RECENT LITERATURE

Edited by Edward H. Burtt, Jr.

BANDING AND LONGEVITY

(see also 21, 48, 53, 57)

1. Bird ringing in the London area. J. D. Hook. 1981. Lond. Bird Rep. No. 45:91–103.—This is a report of selected recoveries from bandings made within ca. 32 km of St. Paul's Cathedral in London. Recoveries were made between 1970 and 1980. The following species, longevity records (days), distance (km), and direction of recovery along with the banding location when other than the London area, are as follows: Swift (*Apus apus*) 5098 (banded as an adult); Dunlin (*Calidris alpina*) 3744, 871 SW (Revtangen, Norway); Black-headed Gull (*Larus ridibundus*) 3722, 2072 NE (Leningrad, USSR); Blackbird (*Turdus merula*) 3444, and Chaffinch (*Fringilla coelebs*) 3792. No distance and direction given indicates local recoveries.—Richard J. Clark.

2. A longevity record for the Black Skimmer. H. W. Kale, II and R. W. Loftin. 1982. N. Am. Bird Bander 7:54.—A Black Skimmer (*Rynchops niger*) of unreported sex was banded as a fledgling by Kale at Little Egg Island (mouth of Altamaha Sound, McIntosh Co., Georgia) 13 August 1958, it was mist-netted in a breeding colony at Ward's Bank, 1.6 km north of Mayport, Duval Co., Florida, at night on 28 June 1978 when it "was about 6 weeks short of being at least 20 years old."—Richard J. Clark.

3. Saw-whet Owl studies at PEPt in 1981. R. Weir. 1981. Ont. Bird Banding 14: 16–19.—A season record of 780 Saw-whet Owls (*Aegolius acadicus*) was banded at Prince Edward Point (PEPt) 24 September–8 November 1981. Since 1975 2745 Saw-whet Owls have been banded at PEPt. Saw-whet Owls banded in the 1981 season included 454 (58.2%) HY (hatching year identified by uniformly colored, unworn flight feathers) and 326 (41.8%) AHY (after hatching year birds which have bicolored flight feathers). Wing chords of males and females fit a bimodal "curve" with the longer chords of the largest HY females overlapping the shortest AHY males.—Richard J. Clark.

4. Bird-ringing report 1979–1980, Stavanger Museum. H. Holgersen. 1982. Sterna (Stavanger) 17:85–123.—In 1979 60,069 birds of 179 species, and in 1980 85,468 individuals of 196 species were banded. The 1980 effort carried the Stavanger Ringing Center over the "first million mark." The number of species banded in Norway is 272. Those species most frequently banded were the Willow Warbler (*Phylloscopus trochilus*) 67,194; Dunlin (*Calidris alpina*) 55,515; and Starling (*Sturnus vulgaris*) 45,093. This report lists 361 recoveries reported to the center during 1979 and 1980. A Redpoll (*Carduelis flammea*) banded on 30 September 1979 at Revtangen, Norway was recovered on 19 March 1980 from a nest box (that was "no doubt a Pygmy Owl's (*Glaucidium passerinum*) larder") in Uusima Province, Finland, some 1030 km to the east.—Richard J. Clark.

MIGRATION, ORIENTATION, AND HOMING

(see also 31)

5. Experiments on the use of the sun by Starlings in the discrimination of geographical locations for navigation. A. J. Cavé. 1982. Ardea 70:197–216.—Experiments were designed to separate the process of location finding (the "map") from the process of direction finding (the "compass"). These experiments dealt only with discrimination between locations 237 km apart in an east-west direction. Caged Starlings (*Sturnus vulgaris*) were trained to use two perches, one perch in The Hague and one at Munster. Tests at the training sites with full view of the surrounding (known landscape) showed that a significantly different choice was made at the two locations, with a preference for the correct perch. Performances were better with the sun directly visible or unlocalizable than in the intermediate situations, i.e., with the sun indirectly visible or the sun-side of the sky lighter.

The two training sites were not recognized when the birds had been trained and

tested at the training sites with the landscape screened off. Under these conditions no effect of the visibility of the sun was found. Cavé concluded that the sun is used in combination with a parameter derived from the landscape, such as the horizon.—Clayton M. White.

6. The migratory orientation of Garden Warblers, *Sylvia borin*. W. Wiltschko. 1982. Pp. 50–58, *in* **Avian Navigation**, F. Papi and H. Wallraff (eds.). Springer, Berlin.—The author reviews 7 years of work on one of the most intensively studied migrant bird species. The results of this work are the basis of much of what we believe migrants are doing when orienting and thus should be read in its entirety. The only previously unpublished results in this paper concern development of night-sky orientation in hand-reared Garden Warblers. Four groups of birds were given different first summer experience in the relationship of an ambient magnetic field and a rotating, artificial night sky. The birds were then tested in autumn by exposure to an artificial night sky (now stationary) in a magnetic field without directional information. The pooled data from all four groups showed that the birds oriented away (south) from the former center of rotation and thus acquired a meaningful orientation response to the night sky independent of their previous magnetic field experience. This result is important because it suggests an ontogenetic shift in the relative importance of the night sky and magnetism (cf. W. Wiltschko and R. Wiltschko. Z. Tierpsychol. 37:337–355, 1975) for the migratory orientation of the Garden Warbler.—Verner P. Bingman.

7. Adaptive temporal programming of molt and migratory disposition in two closely related long distance migrants, the Pied Flycatcher (*Ficedula hypoleuca*) and the Collared Flycatcher (*Ficedula albicollis*). E. Gwinner and I. Schwabl-Benzinger. 1982. Pp. 75–89, *in* **Avian Navigation**, F. Papi and H. Wallraff (eds.). Springer, Berlin.—In this paper, the authors present up to 3 yr of continual data on the molt, migratory fattening, and nocturnal migratory restlessness of individual Collared and Pied flycatchers (Muscicapidae) held after a certain age under constant photoperiodic conditions. Although less extensive than the existing data for Sylviid warblers, the results demonstrated that the flycatchers showed regular periodicity in the characteristics investigated, suggesting endogenous circannual rhythmicity as the agent controlling their expression. The importance of the paper, however, comes from a comparison of the two species which show differences in their migratory behavior. Collared Flycatchers migrated farther and were much less variable in the temporal expression of the traits examined, supporting the prediction that longer distance, perhaps less flexible migrants should be more regular in their circannual rhythmicity (although one has to wonder if the 5000 km migration of Pied Flycatchers really allows more opportunity for improvization and decision making than the 6000 km migration of the Collared Flycatcher). Not supported was the prediction that the Collared Flycatcher should have displayed more nocturnal restlessness. Reasons for this result are presented in an interesting and stimulating discussion.—Verner P. Bingman.

