J. Field Ornithol., 59(1):76–97

RECENT LITERATURE

Edited by Jerome A. Jackson

NEW JOURNAL

1. Japanese Journal of Ornithology. Published by The Ornithological Society of Japan. This excellent journal begins with volume 35, 1986, as a continuation of **Tori** (vol. 1–34). Articles and notes are published in Japanese or English—many are in English. Articles published in Japanese include English figure and table captions and summaries.—Jerome A. Jackson.

MISCELLANEOUS

2. Inks for documentation in vertebrate research collections. S. L. Williams and C. A. Hawks. 1986. Curator 29:93–108.—Twenty-four inks were evaluated for suitability of use in natural history research documentation (e.g., field notes, specimen labels). Desired qualities include: pH 7.0–8.5; noncorrosive; low to moderately fluid; uniformly opaque; above 0.18 g of solids per ml fluid; dry in 90–180 seconds; equal in color value to 16 or above on the Kodak Gray Scale; lightfast; resistant to fluids; low to moderate in cost. Only Rotring 17 Black was rated as good in all categories, but this may not be easily available in the United States. Other inks that performed well were: Pelikan 17 Black; Higgins T-100; Hunt Speedball Super Black India; Pelikan 50 Special Black. The remaining inks tested were not recommended for use in research documentation.—Peter F. Cannell.

3. Grants, awards and prizes in ornithology. R. C. Banks (ed.). 1987. A.O.U., Washington, D.C. 20560. 60 p. $3.00, from Ass't to AOU Treasurer, Dept. of Biological Sciences, Univ. S. Mississippi, Hattiesburg, MS 39406.—This descriptive compilation of 65 ornithological grants, awards, and prizes should be of organizational and informational help to hopeful grantees, particularly students and amateurs. It should help journals and newsletters by saving space—only reminders and new information about awards need be printed. Current and future granting sources may also find the compilation useful: first, in helping to attract a larger number of appropriate applications; second, in identification of the types and amounts of awards most needed. For example, 34 of these presentations are available only to students or amateurs, 21 have a locality restriction, 9 are restricted to study of single species (e.g., loons) or to limited taxa (e.g., raptors), and 4 support museum or meeting travel. The approximate average grant is $575 (NSF, postdoctoral fellowships, and broader awards for which ornithologists are also eligible are not included here). There seems to exist further need for large, loosely restricted ornithological research grants.

It is hoped that this very useful volume will be kept up to date, and perhaps expanded.—Peter F. Cannell.

4. Care of specimen labels in vertebrate research collections. C. A. Hawks and S. L. Williams. 1986. Pp. 105–108 *in* J. Waddington and D. M. Dudkin (eds.), Proc. 1985 Workshop on Care and Maintenance of Natural History Collections, Life Sciences Misc. Publ., Royal Ontario Museum.—The best paper for labels for vertebrate specimens is 100% white cotton stock with a pH of 6.5 to 7.0. Alkaline papers may degrade protein and should not be used in contact with specimens. Labels should have rounded corners and be tied loosely with natural or white cotton or linen thread. Multiple labels should be retied on a single string in a manner illustrated. Printing should be with carbon black printing ink. Staples, most glues, and pressure sensitive tapes should be avoided in repairing labels. Procedures for encapsulating fragile or damaged labels in Mylar are described. Labels should *never* be discarded.—Peter F. Cannell.

5. Arsenic in natural history collections. C. A. Hawks and S. L. Williams. 1986. Arsenic in natural history collections. Leather Conservation News 2:1–4.—This short paper sketches the history of arsenic use in natural history collections from the mid-1700s to the present. It is noted that arsenic applied to the interior of a skin will migrate to the exterior; assays of feathers of study skins at the Smithsonian Institution indicated the presence of arsenic. "All of the foregoing suggests that arsenic and other toxic chemicals may be fairly

common in natural history collections . . . the use of gloves for handling specimens is strongly recommended, and a dust mask and protective clothing should be worn when moving specimens or handling large items . . . any natural history object exhibiting powdery or crystalline deposits should be tested for arsenic contamination . . . chronic exposure is believed to have mutagenic, teratogenic, and hepatic effects and has been linked to cancer" (ibid.).—Peter F. Cannell.

BANDING AND LONGEVITY

(see also 12, 54)

6. Another possible record of long-term pair bonding in wild Mallards. G. L. Ivey and D. G. Paullin. 1987. Murrelet 68:31.—An adult female and 9 male (age unknown) Mallards (*Anas platyrhynchos*) were captured together in eastern Oregon on 27 September 1982. The female and 1 of the males were shot in north-central California—480 km southwest of the capture site—on 25 November 1984. The mating status of the Mallards when captured was unknown, but "the birds behaved as if they were paired when shot." The authors suggest that the Mallards were paired in 1982 and remained together until they were killed in 1984.—Jeffrey S. Marks.

MIGRATION, ORIENTATION, AND HOMING

(see also 6, 11)

7. Considerations on the migrations of two Neotropical hummingbirds. [Consideraciones sobre las migraciones de los picaflores neotropicales.] F. I. Ortíz-Crespo. 1986. El Hornero 12:298–300.—The author summarizes what little is known of the migrations of the Giant Hummingbird (*Patagona gigas*) and the Fire-crown (*Sephanoides galeritus*), and discusses the systematic implications of presence of an endemic hummingbird (*Sephanoides fernandensis*) in the Juan Fernández Archipelago, off the central Chilean coast.

Giant Hummingbirds are relatively common in central Chile and adjacent Mendoza Province in Argentina, but they disappear between mid-fall to mid-winter. Nobody knows where they winter, but the meager information available suggests that they migrate northwards, to Peru, Bolivia, and northwestern Argentina. They return to central Chile and Mendoza to breed, reaching as far south as latitude 45°, and occasionally even to the Strait of Magellan (latitude 54°). The Fire-crowns are distributed along the two sides of the Andean Cordillera from Atacama Region (Chile) and Mendoza Province (Argentina) all the way down to Tierra del Fuego Island (50–55° latitude south), and occasionally to the Malvinas (Britons call them Falkland) Islands. They also are found in the Juan Fernández Archipelago. They appear in central Chile in February/March (austral summer), and stay through fall and winter, disappearing almost completely at the start of spring (some stay and nest). The evidence available suggests that they migrate south to the *Nothofagus* forests of southern Chile and Argentina, and nest there.

The situation posed by the Fire-crown population in the eastern island of Juan Fernández Archipelago is puzzling. It is not considered subspecifically different from the mainland population, and apparently continental individuals maintain gene flow by migrating to the island during the summer-time (whether they go back to the mainland is unknown). But the eastern island is separated from the continent by 400 miles; that is a formidable journey with no stepping stones in between! Interestingly, the endemic *Sephanoides fernandensis* has two subspecies, one in the eastern island (that coexists with *S. galeritus*), the other in the western island of the archipelago. And the islands are separated by (only) 100 miles! Ortíz-Crespo poses more questions than he answers, but his little piece of work should stimulate interest of ornithologists in this much puzzling system of migration, biogeography, and evolution.—Fabian M. Jaksić.

8. Neurophysiological properties of magnetic cells in the pigeon's visual system. P. Semm and C. Demaine. 1986. J. Comp. Physiol. 159:619–625.—Extracellular, single unit recordings were made of electrical activity in the nucleus of the basal optic root (nBOR) and in the optic tectum of the pigeon (*Columba livia*). The results indicate that there are neurons in both the nBOR and optic tectum which show a peak in firing rates when the

magnetic field has a specific inclination. This response is analogous to that of the directionally sensitive cells of the visual system. Although several cells responded to specific magnetic field conditions, none showed a response which would be a neural analog to the inclination compass. When tested with selected light wavelengths, individual units gave their greatest response at either 503 nm or 582 nm, but the differences were not significant. The results confirm that single visual neurons of the pigeon can respond to directional changes in magnetic field conditions. The authors propose that detection of the directionality of the magnetic field may occur within the retina rather than within the cortex. How the pigeon discriminates between visual and magnetic information is unknown.—Robert C. Beason.

9. Attempts to demonstrate magnetic discrimination by homing pigeons in flight. G. J. Carman, M. M. Walker, and A. K. Lee. 1987. Animal Learning & Behavior 15: 124–129.—The experiment reported in this paper was an attempt to replicate the experiment by Bookman (1977. Nature 267:340–342) in which flying pigeons were conditioned to different magnetic fields. Although the test apparatuses were similar, there was one obvious difference. In Bookman's experiment, the pigeon was required to make a right or left turn at the end of the tunnel. In the experiment described in this paper, the pigeon was required to shuttle between two feeders, each located at opposite ends of the tunnel. Although the pigeons were unable to distinguish between the natural ambiant magnetic and a magnetic field with the vertical component halved, they could distinguish between the presence and absence of a 440-Hz tone. As the authors point out, their results can be interpreted in several ways. Most interpretations can be categorized into one of two categories: failure of the experimental design to properly test the animals for their sensory ability, or the lack of a sensory ability to detect magnetic fields. They recommend that further work on magnetic sensitivity in pigeons be conducted in the field, where it was shown initially.—Robert C. Beason.

10. Pigeon homing: early experience determines what factors are used for navigation. W. Wiltschko, R. Wiltschko, M. Grüter, and U. Kowalski. 1987. Naturwissenschaften 74:196–197.—The authors report on the experiment to help resolve the conflicting literature regarding the importance of olfaction in pigeon (*Columba livia*). The data presented indicate that early experience is important for the selection of environmental cues to be used later in life for orientation. Birds which were reared with access to winds from all directions relied on olfactory cues during navigation significantly more than birds reared in lofts at ground level. The winds were blocked from the ground level loft by buildings and vegetation, which prevented any olfactory directional cues from reaching the birds. The basis by which birds select which type of information to learn, and the stability of that learning are not known. This paper is an important contribution towards resolving the conflict about the importance of pigeon navigation.—Robert C. Beason.

