Rivera.

57. Newfoundland birds: exploitation, study, conservation. W. A. Montevecchi and L. M. Tuck. 1987. Publ. Nuttall Ornithol. Club, No. 21. 273 pp., 23 tables, 40 figures.—This monograph was begun by Leslie Tuck to be a portion of his "*magnum opus*" on the avifauna of Newfoundland. Following Tuck's death in 1979, Montevecchi took up the challenge and has brought this first portion of the endeavor to fruition. This volume is more or less the introduction and historical background for a regional bird book that is yet to come.

The first chapter sets the stage, essentially outlining the subject matter of remaining chapters. Chapter 2 provides an excellent description of the topography, vegetation, climate, and general habitat associations present on Newfoundland. Chapters 3–8 are more or less chronological accounts of ornithological exploration in Newfoundland, beginning with evidences of prehistoric associations of birds and men, and ending with an account of recent research by Tuck and others. These chapters are the meat of the book and are essentially a collection of vignettes of the many expeditions that have taken ornithologists to Newfoundland. The list of ornithologists includes many who are well-known for their work elsewhere (e.g., Audubon, Townsend, Glover Allen, Bent, Griscom, Gilliard, Aldrich, Burleigh) and the material presented here is a real biographical treasure trove.

Chapter 9 identifies and discusses the history of the major seabird colonies around Newfoundland, and chapter 10 details the development of conservation efforts and laws, gamebird introductions, and establishment of parks and preserves.

Appendices include a list of Newfoundland birds, vernacular names for Newfoundland birds (by Montevecchi and J. Wells), and a list of parks, wilderness areas, and wildlife sanctuaries.

Although this is an excellent sourcebook for ornithological historians, there is at least one funny typo. On page 33 another chapter is added to our knowledge of the demise of the Great Auk. It was "fightless."—Jerome A. Jackson.

58. The ancestral kestrel. D. M. Bird and R. Bowman, eds. 1987. Raptor Research Reports No. 6. 178 pp., paperback. $12.50 + shipping. (Available from Jim Fitzpatrick, Carpenter St. Croix Nature Center, 12805 St. Croix Trail, Hastings, MN 55033 U.S.A.)—This is a collection of papers presented at a symposium on kestrel species in December 1984. Publication of the proceedings is the joint effort of the Raptor Research Foundation, Inc., and the MacDonald Raptor Research Centre of McGill University. This volume includes 16 of the 20 papers presented at the symposium. Nine of them deal primarily with the American Kestrel (*Falco sparverius*), two with the Eurasian Kestrel (*F. tinnunculus*), one with the Greater Kestrel (*F. rupicoloides*), and the remaining compare species of kestrels. Topics range from kestrel systematics, to kestrel behavior, to kestrel ecology, to kestrels as laboratory animals.

D.A. Boyce and C.M. White present a scenario for the evolution of the 15 modern species of kestrels, suggesting that the Falconidae are diphyletic, with one group originating in the Neotropics, and the ancestors of *Falco* originating in Africa or southeast Asia. Events of the Pleistocene are invoked as facilitators of kestrel dispersal, isolation, and evolution. The American Kestrel is considered the most recently derived of the group.

An analysis of 15 yr of Breeding Bird Surveys by M. R. Fuller et al. suggests that American Kestrel numbers have been increasing in most parts of their range, although declines were noted in Illinois and Arkansas.

A. Village reviews the literature on population regulation in kestrels, summarizing studies of six species (although primarily work on *F. sparverius* and *F. tinnunculus*). Roughly similar in size, morphology, and habitat requirements, kestrel species differ greatly in their population dynamics. An underlying trend among kestrels seems to be their ability to adapt to local conditions. This adaptability, however, means that different factors may be limiting different populations/species. Factors identified and discussed include prey density, territorial behavior, nest sites, presence of transients, emigration, and mortality rates. Village concludes with recommendations for further studies.

A very valuable contribution to our knowledge of American Kestrels is a paper by C. W. Alvarez and J. C. Lorenzo on the nesting success of the Cuban race of the American Kestrel at a 416 ha site in Havana province. This little known Cuban resident was found nesting in the defoliated tops of palms. Laying occurred between 8 Apr. and 25 May; hatching between 27 May and 13 Jun.; fledging between 11 Jun. and 29 Jul. Clutch size averaged 2.78 eggs; fledging success was 52.9%; total nesting success was 37.5%. Human disturbance accounted for 59% of losses.

Other studies of nesting ecology include that by M. L. Hoffman and M. W. Collopy near Archer, Florida; a paper on dispersal and inbreeding avoidance by R. Bowman et al.; and papers on nest-site competition between American Kestrels and European Starlings (*Sturnus vulgaris*) by T. J. Wilmers and E. M. Curley et al. Studies of foraging ecology include: (1) a paper by Petra Bohall-Wood and M. W. Collopy on foraging behavior of American Kestrels in Florida in relation to habitat; (2) a review of foraging behavior of Eurasian and American kestrels by K. L. Bildstein and M. W. Collopy; and (3) a lengthy review of kestrel prey selection studies by H. C. Mueller.

A related paper is a study of habitat separation by the sexes of wintering American Kestrels in California by R. L. Meyer and T. G. Balgooyen. They found that females occupied winter territories that had a higher average density of birds and mammals than did males. The authors suggest that this difference between the sexes is a result, not a cause, of size and color dimorphism in the species. They also propose use of the term "habitat split" rather than "niche split" to refer to the difference.

Excellent studies of kestrel energetics include a paper by D. Masman and S. Daan on the allocation of energy in the annual cycle of the Eurasian Kestrel, and a study of American Kestrel energetics in Utah by J. A. Gessaman and L. Haggas.

A paper by A. C. Kemp details sexual dimorphism in linear and weight measurements of Greater Kestrels in South Africa. Finally, S. N. Wiemeyer and J. L. Lincer review the use of various species of kestrels in toxicological studies.

This is a volume that any raptor enthusiast will want to have. It was worth waiting for.—Jerome A. Jackson.