8. Temperature-related behavior of some migrant birds in the desert. G. T. Austin and J. S. Miller. 1982. Great Basin Nat. 42:232–240.—This paper examines relationships between behavior and ambient temperatures for fall migrants (mostly warblers) vs. resident passerines in the Mohave Desert. Foraging by migrants was reduced and resting was increased at temperatures above 30°C, whereas normal foraging and resting by residents continued to at least 35°C. On average, more than 95% of all foraging by migrants was in the shade when ambient temperatures exceeded 30°C, whereas residents did not use shade until temperatures exceeded 35°C. The authors suggest reduced activity of prey and/or thermoregulatory problems caused these phenomena.

There seems to be a group of errors in Table 4 since positive correlation coefficients (which should be negative) are associated with negative regression coefficients (for foraging activity vs. ambient temperature).—Richard M. Zammuto.

9. The roles of olfaction and magnetism in pigeon homing. H. Wallraff and A. Foa. 1982. Naturwissenschaften 69:504–505.—Although much has been learned about the compass mechanisms used by pigeons during homing, precious little has been revealed about their map sense: their ability to identify the home direction from a release site (for

a review see Gould, Nature 296:205–211, 1982). Currently, the two most discussed stimuli concerning the pigeon's map sense are the earth's magnetic field and olfactory cues. In this study, the authors tried to determine which of these two stimuli plays the critical role in the homing success of 5–6-month-old pigeons on their first release from a distant site. Two release sites were used in this study, one northwest and one southeast of home. Four groups of pigeons provided with different sensory information were tested from each release site: (1) with olfactory and magnetic information, (2) with olfactory but without magnetic information (magnetic field detection was disrupted by bar magnets carried by the pigeons), (3) with magnetic but without olfactory information (olfaction was precluded by sectioning of the olfactory nerves), and (4) without olfactory and magnetic information. Pigeons with an intact olfactory sense oriented homeward from both sites whether their magnetic sensitivity was impaired or not. Anosmic pigeons, whether impaired magnetically or not, oriented homeward from the southeast release site but were unable to orient homeward from the northwest release site. The results seem to justify the conclusion of the authors that olfaction plays an integral role in the pigeon's navigational mechanism. The inconsistent results obtained from anosmic pigeons, however, fail to warrant their conclusion that the geomagnetic field is much less effective in attempting to orient a homeward course. Their explanation for the orientation observed in the anosmic pigeons at the southeast release site as simply reflecting a previously observed bias at that site only makes one question why they used that release site in the first place.—Verner P. Bingman.

10. Flight strategies of nocturnally migrating birds. Radar data on the migration of different bird types over a pass in the Swiss Alps. (Flugverhalten nächtlich ziehender Vögel-Radardaten über den Zug verschiedener Vogeltypen auf einem Alpenpass.) R. Bloch, B. Bruderer, and P. Steiner. 1981. Vogelwarte 31:119–149. (German; English summary)—Various types of radar have been used to study the nocturnal migrations of birds for about 30 years now. However a weakness of previous studies has been their general inability to identify the kinds of birds observed on the radar screen other than dichotomizing waterfowl-shorebirds and small passerines. In what may prove to be an important paper, the authors take a step toward categorizing the types of birds observed on tracking radar. Based on recorded echo signatures from tracked birds flying over an Alpine pass, they were able to segregate 5 types of nocturnal migrants: large, small, and very small songbirds, and large and small waterfowl-waders. The authors compare the effect of varying wind conditions on flight path, air speed, climbing and descending patterns, as well as flight altitude for the 5 groups. Some general observations are also included. One interesting result was the tendency of waterfowl-shorebirds, birds whose flight directions are often thought to be relatively resistent to the effects of wind, to fly downwind even if they oriented in a seasonally inappropriate direction.

Although precise species identification remains impossible, the paper reviewed here is a step toward that hope. My weakness in German dictates only a cursory review, but in a time when increasing emphasis is being put on experimental work examining the mechanisms of orientation, it is important to remember that field studies continue to make important contributions to the study of migration.—Verner P. Bingman.

POPULATION DYNAMICS

(see also 21, 25, 34)

11. Mortality of Redshanks and Oystercatchers from starvation during severe weather. N. C. Davidson and P. R. Evans. 1982. Bird Study 29:183–188.—Redshanks (*Tringa totanus*) and Oystercatchers (*Haematopus ostralegus*) found dead on the Ythan Estuary (n = 12 and 8, respectively) and Montrose Basin (n = 8 and 5, respectively) were weighed, measured, and analyzed for fat and protein content, expressed as standard indices. First winter birds and adults were combined in subsequent statistical analyses because they could not be separated reliably and because no significant differences in body condition were found among age-classes! Statistical support for the latter claim is not provided. Muscle and lipid indices for both species found dead in winter indicated that nearly all fat and protein reserves had been used. Fat and protein indices of dead Redshanks and Oystercatchers were similar to each other and to one Woodcock (*Scolopax*

rusticola) suggesting that these base-line values may be applicable to other starved waders. Comparison of body condition of birds that died in prolonged extremely cold weather at Montrose to birds that died in moderately cold weather at Ythan indicated that at death, Montrose Oystercatchers had significantly larger protein reserves than Ythan Oystercatchers. Davidson and Smith concluded that Montrose Oystercatchers died from an inability to catabolize protein at a rate sufficient to balance heat loss. By comparison, Montrose Redshanks had significantly more lipid reserves than Ythan Redshanks; their protein reserves did not differ. For Redshanks, Davidson and Smith concluded that the differences in fat reserves were not large enough to be biologically meaningful and that Redshanks from both sites died from exhaustion of all protein and fat reserves. Although Davidson and Smith's methods of study appear appropriate, their small sample sizes and statistical inferences do not substantiate these latter conclusions.—Stephen R. Patton.