POPULATION DYNAMICS

(see also 31, 32)

11. Population, biometrics, and movements of the Sanderling *Calidris alba* in southern Africa. R. W. Summers, L. G. Underhill, M. Waltner, and D. A. Whitelaw. 1987. Ostrich 58:24–39.—This work is mostly a synthesis of papers published over the past 11 years as surveys or censuses of Sanderlings along the seacoasts of Namibia and South Africa. Birds arrived in September and November, peaked at an estimated 78,000 individuals, and departed in April. Populations of first-year males fluctuated on a three-year cycle apparently correlated with the lemming cycle on the Taimyr Peninsula, Siberia. A possible explanation given is that the fluctuation is caused by the corresponding cycle of Arctic foxes. First-year birds, although similar in size and bill-length to adults, do not lay on fat reserves as do adults; thus, many first-year birds stay through the austral winter, although some apparently migrate. Migration routes are described for the Palearctic portions of the trips. Migration takes about seven weeks and probably involves three long flights and two stopovers for feeding.—Malcolm F. Hodges, Jr.

12. A comparison of seasonal and annual mortality for both sexes of fifteen species of common British birds. A. P. Dobson. 1987. Ornis Scand. 18:122–128.—Few

studies have sufficient data to estimate mortality rates for both sexes of the same species. Using data from the British Trust for Ornithology's banding program, Dobson assesses annual and seasonal mortality rates for 2 nonpasserine and 13 passerine species.

Survival differences between species were much larger than those between sexes of the same species. Considering all recoveries, only the Kestrel (*Falco tinnunculus*) and Bullfinch (*Pyrrhula pyrrhula*) had significant differences in survival between sexes. For birds recovered at least 1 yr after banding, survival rates were statistically equal between sexes for all but the Sparrowhawk (*Accipiter nisus*), Great Tit (*Parus major*), and House Sparrow (*Passer domesticus*). Among these 5 species, survival was higher in males for all but the House Sparrow. Seasonal patterns of mortality revealed that spring and winter were the periods of highest mortality for both sexes.

Among the passerines considered here, Dobson concludes that "the costs of reproduction are fairly evenly partitioned between the two sexes."—Jeffrey S. Marks.

13. Distribution of the Red-crowned Crane *Grus japonensis* in the breeding season of 1986. H. Masatomi, T. Matsuo, M. Koyama, and I. Matsumura. 1986. Japanese J. Ornithol. 35:47–59. (Japanese, English summary.)—The distribution and breeding status of Red-crowned Cranes were surveyed from a small plane in eastern Hokkaido from 31 May to 2 June 1986, and 275 cranes were observed. These included 57 breeding pairs. A map clearly indicates dispersion of the birds. Tables and figures (with English captions) relate the dispersion to habitat variables. Mean number of chicks per brooding pair was 1.33.—Jerome A. Jackson.

NESTING AND REPRODUCTION

(see also 25, 28, 29, 31, 44, 52, 54)

14. Breeding ecology and conservation of the Black Petrel (*Procellaria parkinsoni*). M. J. Imber. 1987. Notornis 34:19-39.—The Black Petrel once nested on the mainland of New Zealand but is now confined to Great Barrier and Little Barrier islands. One of the world's rarest seabirds, its breeding population numbers perhaps 1000 pairs and the total population approximates 3000–4000 individuals. Imber studied its breeding biology at Little Barrier Island from 1971–1983, largely to determine how the species might be protected.

The general breeding biology of the Black Petrel parallels that of other large shearwaters. Breeding begins at age 6. Males return to burrows and await the arrival of females. Pair formation and mating is accomplished rapidly, after which the birds go to sea for 23 days. The egg, weighing 13% of the female's body mass, is laid within 12 h of her return to the burrow. The male and female alternate four shifts of incubation, with the female being present at hatching, 56 d later; the mean fledging period is 107 d. Pairs may lay every year, but, except for the earliest breeders, rearing a chick generally precludes successful breeding the next year. Black Petrels have a more pelagic foraging range than do White-chinned Petrels (*Procellaria aequinoctialis*), which may account for the former's longer shifts in incubation and the chicks' receiving more food per feeding, although feedings are fewer; the chicks also fledge at relatively greater weights.

Early in this study breeding success was poor, owing to heavy predation by cats on adults and chicks. It improved greatly by 1968–1969, when cats were greatly depleted (they have since been eliminated). The presence of an alternative prey source on Little Barrier—a large population of Cook's Petrels (*Pterodroma cookii*)—was a major factor promoting the decline of the Black Petrel, for the smaller Cook's provided food for the cats, which otherwise would have died out. (For a similar interpretation of the maintenance of a bird predator by an alternative prey source see Savidge, Ecology 63:660–668, 1987.) On Great Barrier Island, where Cook's Petrels are scarce, cats had a negligible effect.—J. R. Jehl, Jr.

15. Allocation of reproductive effort by breeding blackbirds, family Icteridae. G. H. Orians. 1985. Revista Chilena de Historia Natural 58:19–29.—I do not dare to provide my own summary of this superb summary review. What follows is the core of the Abstract, as written by Gordon Orians himself.

"This survey of parental investment patterns in the avian family Icteridae, reveals that

some patterns are highly conservative in the family while others are variable. Among the conservative traits are that females of every species build nests, incubate eggs and feed nestlings and fledglings, and that males apparently never incubate and rarely build nests. Feeding of the incubating female by the male is also very rare in the family. Among monogamous species both sexes feed nestlings and fledglings but males generally feed less than their mates. Males of polygynous species may or may not feed nestlings and there may be considerable intraspecific geographical variation in this behavior."

"These patterns might be explained by assuming that the patterns observed are those that yield the highest fitnesses to the individuals. Alternatively, some of these behaviors may benefit one sex but be detrimental to the other. Evolutionary stabilization in such cases could be achieved if it were difficult for individuals of one sex to predict the behavior of potential spouses, and if terminating the bond once the behavior is known is more disadvantageous than remaining in it. Finally, some aspects of the patterns may reflect evolutionary conservatism within taxonomic lineages. Each of the parental investment patterns is discussed in this context, and ways of distinguishing among the hypotheses are proposed."

The patterns referred to are documented in four tables. In Table 1, blackbirds are classified as monogamous (25 species), polygynous (12 species), or as forming family groups (4 species), and they are also grouped by diet and habitat. Grouping patterns (three categories) with respect to habitats (6 categories), are documented in Table 2. Fourteen species plus most *Icterus* spp. are territorial, 5 species display grouped territories, and 16 species are colonial. Whether males feed (7 species), do not feed nestlings (9 species), or their behavior in this regard is unknown (9 species), is documented in Table 3 for seven Icterid genera. Finally, mating systems (polygynous or monogamous) as related to size dimorphism (percent size difference between sexes) are summarized in Table 4 for 16 Icterid genera.

This is an interesting review that complements and updates Orians' (1980) book on "Some adaptations of marsh-nesting blackbirds," published by Princeton University Press.—Fabian M. Jaksić.

16. Reproductive biology of the chimango (*Polyborus chimango*). [Biología reproductiva del chimango (*Polyborus chimango*).] R. M. Fraga and S. A. Salvador. 1986. El Hornero 12:223–229.—The Chimango Caracara is one of the most abundant raptors in both Argentina and Chile, and is highly tolerant to human presence and related activities. Despite the ease with which this raptor can be observed, no attention has been paid to its biology. Further, the Chimango is one of the few raptors that displays colonial nesting, thus constituting an interesting subject for testing pertinent hypotheses about this phenomenon.

Fraga and Salvador report that the peak of egg laying occurs in October (austral spring), and describe the trees used for nest building, the size and form of the nests, the appearance and size of the eggs, the clutch size (mean = 2.77), the incubation (26 to 27 days) and nestling (32 to 34 days) periods, the development of nestlings from age 0 to 15 days (providing their weights), and the food that parents bring to the nest (orthopterans, amphibians, passerine nestlings, and small mammals). The authors also report observations on colony size (up to 56 nests in 0.7 ha!), distance between nearest nests, and reproductive success (fledging rate = 30%). Finally, they discuss the different hypotheses that have been put forth to explain colonial nesting, and conclude that food concentration (and not nesting place scarcity) is the factor determining the Chimango nesting habits. This little piece of work is a valuable addition to our poor knowledge of this much despised raptor.—Fabian M. Jaksić.

17. Nesting of *Tyto alba* in Cordoba, Argentina. [Nidificación de *Tyto alba* en Córdoba, Argentina.] A. I. Nores and M. Gutiérrez. 1986. El Hornero 12:242–249. (In Spanish.)—Actually, the title is misleading: this article refers not only to nesting but to breeding in general. The authors observed seven nests (6 in old buildings, one in the crown of a palm tree) of Common Barn-Owls, and reported the hunting behavior of the parents, their courtship behavior and pairing, the "nest" and egg aspect, the clutch size (mean = 5.5, n = 26 eggs), incubation period (32.7 days), hatching success (92.3%), interval between successive hatchings (mean = 2 days), mortality of nestlings (several fell from the nest), fledging success (50%), and interval between hatching and abandoning the nest (mean = 64 days). Most of these data are documented in one table. Nores and Gutiérrez also reported

the development of nestlings between 0 and 14 weeks; the growth curve (weight versus time) is presented in a graph. That I am aware, this is the first study ever made on the breeding biology of the Common Barn-Owl in southern South America. Congratulations to the authors!—Fabian M. Jaksić.

18. Magpies nest on the southern shore of the Crimea. [Soroka gnezditsya na Iuzhnom beregu Kryma.] B. A. Appak and A. V. Chernov. 1986. Priroda 10:99–100. (In Russian.)—Magpies (*Pica pica*) are gradually increasing in the Crimea, but at the same time their favored habitat in the steppe and foothills is diminishing. The Magpies have compensated by moving into wooded parts of the steppe, into groves along roads and railroads, and even into the suburbs of Simferopol. Since 1967 they have been encountered on the southern shore of the Crimea, but only in 1984 were they found nesting along a road about 5 km from the sea.

The Magpies start to nest here at the end of February, sometimes incorporating twine or wire from nearby vineyards into the nest structure. Birds nesting right along the road start nest-bulding and egg-laying 10 to 15 days before those who nest away from the road, and lay larger clutches. These probably are older, more successful birds, the younger pairs being less trustful of the road.

When an automobile approaches, the member of a nesting pair "on guard" gives an alarm call, and the other member leaves the nest to hide behind trees on the ground. When a person on foot approaches, both birds fly up very high, with agitated cries.—Elizabeth C. Anderson.

19. Primary cavity-site selection by birds. S. K. Swallow, R. J. Gutierrez, and R. A. Howard, Jr. 1986. J. Wildl. Manage. 50:576–583.—A random sample of 816 snags (standing dead trees) was examined in central New York State to discriminate (using logistic regression) between used and unused snags, and to quantitatively examine forest characteristics surrounding snags. Forest characteristics (total basal area of snags, tree species diversity) around snags were better predictors of snag use by birds than were characteristics of the snags themselves (species and diameter of tree, height, and amount of bark). The authors stress the importance of including both snag and forest variables in forest management plans for cavity-nesting birds.—Richard A. Lent.

20. Biology of the Bank Cormorant, Part 5: clutch size, eggs and incubation. J. Cooper. 1987. Ostrich 58:1–8.—This thorough account results from a 10-year study of Bank Cormorants (*Phalacrocorax neglectus*). Cooper found that clutch size (mean = 2.02) did not vary through the breeding season or with replacement clutches. Vital statistics for Bank Cormorant eggs were: mean dimensions, 59.0 × 38.4 mm; mean mass, 50.4 g; mean mass loss during incubation, 9.4%; composition, 13.3% shell, 17.5% yolk, 69.3% albumen; mean energy content, 207 kJ. Mean egg size decreased with order of laying, and it increased and then decreased over the breeding season. Both parents incubated by placing the eggs on the foot webbing. Mean laying (3.0 d) and hatching (2.7 d) intervals were not significantly different, and laying-hatching intervals, while decreasing in order of eggs laid, did not differ significantly. Sample sizes for interval measurements were small, so insignificance of some results may be in error. Mean hatching period was 1.2 d. Mean temperature of freshly laid eggs was 33.4 C and of nest was 27.7 C.

Bank Cormorants may be the only cormorant to never lay more than three eggs, which appears to be related neither to the mass of the females, nor to the species producing relatively large eggs. Behavioral studies of cormorant nesting success and fecundity may shed some light on this unanswered question.—Malcolm F. Hodges, Jr.

21. Effects of nest location on depredation of artificial arboreal nest. R. H. Yahner and B. L. Cypher. 1987. J. Wildl. Manage. 51:178–181.—Predation on 360 artificial nests, each containing a single chicken egg, was studied in relation to nest height and stand age. During May–August 1985, nests were anchored to woody stems either 0.5 m (low nests) or 1.5 m (high nests) above ground in a series of 1-ha aspen (*Populus*) study plots in central Pennsylvania. Plots were of three age classes: 4-yr-old (clear-cut in winter 1980–1981), 8-yr-old (cut in winter 1976–1977), and mature (approximately 60-yr-old).

Of the 360 nests, 221 (61%) were disturbed by predators during six trials. Of the 221

disturbed nests, 85 (39%) were disturbed by birds, primarily American Crows (*Corvus brachyrhynchos*). Low nests in 4-yr-old plots were the least disturbed by predators, possibly because (1) younger habitats with simpler vegetation structure were less frequented by predators, or (2) low nests were less conspicuous in 4-yr-old plots because of the dense shrub layer. Predator foraging efficiency may have also been reduced in dense vegetation.

Yahner and Cypher caution that, while young clear-cuts in their study appeared to provide well-hidden nest sites, fragmentation of forest habitat may result from management recommendations calling for cutting forests into small stands.—Richard A. Lent.

22. Mating system and nesting biology of the Red-necked Phalarope *Phalaropus lobatus*: what constrains polyandry? J. D. Reynolds. 1987. Ibis 129:225–242.—Only 8% of the female Red-necked Phalaropes nesting on the coast of Hudson Bay, Canada were polyandrous during 5 yr of investigation. Most females were monogamous (75%) and 17% did not obtain mates. The low incidence of polyandry in this sex-role reversed, non-territorial mating system is the focus of this study. The author considers three explanations that might constrain polyandry: (1) degree of breeding synchrony, (2) costs of clutch production, and (3) availability of mates.

During the study, nest initiation for the population covered a period of three weeks. Pair bonds lasted an average of 11 days and ended with clutch completion, and a second clutch was initiated by polyandrous females only 7 d later. Thus it appears that there was ample time for multiple clutches, thereby negating the first hypothesis. The costs of clutch production may have been a factor in limiting polyandry, but the observation that many females after completing their first clutch proceeded to court incubating males or harassed pairs, tends to weaken this constraint hypothesis.

The author concludes that the major factor limiting polyandry appears to be the availability of males. The argument is based on the observation that the phalaropes breed in habitats that are less defensible than those of other role-reversed shorebirds, thereby making it more difficult for females to monopolize males in populations with equal sex ratios. Associated with this observatoin was the finding that sexual size dimorphism, although quite variable, was smaller than in other territorial role-reversed shorebirds. Thus this population was primarily monogamous with sexual selection resulting from the ability of females to opportunistically produce second clutches with receptive males.—J. M. Wunderle, Jr.

23. Food abundance and clutch size of Tree Swallows *Tachycineta bicolor*. D. J. T. Hussell and T. E. Quinney. 1987. Ibis 129:243–258.—Food abundance and clutch sizes were studied in three populations of Tree Swallows in southern Ontario, Canada during eight breeding seasons. The three sites (all within 36 km of each other) differed in food availability, which was measured as an index of the biomass of flying insects derived from daily catches in aerial nets. Mean clutch size differed significantly between sites and was related to average food abundance of the site. At two of the three sites, clutch size increased during years when food abundance increased during the egg-laying period. At the "high" food site, both clutch size and food abundance during the egg-laying period were positively correlated with food abundance during the nestling stage. The results support the hypothesis that female Tree Swallows respond proximately to abundant food during the egg-laying period by laying more eggs. However, the authors caution that their results do not provide an answer to the ultimate evolutionary factors involved in determining clutch size. This is a valuable long-term study which counters some recent studies in which workers have concluded that additional food does not seem to affect the clutch size of passerines.—J. M. Wunderle, Jr.

24. Habitat and nest-site selection by Burrowing Owls in the sagebrush steppe of Idaho. T. Rich. 1986. J. Wildl. Manage. 50:548–555.—Habitat variables measured at 80 Burrowing Owl (*Athene cunicularia*) nest sites were compared (using discriminant function analysis) with those measured at 80 randomly-located sites on the Snake River Plain, southcentral Idaho. Regurgitated pellets collected from 52 nest sites were used to link diet to habitat selection.

Owl nest burrows were in rock outcrops and soil mounds. Occupied sites had greater cover of cheatgrass brome (*Bromus tectorum*), greater habitat diversity, lower elevation, and a more southerly aspect than random sites. Outcrop sites often were in abandoned yellow-

bellied marmot (*Marmota flaviventris*) burrows; those in soil mounds were often in abandoned badger (*Taxidea taxus*) burrows. Owls preferred flat outcrop sites. Primary cover within 50 m of occupied owl burrows was cheatgrass brome and bare ground.

Amount of cheatgrass brome was the best discriminating variable between occupied and random sites, with habitat diversity next best, followed by elevation and distance to water. The discriminant function successfully classified over 77% of the sites. However, the classification success rate dropped to 40% when the function was tested with data collected the following year, illustrating the importance of evaluating the reliability of quantitative wildlife habitat models (see Maurer, J. Wildl. Manage. 50:556, 1986, for similar results using regression analysis of grassland bird-habitat relationships).

Habitat variables were significantly correlated with owl prey species found in pellets, particularly a high positive correlation between area of cheatgrass brome and occurrence of Great Basin pocket mice (*Perognathus parvus*) and burying beetles (*Nicrophorus* spp.). Rich suggests that burrow security and prey availability, particularly the abundance of farmland montane voles (*Microtus montanus*), may explain some of the habitat selection shown by Burrowing Owls. Burrow sites had been disturbed by grazing and fire, leading the author to suggest that this species "may be one of only a few [birds] that benefit from substantially disturbed habitat in the sagebrush steppe."—Richard A. Lent.

BEHAVIOR

(see also 9, 10, 15, 16, 17, 18, 22, 51, 52, 56, 57, 59)

25. Wilson's Phalarope in the central Andes and its interaction with the Chilean Flamingo. S. H. Hurlbert, M. López, and J. O. Keith. 1984. Revista Chilena de Historia Natural 57:47–57.—The authors made observations on *Phalaropus tricolor* in its major wintering area, the high Andean lakes of the Bolivian "altiplano" or "puna" region, shared by Bolivia, Argentina, and Chile. The lakes are saline, and inhabited by substantial numbers of Chilean Flamingo (*Phoenicopterus chilensis*) and two other flamingo species, *Phoenicoparrus andinus*, and *P. jamesi*. The authors report physical characteristics of 10 Bolivian lakes visited (elevation, water surface, and salinity), biotic characteristics (number per liter of two prey species: one calanoid copepod and the brine shrimp), and estimates of the abundances of the three flamingo species (precision: individual level) and of Wilson's Phalarope (precision: hundred individuals).

Whereas the Chilean Flamingo preys mainly on brine shrimp, copepods, chironomid midges, and brine flies, the two other flamingo species feed on diatoms. The Chilean Flamingo moves around more rapidly than the two latter species (the walking rates are quantitatively documented as number of steps per minute), and Wilson's Phalaropes take advantage of this. They swim in close association with walking Chilean Flamingos, and feed on the invertebrates that their companions stir up from the bottom of the lake. The phalaropes almost completely ignore the other two flamingo species.

These associations (or lack of said associations) to the three flamingo species are quantified as number of phalaropes in attendance per flamingo. The Chilean Flamingo does not seem to bother about its kleptoparasites (or commensals?). Given that Wilson's Phalarope shares the same diet with the Chilean Flamingo, that human egg harvesters have reduced the Chilean Flamingo population in Bolivian lakes, and that this has been shown to result in increased prey populations, it should be interesting to evaluate whether the phalaropes benefit more from the presence (facilitation of prey capture) or absence (increase of prey populations) of the Chilean Flamingo.—Fabian M. Jaksić.

26. Four years with the swifts. [Chetyre goda ryadom so strizhami.] G. D. Serov. 1987. Priroda 4:68–73. (In Russian.)—Because nests of the Common Swift (*Apus apus*) are usually inaccessible, it has been hard to study their behavior. This article presents observations made at nest boxes on a balcony in Novosibirsk, USSR.