12. The establishment and growth of a new Fulmar colony on sand dunes. A. Anderson. 1982. Bird Study 29:189–194.—From 1970 to 1980, the number of Fulmars (*Fulmarus glacialis*) seen on the Ythan Estuary increased from 38 to 266 and the mean arrival dates became successively earlier. Nesting was first recorded at Ythan in 1973 after several years of prospecting by Fulmars at the colony. Young did not fledge from this site until 1978. Females outnumbered males at Ythan 1.71:1 (n = 111) and this sex ratio did not vary among years or months. Weights of both sexes captured at Ythan were about 10% lighter than weights of breeding birds at an established colony and suggest that birds colonizing the Ythan site were sub-adults. This study helps to fill a void in our knowledge of the demography of newly established seabird colonies.—Stephen R. Patton.

13. Barrow's Goldeneye nest-box utilization in the Cariboo parkland, British Columbia: year 1. J.-P. L. Savard. 1982. Can. Wildl. Serv. Prog. Notes No. 131, 5 p.—This paper reports avian and mammalian use of 137 newly installed and 38 older nest boxes on 50 lakes in heavily logged Aspen parkland in British Columbia. Ninety-five of the 137 new nest boxes were used for nesting by 4 avian (36 Barrow's Goldeneye (*Bucephala islandica*), 24 American Kestrel (*Falco sparverius*), 1 Northern (Common) Flicker (*Colaptes auratus*), 28 European Starling (*Sturnus vulgaris*)), and 1 mammalian species (6 Red Squirrel (*Tamiasciurus hudsonicus*)) in the first breeding season after installation. Nine more boxes were used at least once for roosting.

The Goldeneyes laid 226 eggs, 165 of which hatched; the Kestrel laid 102, 59 of which hatched, the Flicker's 1 egg did not hatch; 20 of the Starling nests fledged young, and some squirrels were successful. The Starlings may have been responsible for many unsuccessful nesting attempts by other species.

Only 50% of the 38 old nest boxes were used for nesting compared to 69% of the new boxes. Successful hatching by the Goldeneye was higher in old boxes than in new boxes (77 vs. 61% of the nests) and no Kestrels used old boxes. The high use of nest boxes by Goldeneyes suggests a shortage of large nesting cavities in the region. No Bufflehead (*Bucephala albeola*), nested in any of the 175 nest boxes although they are cavity nesters and nested in the area (72 broods). This may indicate abundance of smaller cavities in the region.

Nest-box use over the next few years in the region should provide a better understanding of the role of nest-site availability in nest success. If nest-site availability is the factor limiting population size for these species, the addition of nest boxes may increase the size of these populations. The title of this article may be misleading since it deals with much more than just Goldeneyes.—Richard M. Zammuto.

14. Clutch size, egg size, hatch weight and laying date in relation to early mortality in Red Grouse *Lagopus lagopus scoticus* chicks. R. Moss, A. Watson, P. Rothery, and W. W. Glennie. 1981. Ibis 123:450–462.—This paper summarizes experimental attempts to study the adaptive consequences (i.e., the number of young that can be reared) of clutch size, egg size, hatch weight, and laying date without the confounding effects of the "environment" on offspring mortality. To accomplish this, clutches laid by wild hens were incubated, hatched, and reared in "standard" conditions. In order to separate the effects of the environmental food supply on female performance during breeding, other hens were maintained in captivity and their eggs were treated in a similar manner as those of

the wild birds. Hatchability was not related to egg size, clutch size, hatching weight, or laying date in eggs laid in either the field or captivity. Egg size did not vary significantly with clutch size, and egg size of captive birds was smaller than that of wild birds. The survival of chicks hatched from both wild and captive eggs was related to hatchling weight and to the amount of weight lost during incubation. Only 20% of the variation in survival among clutches could be accounted for by variation in egg size and hatchling weight. Survivorship of chicks from the biggest clutches was less than that from smaller ones.—Cynthia Carey.

NESTING AND REPRODUCTION

(see also 13, 14, 24, 27, 28, 29, 38, 44, 45, 48, 68)

15. Experimental studies on the nesting of Bullfinch *Pyrrhula pyrrhula* (Linnaeus, 1758) in aviaries. Z. Bochenski and T. Oles. 1981. Acta Zool. Cracov. 25:3–12.—Observations on nest building of bullfinches (trapped in the surrounding forest and transferred to outdoor aviaries) indicate that all nest building is carried out exclusively by females. The nest is of two parts: a base of loosely placed dry conifer twigs and a cup of grass and rootlets (occasionally animal hair). Incubation was by females, with the male near. Presence of the male is necessary for completion of the cycle. Predation by yellow-necked mice (*Apodemus*) occurred in the aviary. The role of predation by yellow-necked mice in the natural population is unknown.—R. W. Colburn.

16. Studies on hole-nesting birds in natural nest sites 1. Availability and occupation of natural nest sites. J. H. Van Balen, C. J. H. Boog, J. A. Van Franeker, and E. R. Osiech. 1982. Ardea 70:1–24.—This is apparently the start of a series of studies exploring parameters of natural hole nest sites. Suitable holes occurred in densities of 6–30 per ha, or 11–30 per 100 trees. High densities were found along roads, presumably because the surrounding forest was rather young and unsuitable for hole excavation. Conifers had very few holes. Bird species composition differed appreciably from that in neighboring nest-box areas. These differences can be understood from the differences in size and entrance diameter between nest-boxes and tree holes. The most common users of natural holes were the Starling (*Sturnus vulgaris*) and Great Tit (*Parus major*).

The properties of occupied and unoccupied holes were compared. In general, holes with a large diameter, depth, bottom area, and volume were occupied most frequently, as well as holes exposed to eastern directions. Each of the 11 species examined in some depth had different hole requirements. The hole entrance was modified in some cases. Narrowing the entrances in part of the area resulted in reduced occupation by Starlings and increased occupation by Great Tits. Entrances of next-boxes occupied by Great Tits were enlarged during the laying period; this resulted in a rapid take-over by Starlings.—Clayton M. White.

17. An energetic optimum in brood-raising in the Starling *Sturnus vulgaris*: an experimental study. K. Westerterp, W. Gortmaker, and H. Wijngaarden. 1982. Ardea 70:153–162.—A brood of 5 represented the optimum when cost of raising a chick was considered. A chick in a brood of 5 needs 8–22% less energy to reach a given body weight at fledging than a chick in a brood of 3, a saving that is probably mainly based on huddling behavior. This trend did not continue with a further increase to brood-size 7. Here a chick needed 6–10% more energy. Preliminary observations on energy expenditure showed that deterioration of the insulative properties of the nest in the biggest broods might explain this. Parents of a brood of 3 chicks hardly changed weight during the nestling period. Adults with 5 and 7 chicks all lost 4–6 g, and their entire fat depot. Some parents did not manage to meet the demands of their nestlings, bringing in enough food in weight, though poor in quality, resulting in mortality and low fledgling weight.—Clayton M. White.