Although Common Swifts almost never land on the ground, they can take off from a flat surface, as was demonstrated when once a swift lost its grip on the nest box's entry hole and fell onto the balcony. The author placed the bird next to an opening in the balcony balustrade and expected the bird to crawl to it and then dart off downward. Instead, the

swift spread its wings, struck them against the floor, and instantly disappeared through the 10-cm-wide opening.

The author noticed that birds landing at the nest box erected body plumage, probably to increase drag and slow themselves down. He wonders if they can create "ripples" along their streamlined bodies by erecting plumage first on one side and then on the other to enhance their aerobatic flight, much as dolphins ripple their hide when encountering aquatic vortices.

A week after moving into the nest box, the swifts lay their first egg, followed by usually two more at intervals of three or four days. Both parents incubate as soon as the first egg has been laid; the young hatch after 19–20 days, at the same interval as between egg-laying. Five or six days before hatching begins, the parents line the nest cup with feathers they have caught in the air. They remove the eggshells and eat the young's fecal sacs to keep the nest clean and dry.

One year two pairs of swifts nested on the author's balcony, the second pair starting three weeks after the first. Both pairs laid three eggs each. The third egg of the first pair was infertile, and the parents rolled it out of the nest cup and did not incubate it. The second pair's third egg was discovered to have a hole in the shell, and the partially-developed embryo was dead and dessicated. Doubting that the parents harmed their egg accidentally, the author speculates that they might have made the hole deliberately, because their clutch was so late.

Both parents fed the young. A male, returning with a mouthful of food, was seen to touch the head of the sitting female; only then did she move off the clutch. Then the male literally sat on top of the 3-cm chick and "somewhere underneath of himself" began to feed it. While the young were still unfeathered, the parents fed them about once an hour (less frequently than do other birds their size); when the young were older they were fed only seven or eight times a day. Apparently the only water Common Swifts consume is that contained in their food.

While the young birds would defecate from fright when handled, the adults remained calm when held or when the author looked into the nest box; they merely stopped what they were doing and gazed back. They were so tame that the author managed to photograph one that was sitting on his couch and investigating a box of matches.—Elizabeth C. Anderson.

27. Relationships of diet and roosting behavior in the European Starling. J. Fischl and D. F. Caccamise. 1987. Am. Midl. Nat. 117:395–404.—Communal roosting flocks provide several potential benefits for individuals, one of which is an increase in foraging efficiency. Several hypotheses to elucidate roosting/foraging relationships have been proposed, but supporting data are lacking. In this study, the authors examined the diets of roosting European Starlings (*Sturnus vulgaris*) from early June to early November. They propose that if foraging benefits among roosting birds do occur, then changes in diet should correspond with changes in roosting behavior as the season progresses. Diet in the early part of the season, when communal flocks were small and scattered, consisted largely of insects (65%). After mid-July, animal material decreased and was replaced by fruit, which became increasingly important as starlings coalesced into larger flocks. This dietary change corresponded with the change in flocking behavior, suggesting that foraging locations were shifted to high-density food patches capable of being efficiently exploited by large numbers of birds. These results indeed hint that large roosting flocks are the result of starlings gathering near high density food patches, but they do not necessarily imply that large roosts must be formed in order for starlings to exploit such resources late in the season. Thus, the relationship of diet and roosting behavior in starlings show clear trends, but the cause and effect relationship (roosts resulting from exploitable food vs. roosts resulting from other benefits with exploitable food as fortuitous payoff) is still unclear.—D. J. Ingold.

28. Copulation behaviour in birds. T. R. Birkhead, L. Atkin, and A. P. Møller. 1987. Behaviour 100:101–138.—"Why is it that when a single insemination is sufficient to fertilize all eggs of a clutch, . . . some female birds, like the Goshawk *Accipiter gentilis* copulate over one hundred times prior to egg-laying while others, like the Skylark *Alauda arvensis* copulate only once?" Toward answering this question, the authors have assembled information on the frequency, timing, and form of copulation for 131 species. Four hypotheses

are tested: (1) the fertilization hypothesis states that copulation occurs only as often as required to fertilize the entire clutch; (2) the social-bond hypothesis states that variation in copulation frequency is a function of the formation and maintenance of pair bonds and/or the stimulation of follicle growth; (3) the predation hypothesis states that copulation frequency is related to the risks of predation; and (4) the sperm-competition hypothesis states that copulation frequency is related to the risks of extra-pair copulation.

Clearly, copulation frequency varies widely among bird species. After a methodical assessment of the predictions of the 4 hypotheses, the authors reject outright the fertilization hypothesis and tentatively reject the social-bond and predation hypotheses. Several lines of evidence point to sperm competition as the factor most likely to explain variation in copulation frequency: (1) copulations are frequent in species where males cannot guard their mates; (2) copulations are frequent in polyandrous species; (3) copulations occur inside the hole-nests of colonial species but outside the hole-nests of solitary species; and (4) extra-pair copulations are often followed by forced-pair copulations.

The authors admit that "many of our data constitute extremely crude measures of copulation frequency." Nonetheless, this stimulating paper is the first detailed review of copulation behavior in birds, and the authors have made the best of what is an extremely difficult data set to assemble. This paper belongs in the library of anyone interested in the behavior of birds.—Jeffrey S. Marks.

29. Extent and duration of mate guarding in swallows *Hirundo rustica*. A. P. Møller. 1987. Ornis Scand. 18:95–100.—Male birds that protect paternity by mate guarding have less time to forage and to seek extra-pair copulations (EPCs). Thus, males should seek to balance the costs and benefits of mate guarding vs. other behaviors. Mate guarding could be affected by (1) the experience and condition of the male, (2) the number and dispersion of close neighbors, and (3) the operational sex ratio in the population. Here, Møller examines the factors affecting mate guarding in Barn Swallows nesting in Denmark.

Indeed, mate guarding was influenced by a number of factors. Both larger and older males guarded for longer parts of the nesting cycle than did smaller or younger (i.e., less-experienced) males. Males nesting in colonies began guarding earlier, guarded for a longer time, and guarded at higher rates than did non-colonial males. The lower the male : female ratio, the lower the guarding intensity. Early-breeding males obtained the most EPCs, whereas late-breeding males and males that began guarding later in the nesting cycle were the most likely to be cuckolded.—Jeffrey S. Marks.

30. Dominance hierarchy among wagtail and pipit species living along streams. T. Hirano and H. Higuchi. 1986. Japanese J. Ornithol. 35:79–80. (Japanese, English summary.)—An almost linear hierarchy was found among Motacillid species and sexes along a stream habitat in central Japan. Males dominated females; *Motacilla grandis* dominated *M. alba, M. alba* dominated *M. cinerea,* and *M. cinerea* dominated *Anthus spinoletta.* The authors noted that dominance status was not necessarily related to body size.—Jerome A. Jackson.

ECOLOGY

(see also 11, 13, 24, 43, 47, 48, 49, 55, 56, 57, 58)

31. Responses of wading birds to seasonally fluctuating water levels: strategies and their limits. J. A. Kushlan. 1986. Colonial Waterbirds 9:155–162.—In this review paper Kushlan considers strategies of Wood Storks (*Mycteria americana*) and White Ibises (*Eudocimus albus*) to seasonal water level fluctuations in the southern Florida Everglades. Fourteen of the 21 references are to papers in which Kushlan is an author. Eighty-five percent of the rainfall occurs from June to December, producing recession of surface water in spring to ponds and deeper marshes. Sixty-five percent of the original Everglade wetlands has been eliminated by drainage. Patterns and timing of water level changes have been influenced by levee construction. Both ibises and storks are tactile feeders, with crayfish constituting 66% of ibis diets while storks feed exclusively on fish. When water levels drop, storks feed on the highly concentrated fish populations which have migrated to ponds. Ibises must forage in shallow water marsh sites since crayfish do not migrate, but rather burrow

into the marsh as water levels drop. Both ibises and storks undertake seasonal movements which reflect the pattern of drying in spring. The storks concentrate at ponds while the ibises spread out in the marshes at the drying edge of standing water. White Ibises usually begin breeding in March but may nest as late as fall, and thus forage on both the falling and rising water levels. Wood Storks, since 1962, have shifted the onset of their breeding cycle from October–December to December–March, causing considerable nesting failure due to the onset of the rainy season in May before nesting is completed. Storks use the same colony sites year after year and may fly 80 km to forage on seasonally concentrated fish. Ibises, however, are largely nomadic and establish colonies near current food supplies that will last through their short 60-day nesting period.

Wood Storks have nested successfully in only three years between 1962 and 1982, and White Ibises have not nested in large numbers since 1973. This suggests that ecological conditions have been unfavorably altered for these species in southern Florida. The levee system has resulted in deeper water upstream from the levees, and management procedures have altered both the patterns and timing of drying. Kushlan implies that slowing water level decline may have been responsible for the devastating shift to later breeding by Wood Storks. Kushlan concludes with the suggestion that wetlands managers should be sensitive to the possible effects of surface water manipulation changes such as the rate of water level decline.—William E. Davis, Jr.

32. The structure and seasonal dynamics of the bird community in Tsavo East National Park, Kenya. P. C. Lack. 1987. Ostrich 58:9–23.—In this rare study, a tropical land bird community was censused each month for two yr. Seven habitats were delineated, and abundance of four major food groups was sampled each month for a year. Two rainy seasons, one from mid-November to late December and a short season in April, occur each year. Seeds and arthropods peaked in December and January after the first rains, and showed a smaller peak after April. Peaks of fruit abundance were more complex and depended on the habitat type. Nectarivores were found to be a relatively insignificant fraction of the community studied.

Granivores and insectivores increased sharply in the rains due to influx of immigrants, most granivorous immigrants being intra-African migrants/visitors, and insectivores being largely Palearctic migrants. In the woodland habitat, fruiting of *Commiphora* in the dry season affected the community dynamics greatly, and a predominance of polyphagous resident birds was noted. Average density, biomass, energy requirements, and diversity of the bird community were broadly correlated with increasing complexity of vegetation within habitat types. In more open habitats studied, density, biomass, and energy requirements were lowest in the dry season and increased five times during the rains.

Results of the study are compared with other African community-structure work done with birds. Also, the relative importance of the bird community of the Park is compared to the mammal and lizard communities there.—Malcolm F. Hodges, Jr.

33. Development and testing of linear regression models predicting bird-habitat relationships. M. L. Morrison, I. C. Timossi, and K. A. With. 1987. J. Wildl. Manage. 51:247–253.—Using bird abundance and vegetation data from a mixed-conifer forest in the California Sierra Nevada, the authors apply stepwise multiple linear regression to develop, for 21 bird species, "bird-habitat models that serve as descriptors of the ability of a habitat variable to predict the abundance of a species." An existing forest inventory database provided vegetation data (collected in 0.047-ha circular plots). Birds were counted in 30-m radius plots centered on the vegetation sample points. The study area was 420 ha in area. Cross-validation of regression models was accomplished using multi-year data sets; "same place, different time" and "different place, different time" validations were performed.

Adjusted R^2 values were low (range 0.02 to 0.24) in regression models computed using combined data from all 3 yr of the study. "Same place, different time" validations produced 25–50% underestimates of bird abundances; "different place, different time" validations underestimated abundances by 50–75%. However, observed abundance values generally fell within confidence intervals of the predictive equations. The regression models "failed to adequately predict bird abundance," although the authors assert that their models could successfully predict presence-absence of most species.

Results suggest that forest inventory data may be inadequate to predict bird abundances, and that more intensive single-species studies will be required to gain this level of prediction. The authors acknowledge that unknown or unmeasured factors may have contributed to an inter-year decline in bird abundance during the course of the study, contributing unexplained variation to their models. Also, it has been shown elsewhere (Meents et al., Ecology 64: 1022, 1983) that significant non-linear relationships may exist between bird densities and vegetation variables, which may confound assumptions of linear statistical models.—Richard A. Lent.

34. Forest type, timber size class, and New England breeding birds. R. M. DeGraaf and N. L. Chadwick. 1987. J. Wildl. Manage. 51:212–217.—In the White Mountain National Forest of New Hampshire and Maine, breeding birds were grouped according to their association with forest cover type and/or timber size class. Cover type influenced distributions of 30 bird species, termed "cover type obligates," including Boreal Chickadee (*Parus hudsonicus*) and White-winged Crossbill (*Loxia leucoptera*). "Timber size class obligates" included Least Flycatcher (*Empidonax minimus*) and Magnolia Warbler (*Dendroica magnolia*). Distributions of 13 species (e.g., Yellow-bellied Flycatcher, *Empidonax flaviventris*; Winter Wren, *Troglodytes troglodytes*) were influenced by the interaction of cover type and timber size class. A fourth group was termed "habitat generalists" and included Ruffed Grouse (*Bonasa umbellus*) and American Crow (*Corvus brachyrhynchos*). The authors conclude "that groups of breeding forest birds respond differently to . . . timber size class and cover type," and they provide information that will be useful in habitat management for those species.—Richard A. Lent.

35. Characteristics of northern hardwood trees used by cavity-nesting birds. D. E. Runde and D. E. Capen. 1987. J. Wildl. Manage. 51:217–223.—Characteristics of 110 active nest trees of Yellow-bellied Sapsuckers (*Syphrapicus varius*; $n = 38$), Hairy Woodpeckers (*Picoides villosus*; $n = 21$), Downy Woodpeckers (*P. pubescens*; $n = 7$), and Black-capped Chickadees (*Parus atricapillus*; $n = 44$) were studied in a Vermont northern hardwoods forest. Nest trees were compared with adjacent non-nest trees judged to provide potential cavity sites.

Each species of cavity nester selected nest trees differing significantly in at least two characteristics from non-nest trees. Wood decay was associated with presence of cavity nests. In general, woodpeckers and the sapsucker used live, deciduous trees with decayed heartwood (often showing characteristic fungal fruiting bodies), broken branch stubs, broken tops, or old cavities. Chickadees were associated with dead, highly decayed, deciduous trees with broken tops. Runde and Capen present criteria that will aid resource managers in providing suitable cavity nest trees in northern hardwoods forests.—Richard A. Lent.

36. Effects of fuelwood cutting on birds in southern New England. N. L. Chadwick, D. R. Progulske, and J. T. Finn. 1986. J. Wildl. Manage. 50:398–405.—Fuelwood cutting is a form of uneven-aged forest management in which cutting intensity varies widely, producing small-scale, patchy disturbance to the vegetation. To examine the effects of fuelwood cutting on central Massachusetts birds, Chadwick et al. sampled breeding bird populations and vegetation structure in 22 forest stands subjected to fuelwood harvesting and nine uncut (≥ 60 yr old) stands. Multivariate data analysis was used to search for bird-habitat patterns.

Birds and vegetation differed significantly in cut versus uncut stands, with strong relationships among bird and habitat variables. Fuelwood cutting produced open canopies and dense ground vegetation. Rufous-sided Towhees (*Pipilo erythrophthalmus*), Common Yellowthroats (*Geothlypis trichas*), Blue Jays (*Cyanocitta cristata*), Black-and-white Warblers (*Mniotilta varia*), and Chestnut-sided Warblers (*Dendroica pensylvanica*) were abundant in cut strands. Cavity nesters and species requiring mature forests dominated uncut areas. Intense fuelwood harvesting reduced cavity nester foraging and nesting sites through removal of dead trees, which are often the first trees removed during fuelwood harvesting. Cutting did not eliminate any bird species. However, some species (i.e., Ovenbird, *Seiurus aurocapillus*, and Wood Thrush, *Hylocichla mustelina*) "responded negatively to opening of the canopy and the development of a thick understory." Cut stands supported approximately 40 species of birds versus about 20 for uncut stands.

The authors conclude that fuelwood cutting was neither beneficial nor detrimental to birds, with some species responding favorably, some unfavorably. They describe management techniques involving manipulation of vegetation structure and dead tree abundance, noting that leaving even a little overstory in cut areas will maintain many bird species more commonly found in forest interior habitat.—Richard A. Lent.

37. Territory size, energetics, and breeding strategy in the Corvidae. C. C. Shank. 1986. Am. Nat. 128:642–652.—Various factors that may influence variation in territory size were investigated from data compiled from the literature on 18 species of corvids. No simple relationship existed between territory size and body size among the species. Net primary productivity of the species' habitats was estimated from an "actual evapotranspiration" index using climatic data. Territory productivity (calculated as net primary productivity multiplied by territory size) did not seem to affect the relationship between territory size and body size. Corvid group size and body size, used to estimate group energy requirements, was significantly correlated with territory size. When plural-nesting species (those having more than one nest per territory) were separated from singular nesters, it was shown that the individuals of the former group have less available food energy than individuals of the latter group. In other words, for a given group energy requirement, singular nesters have a higher annual primary production per territory than plural nesters.

The major contribution of this study seems to be the introduction of social factors into the interspecific relationship between territory size and body size.—George Kulesza.

38. Breeding bird populations in relation to vegetational change in a grassland in Hokkaido. Y. Fujimaki and M. Takami. 1986. Japanese J. Ornithol. 35:67–73.—This 3-year study of a 5.6-ha site documents avifaunal changes in a grassland environment that was grazed. The major habitat factor which changed with grazing was the height of vegetation during mid-June and mid-July: pre-grazing height was nearly double the post-grazing height in mid-May and more than triple in mid-June. Thirty-nine bird species were recorded from the site; 13 established territories there. After grazing, *Acrocephalus bistrigiceps* and *Locustella ochotensis* disappeared from the site. Other species' numbers increased or decreased slightly, but the total bird density decreased with the decreased species diversity.—Jerome A. Jackson.

39. Field notes on the Philippine Barred Rail *Rallus torquatus*. H. Morioka and D. McWhirter. 1986. Japanese J. Ornithol. 35:76–78.—Habitat of *R. torquatus* included grassy swamps, mowed fields, abandoned paddy fields, mangroves, and a horse stable area with tall grasses. The birds were shy, but quick to return following disturbance (such as a car passing). Duets and single calls were recorded by DM and were described as similar to the calls of *R. okinawae*. A nest and eggs are described.—Jerome A. Jackson.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(see also 6, 19, 21, 24, 31, 34, 35, 36, 38, 43)

40. The role and potential of man-made and man-modified wetlands in the enhancement of the survival of overwintering shorebirds. N. C. Davidson and P. R. Evans. 1986. Colonial Waterbirds 9:176–188.—In this paper the authors argue that conservation efforts in estuaries are largely directed towards remaining intertidal mud and sandflats, but that more attention should be paid to conserving peripheral wetlands, especially those that are man-made which can serve as important secondary feeding areas for overwintering shorebirds. Shorebird mortality may be high on the wintering grounds, especially during severe winters, and may be influenced by the reclamation of high tidal feeding areas. The authors specifically report on the use of peripheral wetlands by shorebirds at Teesmouth, England during the severe winters of 1978–1979 and 1981–1982. The Teesmouth estuary has lost more than 90% of its intertidal land to reclamation, some now supporting chemical industries and a nuclear power plant. Teesmouth still supports an important wintering shorebird population, and reclamation has left a substantial suite of peripheral man-made wetlands, including rough-grass pastures, brackish pools, and high-tide mudflats and sandflats. Simultaneous counts of birds feeding and roosting during the winter study periods provided data for the analysis of peripheral wetland use by 7 species of shorebirds and shelducks (*Tadorna tadorna*).

In the early 1970s reclamation destroyed the higher level mudflats, reducing the tidal exposed areas from 12.5 h to about 8 h per day, thus threatening particularly the smaller (lighter) shorebirds such as Dunlin (*Calidris alpina*) and Redshanks (*Tringa totanus*) which in winter required the largest foraging times. During the 1978–1979 winter these species foraged more extensively in peripheral wetlands during high tide when flats were covered with water than did other, predominantly larger species. There were marked seasonal differences in peripheral habitat usage both within and among the shorebird species studied. Habitat use in some species also showed intraspecific age and sex differences. Seasonal patterns of peripheral habitat use among species also differed during low tide when use of peripheral wetlands was generally lower. Most species fed in sheltered areas at low tide, suggesting that wind is an important factor in influencing foraging behavior.