18. Lapwing nest sites and chick mobility in relation to habitat. C. P. F. Redfern. 1982. Bird Study 29:201–208.—Lapwings (*Vanellus vanellus*) nesting in blanket bog moved their young to forage in adjacent pasture within 3 days of hatching. By comparison, Lapwings nesting in pasture kept their young on pasture for the duration of the prefledg-

ing period. Apparently the faunistically poor blanket bogs are unsuitable as a habitat for foraging by chicks, but are suitable for nesting by Lapwings if located adjacent to pasture. Redfern concludes the obvious, that the habitat needs of Lapwings during the incubation period and the prefledging period may differ.—Stephen R. Patton.

19. Breeding synchrony in the Lesser Snow Goose (*Anser caerulescens caerulescens*). I. Genetic and environmental components of hatch date variability and their effects on hatch synchrony. C. S. Findlay and F. Cooke. 1982. Evolution 36:342–351.—Fred Cooke and his students have been studying the breeding biology of Lesser Snow Geese at La Perouse Bay, Manitoba since 1973. In this paper the authors investigated the genetics of breeding synchrony as measured by comparing hatching date of an individual female's eggs with the mean hatching date for the colony. Heritability, based on mother-daughter regression, was estimated to be .44. That is, 44% of the total phenotypic variance is thought to be due to genetic makeup (additive genetic variance).

This leaves a problem that remains to be dealt with in future papers. If synchrony is adaptive, then one might suppose that there should not be any additive genetic variance in the population because Fisher's Fundamental Theorem of Natural Selection states that adaptive genetic variance is rapidly eliminated by selection. Thus, one of the following would appear to be true: (1) hatching synchrony is not adaptive; (2) the direction of selection varies from year-to-year, so that early hatching is favored one year, late the next, etc.; (3) selection is relatively weak and the observed genetic variance is due to a balance between the elimination of additive genetic variance by natural selection and its renewal by mutation and immigration. It will be interesting to see how the authors go about teasing apart these tricky effects.—George F. Barrowclough.

20. Biological notes on the Giant Coot *Fulica gigantea*. J. Fjeldsa. 1981. Ibis 123: 423–437.—Prior to this paper, very little was known about the biology of this species which breeds in the Andean puna. The distribution, habitat, food, nests, behavior, breeding success, and dispersal are well described and are accompanied by photos and excellent drawings of behavioral and developmental sequences. Three items are of particular interest: (1) the offshore nests originate as floating structures, but, after repeated use, rest on the bottom like islands, (2) the main breeding season occurs in the austral winter when intense cold temperatures occur frequently at night, and (3) the threat behavior differs considerably from that described for other coots.—Cynthia Carey.

21. The annual cycle of the Sooty Shearwater *Puffinus griseus* at the Snares Islands, New Zealand. J. Warham, G. J. Wilson, and B. R. Keeley. 1982. Notornis 29:269–292.—The Sooty Shearwater is one of the most abundant birds in the world. Its population at the Snares Islands is an estimated 2,750,000 pairs. The basic biology of that population (including some marked pairs) was studied in parts of 4 breeding seasons. The data are extensive and beyond brief review, but the paper is a basic reference on the species' biology. The only 2 banding recoveries from this population were provided by the Japanese fishing industry at 48–49°N.—J. R. Jehl, Jr.

22. Parental care of nestlings by the Goldcrest *Regulus regulus*. S. Haftorn. 1982. Ornis Fenn. 59:123–134.—In his introduction, Haftorn proposed to describe Goldcrest parental behavior and intersexual cooperation during the nestling period. He studied the first and second broods of one pair in 1971 and one brood of a pair in 1974. Nests were observed by closed-circuit television. The discussion relates data on incubation, brooding, and feeding of young to parental investment and the reproductive strategy of double brooding. A sample size of 3 nests is much too small to meaningfully support his sweeping evolutionary conclusions. Much of the discussion is unsubstantiated by data or literature citations.—Lise A. Hanners.

23. An unusual nesting site for the Tawny Owl. (Uvanlig beliggenhet for et kattuglereir.) H. Holgersen. 1982. Sterna (Stavanger) 17:127–128. (Norwegian; English summary)—A nesting site in a cavity "under a boulder in birch wood" is described for the Tawny Owl (*Strix aluco*). Two photographs show two downy young near the entrance to the cavity.—Richard J. Clark.

BEHAVIOR

(see also 5, 6, 8, 15, 20, 22, 33, 34)

24. Functional aspects of serial monogamy: the magpie pair-bonds in relation to this territorial system. G. Baeyens. 1981. Ardea 69:145–166.—This paper asks 2 major questions: (1) Are non-breeders prevented from establishing territories and from breeding by territoriality? (2) What are the advantages of mate switching? There were 2 classes of territories, Class I territories were permanently occupied, whereas Class II territories were used on a temporary basis. Non-breeders filled vacancies between territory holders in both classes of territories, but new territories were not established in Class I areas. When a bird was removed from a Class I territory, the territory was often filled by a bird from a Class II territory and mate switching occurred. Advantages of mate switching (moving from a Class II to Class I territory) were thought to be (1) the new partner was healthier and cooperated better, (2) genes responsible for acquisition of better territories were passed to offspring, or (3) the newcomer saved time and energy by copying its partner's activities.—Clayton M. White.

25. Blue Tit territories in populations at different density levels. A. A. Dhondt, J. Schillemans, and J. DeLast. 1982. Ardea 70:185–188.—This study compares density of tits on several plots in 2 different years. In areas where protected winter roost sites were available their breeding density increased compared to areas with no such sites. The observations strongly support the idea that at low breeding density, when interspecific competition with the Great Tit (*Parus major*) is important, spring territorial behavior did not affect Blue Tit (*P. caeruleus*) numbers. When interspecific competition with the Great Tit is relaxed, intraspecific competition for space through spring territorial behavior limits the size of the Blue Tit breeding population.—Clayton M. White.