The authors suggest that the ". . . creation, reinstatement or enhancement of peripheral habitats at coastal wetlands is a viable approach to the conservation of shorebirds on reclaimed estuaries," and offer guidelines for implementing these conservation efforts.—William E. Davis, Jr.

41. Use of the herbicide 'Dalapon' for control of *Spartina* encroaching on intertidal mudflats: beneficial effects on shorebirds. P. R. Evans. 1986. Colonial Waterbirds 9:171–175.—Cord-grass (*Spartina anglica*) is colonizing intertidal land in many areas of Britain and threatens to significantly reduce mud and sandflats which currently are used by foraging wildfowl and shorebirds. Birds generally do not feed in the *Spartina* swards where the invertebrate population is lower than in adjacent mudflats. The author shows that shorebird foraging patterns were affected by the use of "Dalapon" (sodium dichloropropionate) to treat encroaching *Spartina*. The study was conducted at the Lindisfarne National Nature Reserve in northern England, which has internationally important populations of ducks and large populations of five species of wintering shorebirds. Counts of Redshanks (*Tringa totanus*), Curlew (*Numenius arquata*), Black-bellied Plover (*Pluvialis squatarola*), Bar-tailed Godwits (*Limosa lapponica*), and Black-headed Gulls (*Larus ridibundus*) in strips 50–60 m wide of untreated *Spartina*, swards treated 1–2 yr and 3–4 yr before, and open mud, showed significantly non-random distribution for all species. The density of birds in the strip sprayed 1–2 yr before was significantly higher than in other strips, and *Spartina* swards had the lowest density. Evans suggests that sediment characteristics, food abundance, and vegetation height all play a role in determining the relative use of the various strips. The amphipod *Corophium*, for example, was absent in the swards and in greatest abundance in the strip sprayed 1–2 yr before. Evans concludes that the use of Dalapon to control *Spartina* was effective in the short-term and beneficial to shorebirds, but that regrowth of *Spartina* had occurred in the 3–4 yr old strip, suggesting a need to respray. Thus unless methods of long-term control not requiring spraying can be found, and thus allow the regrowth of eel-grass, the benefits to herbivorous waterfowl are limited.—William E. Davis, Jr.

CONSERVATION AND ENVIRONMENTAL QUALITY

(see also 14, 25, 31, 38, 40, 50, 62, 63)

42. Plastic pellets in New Zealand storm-killed prions (*Pachyptila* spp.) 1958–1977. P. C. Harper and J. A. Fowler. 1987. Notornis 34:65–70.—Plastic pollution in the oceans, whether in the form of driftnets that ensnare birds and mammals in addition to their intended target species, or of floating debris such as resin pellets, styrofoam cups, etc., is currently the subject of international attention. How serious is the problem? Is the mortality among seabirds an unavoidable cost of commercial fishing, for example, or are the population consequences of "incidental kills" too great to be tolerated by some species. Is floating debris mainly an aesthetic insult, or does its ingestion lead to increased mortality? And, is this form of pollution increasing?

Prions are good subjects for monitoring plastic pollution because they are numerous and widespread in the southern oceans and obtain their food from the sea surface. In a 21-yr study of beached prions in New Zealand, Harper and Fowler examined the stomach contents of nearly 2000 individuals of 5 species, finding plastics in 15%. There was no difference in its incidence in juveniles and adults. There was, however, a strong inverse correlation between body mass and the number of ingested particles, indicating that floating

debris was mistaken for food during periods of scarcity. The alternative interpretation—that the mortality was a result of ingestion—was rejected because weights of birds that had not fed on plastics did not differ from those that had.

When the authors began this study in the late 1950s they found no plastic debris in the prions. Although they claim that there has since been a steady increase in frequency, their data seem to show essentially no change since the mid-1960s, which we may hope indicates that this problem is not intensifying, at least in the Southern Hemisphere.

This paper is an excellent example of how beached-bird studies can yield unexpected dividends. Data-gathering is unpleasant, for obtaining reliable data requires processing large numbers of decomposing birds. But the results are important and deserved to be extended. Would data from seabirds in the Northern Hemisphere provide similar results? Are there stout observers willing to look?—J. R. Jehl, Jr.

43. Effects of reforestation on the bird community: a different case. [Efectos de una repoblacion forestal sobre la communidad de aves. Un caso diferente.] J. Potti. 1986. Ardeola 33:184–189. (Spanish, English summary.)—In an earlier study, Potti (1985. Ardeola 32:253–277) found that in highland areas of the Sistema Central mountains of Spain, avian population densities and species richness was greater in pine forest than in shrublands. This study was conducted in the foothills (990–1100 m) in May 1982 in planted forests of *Pinus pinaster* and *P. nigra* and in nearby natural scrub. The bird community of the lowland pines was neither denser nor more diverse than in the shrubland. Potti concludes that replacement of the lowland scrub with pine forest brings about important decreases in Mediterranean and tropical migrant bird species.—Jerome A. Jackson.

PARASITES AND DISEASES

44. Infestations of *Carnus hemapterus* Nitzsch (Diptera: Carnidae) in Northern Saw-whet Owls. R. J. Cannings. 1986. Murrelet 67:83–84.—*Carnus hemapterus* is a tiny fly that typically is found on the young of hole-nesting birds. Its parasitic nature is poorly known, although Fitzner and Woodley (Raptor Res. 17:28–29, 1983) suggested that it feeds on blood.

One of 3 Northern Saw-whet Owl (*Aegolius acadicus*) nests monitored in southern British Columbia in 1985 was heavily infested with adult *C. hemapterus*. The insects concentrated in the axillary regions of the nestlings, and all infested nestlings had axillary bruises. Four of 6 nestlings in the infested nest died within 4 d after hatching. This nest had been used the previous year by European Starlings (*Sturnus vulgaris*), and all 13 starling nests found in 1985 had at least minor infestations of *C. hemapterus*. Only 1 fly was found in a saw-whet nest that had not been used by starlings the previous year.

Cannings supports the notion that *C. hemapterus* is a blood feeder and suggests that the deaths of the saw-whet nestlings were caused by the parasites. He also suggests that nests are more likely to be infested if they have been used previously by starlings.—Jeffrey S. Marks.

PHYSIOLOGY

(see 8)

MORPHOLOGY AND ANATOMY

(see also 8, 17)

45. An osteological key to the identification of Iberian Passerines. II. Hirundinidae, Prunellidae, Sittidae, Certhiidae, Troglodytidae, Cinclidae, Laniidae, Oriolidae, Corvidae, Sturnidae, Motacillidae. [Clave osteologica para la identificacion de los Passeriformes Ibericos. II. . . .] E. Moreno. 1986. Ardeola 33:69–129. (Spanish, English summary.)—This well-illustrated paper provides a verbal, statistical, and visual guide to the skulls and postcranial skeletons of passerines from the Iberian peninsula. Although sample sizes are small (usually <10) and sex and age differences are generally not presented, this key is an important contribution to comparative morphology and should be of particular value to those who study raptor food habits by means of pellet analysis. Earlier papers by

Moreno on variability in the Passerine sternum (1983. Ardeola 30:109–113) and osteological keys to other Iberian Passerines (1985. Ardeola 32:295–377) will also be of interest.—Jerome A. Jackson.

PLUMAGES AND MOLTS

(see also 54)

46. Nestling and fledgling plumages of *Cuculus saturatus horsfieldi* and *C. poliocephalus poliocephalus* in Japan. H. Higuchi and R. B. Payne. 1986. Japanese J. Ornithol. 35:61–65.—Adult Himalayan and Little Cuckoos (*C. saturatus* and *C. poliocephalus*) have similar plumages and share some of their host species. Higuchi and Payne describe differences that allow researchers to distinguish the species' nestlings.—Jerome A. Jackson.

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 7, 18)

47. Abundance, distribution and habitat use by anatids in the Virgin Islands. R. L. Norton, J. A. Ynterma, and F. W. Sladen. 1986. Carib. J. Sci. 22:99–106. A stable population of the only U.S. Virgin Islands resident duck, the Bahama Pintail (*Anas bahamensis*), is dependent on coastal ponds with low salt concentrations, emergent and submergent vegetation (predominately mangroves), and natural course drainage. Migrant species of ducks appear to use the same habitats as the resident species.—Tristan J. Davis.

48. The breeding birds of a sandsage prairie. L. Herbert. 1986. Bull. Kansas Ornithol. Soc. 37:41–42.—Eight census trips were done to accumulate data on the breeding birds of an intact sandsage prairie. Eighteen species and 41.9 birds/40 ha. were recorded. Also included are observations of breeding activity during the census period and a list of avian "visitors" to the study plots.—Tristan J. Davis.

49. Distribution-abundance relationships of some Arizona landbirds: a matter of scale? C. E. Bock. 1987. Ecology 68:124–129.—Avian ecologists have noted that the most abundant species found at particular census sites also occur in the greatest number of different census sites. In this paper, Bock examines the positive correlation between abundance and range size among species of passerines and woodpeckers in various habitats during the winter in the Huachuca Mountains of Arizona. Range sizes of species were determined from Christmas bird count data. Bock specifically tested whether the abundance-range size correlation was (1) due merely to different species' conspicuousness, or (2) due to the occurrence of habitat generalists that are not especially abundant in any habitat. By recording "detection distances" for each species, Bock rejected the hypothesis that the more abundant species at a site were also the more conspicuous species. He also rejected his second hypothesis and showed that the abundance-distribution correlation does not depend on the geographic scale of the habitat comparison.

These results suggest that avian communities might be structured not so much by interactions among species, but rather by abundance patterns of individual species. This may lead to a rethinking about how ecologists should proceed in studies of community structure.—George Kulesza.

SYSTEMATICS AND PALEONTOLOGY

(see also 7)

50. Age and diet of fossil California Condors in Grand Canyon, Arizona. S. D. Emslie. 1987. Science 237:768–770.—Has the decline of the California Condor (*Gymnogyps californianus*) occurred only within the past two centuries or was the condor extirpated at the close of the Pleistocene in conjunction with the disappearance of the megafauna (horses, camels, bison, ground sloths, etc.)? The author tests these two hypotheses with a new technique—tandem accelerator mass spectrometer (TAMS), which provides accurate radiocarbon analysis of very small samples of organic material and thus provides a means of obtaining dates on many fossil birds. To determine the exact time and cause of the condor's

extinction the author obtained dates for fossil condors and their food from eight caves in the Grand Canyon and at five sites in New Mexico and Texas. Associated with the fossil condors were bones or bone fragments of horses (*Equus* sp.), bison (*Bison* sp.), mammoth (*Mammuthus* sp.), camel (*?Camelops* sp.), and extinct mountain goat (*Oreamnos harringtoni*), all of which were likely condor food items. The radiocarbon data indicate that the condor became extinct in the Grand Canyon, and other parts of the inland West, more than 10,000 years ago in coincidence with extinction of the megafauna. If Pleistocene condors indeed depended on large mammal carcasses, then their disappearance from most areas at the end of the Pleistocene may be traced to loss of food source.

So why did the condor survive in its present limited range along the Pacific coast? The author suggests that the Pacific coastal population survived by feeding primarily on beached carcasses of whales, seals, and fish, marine animals not affected by late Pleistocene extinctions. This appears to be a reasonable argument, given that the closely related Andean Condor (*Vultur gryphus*) frequently feeds on marine animal carcasses. Of course, the discovery of inland condor remains that significantly postdate 10,000 B.P. would falsify these hypotheses.

If the present California Condor captive breeding effort proves successful, the results of this study would be relevant to suggestions of releasing condors in the Grand Canyon. Since the condors could not survive after the close of the Pleistocene, with the loss of the megafauna, it is unlikely they could survive there today without food supplementation.—J. M. Wunderle, Jr.

EVOLUTION AND GENETICS

(see also 7, 15, 22, 61)

51. Coevolution and avian brood parasitism: cowbird eggs show evolutionary response to host discrimination. P. Mason and S. I. Rothstein. 1986. Evolution 40:1207–1214.—Rufous Horneros (*Furnarius rufus*) are apparently particularly dependable and productive breeders, and hence may become dominant hosts for Shiny Cowbirds (*Molothrus bonariensis*). But horneros are able to detect and eject cowbird eggs on the basis of their relative width alone. In natural observation and experimental manipulation, cowbird eggs less than about 88% the width of hornero eggs were ejected. Host detection based on a single characteristic of egg variation is not otherwise known.

In Uruguay, cowbird eggs are wider than they are across the Rio de la Plata in Buenos Aires Province; hornero egg size does not change. Cowbirds are also apparently more successful in hornero nests in Uruguay (58% success, vs. 15% in Buenos Aires). The authors suggest that egg width has increased in Uruguay under selection from horneros (coevolution is mentioned). Buenos Aires, they point out, was historically treeless and not suitable for horneros until the habitat alteration that accompanied European settlement. Hence, in Buenos Aires cowbirds have only recently come under selection from horneros. Presumably, the authors would predict that Buenos Aires cowbird eggs will widen. One wonders over what period of time such a change might occur.—Peter F. Cannell.

52. Sexual selection, mating systems, and the evolution of avian acoustical displays. C. A. Loffredo and G. Borgia. 1986. Am. Nat. 128:773–794.—These authors predicted that male courtship vocalizations, among polygynous species (where males do not contribute to parental care) have converged in quality, and differ significantly from male vocalizations of monogamous species. Vocal recordings obtained from the Library of Natural Sounds at Cornell University were analyzed from 158 species to test these hypotheses. Data were collected on the occurrence of various sound classes (e.g., whistles, trills, clicks, harsh slurs, etc.), and the frequency range of each sound class.

As predicted, the polygynous species used certain sound classes more often than did the monogamous species. The average range of sound frequencies was greater in males of polygynous species than in monogamous species. This pattern was found in several unrelated avian families including the Phasianidae, Ptilonorhynchidae, and Paradisaeidae which all showed a convergence toward harsh-sounding courtship vocalizations in polygynous species. Among the polygynous species, further differences in sound production occurred in "lekking" vs. "exploded-arena" species.

Loffredo and Borgia considered several alternative explanations for these patterns.

They felt that female choice for males that produce aggressive-sounding displays may best explain why certain vocalizations are associated with particular mating systems. The major conclusion is that male courtship vocalizations have converged among unrelated groups because of the similarity in functional context of the sounds.

This is a truly impressive paper that illustrates how the comparative approach and "adaptive reasoning" can be applied to a study of avian vocalizations.—George Kulesza.

53. Optimizing Great Tit clutch size in a fluctuating environment. M. S. Boyce and C. M. Perrins. 1987. Ecology 68:142–153.—Evidence for a "cost of reproduction" in terms of decreased adult survivorship, postulated years ago by Williams (Am. Nat. 100: 687–690, 1966), has led to conflicting conclusions among various studies of passerine birds. In this paper, 24 yr of Great Tit clutch-size data from Wytham Wood (Oxford, England) were used to determine whether the "cost hypothesis" is sufficient to explain the disparity between the observed average clutch size and the predicted "most productive" clutch size. Linear and logistic regression analysis between the variables of female survivorship and three measures of fecundity failed to support the cost hypothesis. A "geometric mean model of fitness" was developed which emphasizes the affect of environmental variability among years on a long-term expression of fitness. A relationship was shown between the mean relative fitness and the observed mean clutch size. This supports the hypothesis that "bad-years" for offspring survivorship reduce the observed mean clutch size associated with higher long-term fitness. These authors conclude that variation in the conditions for raising offspring provides a better model for understanding Great Tit clutch size than a model invoking reproductive costs.

We are still a long way from understanding how passerine life-history traits have evolved, but this study shows the importance of long-term population studies in achieving that goal.—George Kulesza.

54. Does longevity influence the evolution of delayed plumage maturation in passerine birds? R. D. Montgomerie and B. E. Lyon. 1986. Am. Nat. 128:930–936.—The occurrence of a dull plumage in subadult male passerines has been the subject of much recent interest among ornithologists. Studd and Robertson (Am. Nat. 126:101–115, 1985) argued that such plumage is more likely to evolve in long-lived passerines, and they showed a relationship between wing length (as an index of longevity) and the occurrence of delayed plumage maturation. In the present paper, Montgomerie and Lyon continue the analysis and introduce the additional variable of territory type. Species with type-A territories (where feeding areas are defended) were hypothesized to be less likely to have delayed plumage maturation than species with type-B territories (where feeding occurs outside of the territory). They reasoned that in the latter case female mate choice would not be based on territorial attributes and bright-colored males would be little affected by the presence of dull-colored males. Montgomerie and Lyon performed a stepwise logistic regression analysis using territory type and wing length as two explanatory variables, and the occurrence of delayed plumage maturation as the dependent variable. Only territory type had a significant effect in the model. Repeating the analysis, where maximum life span replaced wing length as an explanatory variable, led to a similar result. Thus longevity or wing length appears to have little influence on the occurrence of dull subadult male plumage, and social factors may assume greater importance.

This is the stuff of modern ornithology. Not only are hypotheses more rigorously formulated than they were years ago, but now there is a keen interest in using statistical methods for sorting-out alternative hypotheses.—George Kulesza.

FOOD AND FEEDING

(see also 14, 23, 24, 25, 27, 45, 50)

55. Predation of marine invertebrates by the Kelp Gull *Larus dominicanus* in an undisturbed intertidal rocky shore of central Chile. I. Bahamondes, and J. C. Castilla. 1986. Revista Chilena de Historia Natural 59:65–72.—Although the Kelp Gull is one of the most common birds along the Chilean coast, this is the first study ever made of its food habits. The authors made observations on gull foraging from blinds, collected prey items

from middens, and analyzed regurgitated pellets. The Kelp Gull showed a very catholic diet, preying on 30 different types of marine invertebrates, of which gastropod and amphineuran molluscs, as well as intertidal crustaceans were the most common in the diet.

The authors measured the sizes of the five most common molluscan prey as represented in the diet and as available in the field, and by comparing these frequency distributions found that the gulls select the larger specimens of one species of chiton, and the smaller individuals of one species of carnivorous gastropod (*Concholepas concholepas*), and of three limpet species. All this evidence is documented in three tables and one figure. The authors speculate that the potentially high predation pressure exerted by gulls on *C. concholepas*, a "keystone predator" of the central Chilean coast, may reverberate through the whole food web.—Fabian M. Jaksić.

56. Foraging patterns of Water Pipits (*Anthus spinoletta*) with nestlings. P. Hendricks. 1987. Can. J. Zool. 65:1522–1529.—Anytime both the males and females participate in feeding the young, the possibility exists for competition between the sexes. Hendricks here reports on niche partitioning between male and female Water Pipits breeding on the Beartooth Plateau in Wyoming. Because the species is monomorphic with respect to feeding morphology, it would seem reasonable to expect some differences in habitat used by the sexes. Hendricks looked for such differences by studying the behavior of pairs of pipits at six focal nests. He found considerable heterogeneity among the nests—some pairs showed significant intersexual differences in measures that others did not. Overall, there were no consistent trends for males and females to forage in different habitat types or to forage different distances from the nest. However, there was a consistent tendency for males and females to depart from the nest in different directions when they left to forage. Thus, there was some horizontal partitioning of the habitat. Hendricks suggests that female dominance, including chasing males from their preferred feeding areas, may be the proximate mechanism for this partitioning. He also reports two antipredator defenses: foraging closer to the nest when the chicks were older and carrying fecal sacs farther away from the nest than the birds went merely to forage. Considering the small number of nests studied and the number of times individual pairs showed significant differences not seen among all pairs, it would be highly desirable if further study were done to see if further patterns of differences could be found.—A. John Gatz, Jr.