26. Foot-trembling and feeding behaviour in the Ringed Plover *Charadrius hiaticula*. B. C. Osborne. 1982. Bird Study 29:209–212.—Ringed Plovers were observed foot-trembling at a shallow inlet in the Aberlady Bay Nature Preserve, Scotland, where surface water was retained by a thin layer of mud overlying sand. Using 10 cm deep substrate samples collected from Aberlady Bay and a mechanical plover foot vibrating with an amplitude of 2 mm at 10 cycles/s (determined from movies of plover foot-trembling), Osborne investigated the effects of foot-trembling on plover prey items, primarily nematodes. Foot-trembling in experimental tanks increased the number of moving nematodes and decreased the number of stationary nematodes ($0.1 > P > 0.05$). In 4 of 5 tests, there was an increase in the proportion of moving nematodes after a bout of foot-trembling. Movement by nematodes in the mud layer is transmitted to the surface water film and perhaps is a cue used by plovers to locate nematodes. Osborne presents data sufficient to reject the hypothesis that plover foot-trembling causes buried prey items to float out of the mud substrate.—Stephen R. Patton.

27. Polygamy by Willow Warblers. S. R. D. daPrato. 1982. Br. Birds 75:406–411.—Despite the general sound of the title this is an anecdotal report of one male Willow Warbler (*Phylloscopus trochilus*) that successfully paired with 5 females during 2 consecutive breeding seasons. The observation is notable because Willow Warblers seldom have more than one brood per season and multiple mating is rare. The costs imposed by attempting multiple broods in a single season are exacerbated by the typical molting schedule of individuals of this species: apparently feeding young and molting impose considerable strains. However, it seems likely that multiple mating by males is probably limited by the number of females that will share mates which may be the only way that a female that has failed to breed successfully on her first attempt can produce young. Therefore, the author supposes that multiple mating in this case is an example of opportunistic breeding by experienced birds.—Patricia Adair Gowaty.

28. The characteristics and occurrence of cooperative polyandry. J. Faaborg and C. B. Patterson. 1981. Ibis 123:477–484.—The evolutionary conditions directing selection for cooperative polyandry and other breeding systems in birds are far from understood. This paper uses the special case of the Galapagos Hawk (*Buteo galapagoensis*), which has

been considered to be both polyandrous and a cooperative breeder, to define and synthesize current evolutionary theories concerning polyandry and cooperative breeding. The authors contend that mating systems can be defined on the basis of sexual differences in the number of partners making simultaneous attempts to raise young. In polyandrous systems, the females attempt to raise a brood with multiple males, while the males contribute to the brood of only one female. Three types of polyandry are defined: (1) sequential polyandry in which a female copulates with and lays clutches for 2 or more males in succession, (2) simultaneous polyandry in which a female copulates with and forms stable bonds with several males simultaneously and may lay a separate clutch for each male, and (3) cooperative polyandry in which females have simultaneous pair bonds with several males and all adults in the group cooperate equally to raise a single brood. Possible reasons for the evolution of each type are hypothesized. This paper will not only stimulate discussion among evolutionary biologists, but also should be on the reading list of all biologists.—Cynthia Carey.

29. Spatial organization of the White-fronted Bee Eater. R. E. Hegner, S. T. Emlen, and N. J. Demong. 1982. Nature 298:264–266.—A long term study of the social organization of White-fronted Bee Eaters (*Merops bullockoides*) in Lake Nakuru National Park (Kenya) has revealed a complexity surpassing anything heretofore reported for any avian species. These gregarious birds nest and roost in colonies of up to several hundred individuals, which are made up of well-organized social units or clans of 2–11 individuals—largely extended family units—typically consisting of 5 or fewer monogamous pairs and a lesser number of single birds. Clan members interact daily and actively defend a group foraging area that is located some distance from the nesting/roosting site. Within clan foraging areas members showed no tendency to group, and pairs and singles occupied overlapping home ranges, while unpaired juveniles ranged through the area. Breeding is cooperative and most pairs are aided at the nest by nonbreeding clan members. Colony sites were moved periodically, though clan foraging areas remained unchanged. The authors contend that the spatial segregation of colonial nesting and group foraging territories have contributed to the uniquely and elaborately layered social organization of these birds. Throughout this paper references are made to interesting unpublished data which will intrigue many readers into looking forward to learning more about this fascinating society and its ecological correlates.—W. A. Montevecchi.

30. Female choice selects for extreme tail length in a widowbird. M. Anderson. 1982. Nature 299:818–820.—Widowbirds (*Euplectes progne*) are sexually dimorphic polygynous weaverbirds (Ploceidae). During territorial flight displays males expand their tails below themselves in a keel position while flying slowly over their territories. To test female choice of male tail adornment, Anderson experimentally elongated the tails of 9 territorial males and compared them with appropriate comparison groups of males (tails shortened, tails cut and reattached, handled, all n = 9). Comparing the number of clutches on territories before and after experimental manipulations, males with elongated tails showed, on average, a slight increase, while all other groups decreased. Of the 9 males with experimentally lengthened tails, only 3 actually had more clutches on their territories after the manipulation, 5 had fewer, 2 showed no change. The results support the hypothesis that female choice (intersexual selection) selects for long tails in male widowbirds. In view of the finding that experimental treatments did not affect "territory tenacity," Anderson contended that male-male competition (intersexual selection) probably plays no role in the maintenance of tail length. The application of insightful manipulations of birds in the field and reliance on natural dependent measures (clutches/male territory) make this study and its evolutionary and ecological implications very interesting. Fine-grained analyses of the effects of these manipulations on mating behavior (e.g., copulating), other than territorial display, could prove fruitful.—W. A. Montevecchi.

ECOLOGY

(see also 8, 16, 18, 20, 42, 69, 70, 72)

31. The abundance and seasonality of forest canopy birds on Barro Colorado Island, Panama. R. Greenburg. 1981. Biotropica 13:241–251.—Observations on avian use

of the forest canopy were made from an observation tower which extended well above the canopy. A high proportion of the species that were common in the canopy were also found in scrubby second growth. The most common species was the Blue Dacnis (*Dacnis cayana*); with the Bay-breasted Warbler (*Dendroica castanea*), a temperate-tropic migrant, second most common. Few restricted insectivores occurred in the canopy. A majority of the common canopy species exhibited seasonal fluctuations in abundance. This fluctuation was attributed to an influx of small omnivorous tanagers in the early dry season to early wet season, and the presence of temperate-tropic migrants from the late wet season through the dry season. There was no obvious shift in the resident population in response to the influx of migrants. The strong late dry-season peak in residents occurred when the migrants were still present.—Robert C. Beason.

32. The production of dilute nectars by hummingbird and honeyeater flowers. G. H. Pyke and N. M. Waser. 1981. Biotropica 13:260–270.—Data from temperate and tropical habitats indicate that nectars produced by hummingbird and honeyeater flowers are dilute when compared to the nectars of bee flowers. The authors applied the nectar productivity data to some previously proposed hypotheses to account for the low concentrations of hummingbird nectars, but no suitable explanation was found. In order to produce useful hypotheses about nectar quality, several relationships must be known: (1) the cost of nectar production to the plant, (2) the relationship between nectar production and pollinator behavior, and (3) the relationship between pollinator behavior and increased fitness of the plant.—Robert C. Beason.

33. Foraging behavior of forest birds: the relationships among search tactics, diet, and habitat structure. S. K. Robinson and R. T. Holmes. 1982. Ecology 63:1918–1931.—Holmes and his co-workers previously have reported many aspects of avian community structure in the Hubbard Brook Forest, New Hampshire, but never before how the component species search for food. Here, Robinson and Holmes report such information as obtained from observations made over 6 summers for 11 passerine species that forage primarily on leaf surface arthropods. They categorize searching patterns by type of movements made (hops or flights), search velocities, search flight distances, attack maneuvers, and attack distances. Dietary information comes from both direct observation and from the use of emetics on mist-netted birds. A synthesis of all their results indicates that 5 major searching modes can be identified and that each searching mode leads to the capture of a different type of prey. Specifically, Least Flycatchers (*Empidonax minimus*) and Scarlet Tanagers (*Piranga olivacea*) hop rarely if at all and fly the farthest, although with the lowest frequency of all species present. These species use their long, infrequent flights to hover or hawk for active prey like wasps and flies. In contrast, 3 species of warblers hop more frequently than they fly and thereby wind up moving short distances at a rapid rate in order to glean medium and small often cryptic insects. Intermediate to these categories are the searching pattern of the American Redstart (*Setophaga ruticilla*) which moves frequently to flush active prey like flies and leaf hoppers that are subsequently chased, and the searching patterns of the Rose-breasted Grosbeak (*Pheucticus ludovicianus*) and 3 species of vireos, all of which hover to capture medium to large insects identified while moving medium distances at a moderate rate. The most divergent searching pattern is that used by the Black-capped Chickadee (*Parus atricapillus*) which moves variable distances to search one specific type of substrate, e.g., curled leaves or tree boles, for hidden or cryptic prey. Overall, the authors note that information on both microhabitat use and foraging pattern are necessary to understand community structure. Although both habitat characteristics, e.g., foliage density and type, and prey characteristics, e.g., sizes and abundances, likely constrain searching patterns to some degree, species with some morphological and microhabitat similarities can and do show very different searching patterns and hence have quite distinct diets. Thus, to fully understand food resource partitioning, Robinson and Holmes indicate the need exists for a comprehensive study of not just microhabitat or morphology, but also patterns of foraging behavior. Their own study sets excellent standards to follow.—A. John Gatz, Jr.

34. Winter ecology and partial migration of the Goldcrest *Regulus regulus* in Finland. O. Hilden. 1982. Ornis Fenn. 59:99–122.—Annual winter bird counts in Finland

from 1956 to the present, monthly censuses during six winters (1971–1977), and banding records were used to determine seasonal, annual, and geographical variation in Goldcrest winter mortality. Northern populations of Goldcrests migrate to central and southern Europe and comprise a population approximately equal in size to the resident Goldcrest population. Goldcrests winter in social groups of 2–5 individuals maintaining fixed territories. Flocking, foraging behavior, and food habits of wintering Goldcrests were discussed. Mean winter mortality in southern Finland was about 70% for migrants and residents, influenced by temperature and food availability. Annual variation in resident mortality was very pronounced ranging from 30–90%; migrant mortality was consistantly high. Hilden suggested that density-dependent population regulation resulted from a social hierarchy in which dominant individuals remain as residents and subordinates migrate.—Lise A. Hanners.

35. Winter foraging by cavity nesting birds in an oak-hickory forest. J. D. Brawn, W. H. Elder, and K. E. Evans. 1982. Wildl. Soc. Bull. 10:271–275.—This paper presents data on use of snags as winter foraging substrates by 9 species of cavity nesters in central Missouri. Many individuals were color-banded. Snags used as foraging substrates were assigned to 1 of 5 decay classes with 1 indicating "onset of observable decay" and 5 "a barkless, limbless bole with a broken or hollow trunk." All snags on two 16.5 ha study plots were inventoried and measured, allowing analysis (by Chi-square tests) of observed snag use versus snag availability.

Selection of foraging substrates by cavity nesters varied and is described for each species. All decay classes were used, with class 2 used most frequently (34% of all observations) and class 5 (5%) the least. Class 2 and 5 snags were selected more and less frequently, respectively, than expected according to their availability on the study plots. The other decay classes were used according to their availability. Snags between 20 and 50 cm diameter at breast height were used most frequently with birds showing a preference for larger diameter snags with deeply furrowed bark. Pileated (*Dryocopus pileatus*), Red-headed (*Melanerpes erythrocephalus*), and Red-bellied woodpeckers (*M. carolinus*) selected snags in a relatively advanced state of decay; Common Flickers (*Colaptes auratus*), Downy Woodpeckers (*Picoides pubescens*), and White-breasted Nuthatches (*Sitta carolinensis*) selected less decayed snags.

The authors stress that a sound year-round habitat management plan for cavity-nesting birds must include the quality, as well as quantity, of snags, which are a major source of winter food for many bird species. Management guidelines are summarized.—Richard A. Lent.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(see also 35, 39)

36. The Lesser Snow Geese of the eastern Canadian Arctic: their status during 1964–1979 and their management from 1981–1990. H. Boyd, G. J. Smith, and F. G. Cooch. 1982. Can. Wildl. Serv. Occas. Pap. No. 46, 25 p.—This paper reports the population status of Lesser Snow Geese (*Anser c. caerulescens*), in summer and winter using aerial surveys, band recoveries, and hunter kills from 1964–1979. Overall, population size ($\bar{x}$ = 2.4 million birds) of the Lesser Snow Goose in summer has been increasing since 1965 at a rate of about 130,000 birds annually.