57. Intersexual niche segregation among three bark-foraging birds of eucalypt forests. R. A. Noske. 1986. Australian J. Ecol. 11:255–267.—The only Australian birds specialized for foraging on bark surfaces are the treecreepers (Climacteridae) and sittellas (Neosittidae). In this paper Noske describes intersexual foraging differences in three species: White-throated (*Cormobates leucophaea*) and Red-browed (*Climacteris erythrops*) treecreeper, and the Varied Sittella (*Daphoenositta chrysoptera*). All three are completely arboreal and sympatric where this study was conducted in eucalypt forests of SE Australia. The three species differ in their selection of bark type and in their degree of sociality. The White-throated Treecreeper is generally solitary, the Red-browed Treecreeper occurs in pairs or groups of 3–4 birds, and the smaller Varied Sittella occurs in groups of up to 12 birds. Male White-throated Treecreepers were significantly heavier and had significantly longer bills than females. The sexes of the Red-browed Treecreeper differed only in tongue length; males having a tongue averaging 0.4 mm longer than that of females. Male Varied Sittellas had significantly longer wings and bill and a more curved hind claw than did females. Noske found sexual differences in substrate use in all three species, with differences least distinct in the White-throated Treecreeper and most distinct in the Varied Sittella. Sexual differences in vertical distribution were evident in the Red-browed Treecreeper and marked in the Varied Sittella. Noske associates the differences found with increasing sociality among the species and suggests that the differences lessen competition and increase foraging efficiency. Both explanations have been suggested for similar intersexual differences noted in North American woodpeckers. This well-executed study includes data on the behavior, diet, habitats, and morphology of the species and both univariate and multivariate analyses of the data. It is a fine contribution to the growing body of literature related to intersexual and interspecific differences in niche use by bark-foraging birds.—Jerome A. Jackson.

58. Criteria of selective predation by *Bubo bubo* and *Tyto alba* on *Rattus*. [Cri-

terios de predacion selectiva de *Bubo bubo* y *Tyto alba* sobre *Rattus*]. E. Zamorano, L. J. Palomo, A. Antunez, and J. M. Vargas. 1986. Ardeola 33:3–9. (Spanish, English summary.)—Lower mandible length of *Rattus rattus* and *R. norvegicus* found in pellets produced by Eurasian Eagle Owls (*Bubo bubo*) and Common Barn-Owls (*Tyto alba*) were compared with measurements from *Rattus* trapped by the authors. Both the pellet samples and trapped specimens were from several Spanish localities. Pellet sample sizes were higher for *Tyto* (335 *R. rattus*, 227 *R. norvegicus*) than for *Bubo* (83, 42). Trapped samples were nearly equally divided between males and females, and included 317 *R. rattus* and 41 *R. norvegicus*. The results were strikingly clear that *Tyto* selected significantly smaller (interpreted as young) rats of both species, whereas the size distribution of rats taken by *Bubo* was similar to that of the trapped sample. The authors relate jaw length to other rat parameters and conclude that biomass values of rats in the diet of *Tyto* were considerably less than those reported by other authors. Students of raptor food habits take note!—Jerome A. Jackson.

59. Pellet regurgitation by Great Spotted *Dendrocopos major* and White-backed woodpeckers *D. leucotos*. S. Matsuoka. 1986. Japanese J. Ornithol. 35:75–76.—The "pellets" were seeds of the cucumber tree (*Magnolia ovobata*), poison ivy (*Rhus* sp.), and a beetle larva (Cerambicidae).—Jerome A. Jackson.

SONGS AND VOCALIZATIONS

(see also 39, 52)

60. Neighbour-stranger discrimination by song in the Veery, a species with song repertoires. D. M. Weary, R. E. Lemon, and E. M. Date. 1987. Can. J. Zool. 65:1206–1209.—It makes sense for territorial birds to be able to distinguish the songs of their neighbors from those of strangers so as not to waste energy confronting established neighbors. Be that as it may, previous studies of birds with song repertoires have found little such discrimination whereas studies of birds with only a single song type have identified much stronger discrimination. The authors feel much of the reason for this difference in results may be that only a small fraction of the total repertoire has been used in previous discrimination studies of species having song repertoires. To overcome this, they prepared playback tape loops of five songs of Veeries (*Catharus fuscescens*) recorded in the field. Anywhere from two to four of the five songs on each tape were different. Veeries showed strong neighbor-stranger discrimination during playbacks. The Veeries had a significantly shorter latency in approaching within 7 m of a speaker playing the tape of a stranger than of a neighbor, stayed at that distance significantly longer, and also responded with significantly more vocalizations of their own. As work of this type is continued, even greater care must be taken—as Weary et al. did—to insure that the results obtained are not merely artifacts of the procedures used.—A. John Gatz, Jr.

61. Sources of phenotypic variation in the separation call of Northern Bobwhite (*Colinus virginianus*). J. A. Baker and E. D. Bailey. 1987. Can. J. Zool. 65:1010–1015.—The separation call is a simple two-note call used to rejoin a separated covey. The calls of different coveys are distinct, thus an isolated chick can distinguish between his own covey and a strange one. Baker and Bailey show here that the particular distinguishing characteristics of different separation calls are genetically based and are minimally influenced by culture. Chicks from the same clutch had the same separation call whether they were tutored by their father or by an unrelated male. Chicks reared in the company of unrelated chicks by unrelated males showed separation calls that were different than those of the unrelated chicks and similar to the calls of other of their own sibs raised separately. Separation calls in two successive generations in the same family line were the same. Seemingly, all phenotypic variation in this characteristic is genotypic variation.—A. John Gatz, Jr.

BOOKS AND MONOGRAPHS

62. Audubon wildlife report 1986. A. S. Eno, R. L. Di Silvestro, and W. J. Chandler, eds. 1986. National Audubon Society, New York. 1094 p. $24.50.—This second volume in the report series represents a continued effort to provide information to those who are interested in conservation of the natural resources of the United States. It contains an

enormous amount of information, presented in easily readable form supported with appropriate graphs, tables, and references.

The book is divided into five parts, the first of which, "the featured agency," presents a 173-page description and analysis of the U.S. Forest Service in two chapters. The Service is described as the largest of the natural resource agencies of the Federal Government, with a $2 billion budget and the equivalent of 39,000 full-time employees. The authors of this chapter, Katherine Barton and Whit Fosburgh, present a detailed history of the Forest Service and its legislative authority, and the Forest Service administration, including diagrams of the Forest Service and field staff organizational structure with names and telephone numbers of current administrators. An extensive section on timber management includes discussion of reforestation, timber-stand improvement, and road construction. Additional sections include the management of energy and minerals, fish and wildlife habitat, and recreation and wilderness. The management sections include sub-sections on trends and issues, which present an historical perspective on trends, the current situation, and, in many cases, the opinions of conservation organizations on controversial issues such as increased timber harvest or road construction in roadless areas. A second chapter deals with wildlife issues in the National Forest system. Old-growth tree harvest policy discussions include case studies of the Spotted Owl (*Strix occidentalis*) and the Red-cockaded Woodpecker (*Picoides borealis*). Other areas of controversy focused on below-cost timber sales, and several mammal species.

Part 2 deals with federal agencies and programs. This includes some abridged material from the 1985 Report but updates the workings of the agencies, such as the Fish and Wildlife Service, through 1985, and has new chapters on federal marine fisheries management and on international wildlife conservation. It includes chapters on federal grants for state wildlife conservation, migratory bird conservation, the endangered species program, wetlands protection programs, the national wildlife refuge system, and the wildlife concerns of the National Park Service and Bureau of Land Management. Again, I found the current issues sections, which are balanced presentations, of particular interest.

Part 3 includes chapters on an overview of state wildlife conservation, nongame programs, and law enforcement. The overview chapter presents the historical and legal context in which state conservation practices have developed, and sections on the funding and research for state fish and wildlife agencies.

Section 4, "Wildlife Report," has 18 chapters on individual species which were selected to illustrate a wide range of conservation issues and problem areas. Ten of the accounts concern bird species, the others mammals, fish, butterflies, plants, and a sea turtle. Each chapter contains a brief life-history account, and sections on the significance of the species, population trends, management procedures, prognosis, and recommendations. The chapters were written by well-known experts on the species, and the references are generally extensive and up to date, most including 1985 publications.

Part 5 is a compendium of 14 appendices, including directories for, among others, the National Park and Fish and Wildlife services. These list the names, telephone numbers, and usually addresses of important Washington D.C. and Regional Offices personnel. The appendices include as well, budget information contacts for federal Fish and Wildlife programs and congressional contacts, with addresses. Other appendices provide information on a variety of subjects including permit requirements for federally-protected species, and population objectives, status, and trends of selected migratory bird species.

The volume is well indexed, and despite the bewildering amount and complexity of information presented, relatively easy to use. The errata sheet accompanying the volume has 8 text corrections, so keep it handy when using the book. These minor editorial errors are understandable considering the magnitude of the volume and the early deadlines. My only other quibble is with the cover which is of low quality. The book is really indispensable for anyone interested in staying current, or actively working on conservation issues. It is an important reference work. If you don't wish to purchase this book because much of the material is dated, at least make sure that your local library has a copy.—William E. Davis, Jr.

63. A dowry of owls. 1986. L. McKeever. Available from the publisher: Lester & Dennys Ltd., 78 Sullivan Street, Toronto, Ontario M5T 1C1, Canada [$19.95 plus $1.50 postage and handling]. 208 p.—This book is a narrative of personal anecdotes of the husband

of a woman whose single-minded purpose is to rehabilitate injured owls. It is written in a smoothly flowing narrative which is often humorous, and sometimes borders on the incredulous (unless one has had experiences similar enough that one can relate to the stories told). The concern of the author and his wife for owls is always obvious. The book seems free from typographical errors, as one would expect from an engineer.

This is also a history of the Owl Rehabilitation Research Foundation, Inc. and a common sense, no-nonsense introduction to what is required for a successful owl rehabilitation program to operate. Because of the latter content I would highly recommend it as required reading for personnel of nature centers, rehabilitation centers, conservation camps, and in general with any centers where orphaned wild animals are apt to be brought to be "saved." It would also be useful reading for students of veterinary medicine.

I had some technical differences with certain items in the book, e.g., on p. 35 the author talks about a "Screech Owl of the grey colour-phase." "Phases" are transitory stages and color-phase is more appropriately termed a color-morph as it is a genetic polymorphism that is not a temporary condition for an individual. The second point is that on p. 58 the author talks about Kennicott's Screech Owl as a "sub-species of our common Screech Owl," while most consider it to be a distinct species, i.e., the Western Screech-Owl. The third point that I did a double take on was "preening mice" on p. 79, to me birds preen and mice groom. This demonstrates how trivial one has to get in order to find "fault" with even the biology of this book.—Richard J. Clark.