In Canada, recreational hunters killed on average 47,000 Snow Geese annually whereas natives killed about 72,000. In recent years (1975–1979), recreational hunters have increased their kill by about 6000/year while the native kill has been halved in Canada. This seems due to a shift of habitat-use by the geese. In the United States, recreational hunters killed on average 356,000 Snow Geese annually, a significant ($P < 0.05$) kill increase in recent years. Estimated annual survival rates of adults (±75%) seemed to be higher than those of juveniles (±45%) but these values were derived from imprecise data (as the authors explicitly point out).

In an effort to predict future population trends, tentative models are provided among numbers of geese, weather variables, and hunter kills. The northern kill was related to increasing goose population size and increasing monthly mean temperatures in Novem-

ber–December in the northern but not in the southern United States. The authors suggest this relationship was partially caused by higher temperatures in the north encouraging geese to remain there longer. Higher spring temperatures in the northern United States and population size in August of the previous year accurately predict ($r^2 = 0.83$, $P < 0.001$) population size in December on the wintering grounds. Higher monthly mean June temperatures were associated with a higher production of juveniles on the breeding grounds in the Hudson Bay region ($r^2 = 0.76$, $P < 0.001$).

A map shows locations of breeding colonies and numbers of nests in the Hudson Bay region. Management recommendations are offered but the overall message is that this species has been successfully managing itself over the past decade.—Richard M. Zammuto.

37. Waterfowl in the Volga delta (Vodoplavayushchaya dich' del'ty Volgi). G. Rusanov and V. Bocharnikov. 1982. Okhota okhot. khoz. 9:12–14. (Russian)—The Volga delta is a wetland of international significance for waterfowl and waders and deserves careful management. This article presents statistics on the harvest of ducks, geese, and coots for 1980 and the shortcomings in these data.

With the exception of those areas that are parts of nature reserves, the entire littoral zone along the river's mouth is administered by hunting collectives. Use by hunters and hunting success varied in 1980 among the 11 enterprises that provided information. The most intensively hunted area had 252 man-days of use/1000 ha and a harvest of 7.3 birds/1000 ha/man-day. Hunting was least successful in the next most popular area which had 173.6 man-days of use/1000 ha, but only 1.6 birds/1000 ha/man-day. The largest area, a wildlife management area of 150,000 ha or about one-fourth of the total wetland, had the least hunting pressure (1.2 man-days use/1000 ha), but the most success (9.3 birds/man-day/1000 ha). Hunting success for the area overall per hunter per day varied from 1.8 to 3.2 birds (average 2.2), per trip: 6.1 to 8.4 (average 7.5). In 1980, 135,070 birds were recorded as taken by hunters.

Some hunting is commercial (market) hunting, but the proportion is unclear. The 135,070 birds harvested in 1980 had a value of 112,071 rubles (about $184,000).

To avoid inflating or deflating these figures, the authors take into account that some hunting enterprises are more professionally managed than others and hence provide better data; that hunting is not permitted on all days of a week; that some hunters spend some time fishing instead; that 30% of all birds shot are not recovered; that some hunters shoot outside the hunting enterprise areas (but apparently not illegally) and so their bags are not included in the official figures; and that birds shot "for the pot" (and not recorded) by hunters, fishermen, and the hunting enterprise personnel may equal 20% of the stated total. The "bottom line" is 216,400 birds shot on the Volga delta in 1980.

Data on the temporal, species, sex, and age composition of the harvest are based partly on inspection of wings. In September, 20.5% of the season's take is shot, in October, 55%, and in November, 24.5%. At least three fourths of the harvest are Anatinae ducks, mostly teals and Mallards (*Anas platyrhynchos*). Males constituted 53.5% of all ducks taken. Adults were somewhat more abundant than juveniles (it was difficult for this reviewer to figure out to what extent). This preponderance, the authors maintain, is evidence of considerable loss of the annual production during the fall hunting season. They conclude from this that hunting pressure in the West Siberian/Caspian region of the USSR is as great as it is in the European zone, and end their article on a note of caution that this pressure should be monitored.—Elizabeth C. Anderson.

CONSERVATION AND ENVIRONMENTAL QUALITY

(see also 70)

38. Breeding biology of Tree Swallows and House Wrens in a gradient of gamma radiation. R. Zach and K. R. Mayoh. 1982. Ecology 63:1720–1728.—Responses of populations of wild birds to ionizing radiation, especially low levels of radiation, have seldom been studied. Here, both nest-site selection and breeding performance were investigated for 2 years in wild populations of Tree Swallows (*Tachycineta bicolor*) and House Wrens (*Troglodytes aedon*). The birds had free access to 253 nest boxes arrayed at various distances and hence exposure rates from a ^{137}Cs source of gamma radiation. Both species showed

significant avoidance of nest boxes having high exposure rates although one exceptional swallow did use a nest box very close to the radiation source and laid eggs that failed to hatch. Correlations were examined between exposure rates for occupied boxes and various measures of breeding performance: clutch size, hatching success, number fledged per nest, incubation time, nestling time, and growth rate of the nestlings. Results showed little or no influence on breeding performance by the low levels of radiation that occurred in the nest boxes used (mean exposure rates = 3.9 $\mu C \cdot kg^{-1} \cdot d^{-1}$ in 1979 and 11.0 $\mu C \cdot kg^{-1} \cdot d^{-1}$ in 1980). The one exception was a single significant, although perhaps spurious, negative correlation between exposure and number of young fledged per nest for swallow nests not affected by predation in 1979 only. It is unknown whether the birds selected nest boxes away from high exposure areas by direct or indirect methods, although no correlations were found between any of the nest box descriptors used (hole height and direction, lateral and canopy cover indices) and exposure rates. Thus any indirect methods the birds might have used would have to have involved more subtle cues to habitat suitability. Zach and Mayoh note that more birds bred each year in the nest boxes (56 in 1979, 94 in 1980, ca. 120 in 1981) and each year more extensive use was made of high exposure boxes. They suggest this latter use exemplifies populations spreading into suboptimal habitat as density increases. Whatever the exact cause for this shift, it would be interesting for the study of breeding performance to be continued to see what levels of gamma radiation are necessary before detectable influences on the breeding performance occur.—A. John Gatz, Jr.

39. Effects of two sagebrush control methods on nongame birds. J. S. Castrale. 1982. J. Wildl. Manage. 46:945–952.—A sizeable fraction of the sagebrush habitat in western North America has been altered by human activities. This author examined breeding bird populations and vegetation composition on several 16 ha sagebrush sites in Utah that had been burned and chained 4 yr previously, and compared results to those from a relatively undisturbed site. The undisturbed site had not been treated since 1963 when it was plowed and seeded to grasses. One recently-disturbed site was chained and seeded in 1976; the other was burned in 1976 after having been previously seeded. Quantitative vegetation measurements were made on each site. Birds were censused using a combination spot-mapping/flush technique. Statistical analyses used 1-way analysis of variance of vegetation variables by site treatments.

Total density and species richness of birds were similar among sites, but the burned site had 50–86% fewer Brewer's Sparrow (*Spizella breweri*) territories than chained and 17-yr-old plowed sites. Vesper Sparrows (*Pooecetes gramineus*) and Western Meadowlarks (*Sturnella neglecta*) were not affected by sagebrush control. Horned Lark (*Eremophila alpestris*) densities were greater on the recently-disturbed sites. Sage Thrashers (*Oreoscoptes montanus*) were only found in habitat patches with large shrubs. Different requirements of shrubs for nesting best explained the varying responses of species to sagebrush control.

The author notes that management of sagebrush habitats for passerines is easy because of the simple community structure and because the bird species are widely distributed and tolerant of habitat disturbance. Thus the thrust of management for these species is to "provide sufficient habitat, compatible with other uses, for maximum diversity and density of birds."—Richard A. Lent.

40. Wetlands of ornithological importance in the Netherlands. E. R. Osieck. 1982. Limosa 55:43–55.—This paper gives a list of 60 wetlands in the Netherlands which are ornithologically important based on distribution of 15 species of breeding birds and 42 species of non-breeding birds. Of these areas, 56 qualify as "wetland of international importance" (including 4 qualifying only for breeding birds). On 23 May 1980 the Netherlands ratified the Convention on Wetlands of International Importance Especially as Waterfowl Habitat and designated 6 wetlands under the Convention (and an additional 6 in the Netherlands Antilles).—Clayton M. White.

41. Red-cockaded Woodpecker relocation experiment in coastal Georgia. R. R. Odom, J. Rappole, J. Evans, D. Charbonneau, and D. Palmer. 1982. Wildl. Soc. Bull. 10: 197–203.—This paper reports an effort to relocate 5 clans (12 individuals) of the endangered Red-cockaded Woodpecker (*Picoides borealis*). Relocation was made at night to min-

imize stress on the birds. Birds were trapped immediately after they entered roost cavities for the night. After capture, roost trees were cut down and sections of tree containing cavities were removed. Both the birds and their individual roost cavities were relocated. Upon arrival at release sites, cavity sections were trimmed to fit previously-cut holes in living pines. Birds were replaced in their cavities and holes plugged to prevent escape. The following morning birds were released and monitored by telemetry and sight observation daily through 30 July 1981 with periodic monitoring through 30 September.

The authors present detailed behavioral data of birds following their release. Of 5 instrumented birds, 3 were killed by raptors and 1 died as a result of resin flow into a cavity. The other bird was alive as of 4 March 1981. Seven birds, including 1 offspring of a transplanted individual, could still be accounted for as of 24 September 1981.

Odom et al. stress that such an intensive relocation effort should only be used as a last resort when all alternatives for preserving the birds in their natural habitat have been exhausted. In this case, the chance of the colony surviving impending habitat destruction without relocation was "probably very slim."—Richard A. Lent.

42. Strategy for conserving rare animals (Strategiya okhrany redkikh zhivotnykh). V. Flint. 1982. Okhota okhot. khoz. 9:1–2. (Russian)—The intricate interactions between humans and the animal kingdom are recognized in the IUCN's World Conservation Strategy and have been codified in the Supreme Soviet's USSR Law on the Protection and Utilization of the Animal Kingdom. Thus conserving rare and vanishing fauna is considered of national importance. Soviet conservation is based on a national strategy determined by socio-political characteristics (government ownership of land, water, forests, and animal resources; government planning; government control or responsibility for conservation and use of animal resources) plus modern scientific principles that are drawn from the experience of many countries.

The conservation strategy of the USSR has 5 interdependent "blocks" of action. The first is legal protection established by the law on protection and use and several international conventions. Soviet law considers rare and vanishing species as components of their ecosystems and as unique biological entities with special scientific, aesthetic, and cultural significance. By proclaiming ownership of animal resources, the national government has assumed responsibility for their protection.

Inventory of rare species is the second block and takes the form of a Red Data Book. The USSR being so large and diverse, Red Data Books for each of its constituent republics are being compiled too (Moldavia, Kazakhstan, Latvia, Belorussia, and the Ukraine have completed theirs).

Detailed knowledge of the biology of rare species is the third block, essential to determining both a species' status and how best to intervene in its decline toward extinction. Study of rare species is complicated by rarity and the vulnerability of rare species to disturbance.

Of practical measures, the fourth block, the most effective is habitat protection. Presently the USSR totally protects over 130 areas, totalling about 11 million ha, where endangered species breed, overwinter, or reside yearround. Although an extreme measure, captive breeding may preserve a gene pool and provide animals for re-introduction, for zoos, and for research. Biotechnical measures include habitat improvement, control of competitors, and providing nest platforms. Finally, preserving gametes and somatic cells by freeze-drying, though still experimental, shows promise.

The final block of action is ecological education. Most often endangered species and their habitats are destroyed through ignorance, therefore study of the ecological bases of conserving rare species will be included in school curricula in the USSR.

The article fails to mention endangered flora, perhaps because the journal is devoted to hunting and wildlife management. However, the author is a zoologist and there is no analogous protective legislation for plants in the USSR.—Elizabeth C. Anderson.

43. Dynamics of Leningrad's avifauna (Dinamika ornitofauni Leningrada). V. M. Khrabryi. 1982. Priroda (Mosc) 6:32–40. (Russian)—Since 1977 the Laboratory of Ornithology of the USSR Academy of Sciences' Zoology Institute has intensively studied Leningrad's avifauna. Through 1981, researchers had counted 168 species in 13 orders, either

migrating through, wintering, or nesting. Although some species have disappeared from the area encompassed by the city's recently expanded limits, others have accomodated themselves to drastic changes in their habitats (some even becoming more numerous than in nearby woodlands), and a few species have taken up city nesting. Comparison with earlier records shows a net increase in the number of species over the past 20–25 years, and continued increase is predicted.

The bulk of the article is a fairly detailed description of where in the city different types of birds are usually found. Newer parts of town have the least variety and fewest birds. The city's parks attract different species and in different numbers depending on whether the park is a suburban, large urban, small central-city, or "new" one. A unique feature of Leningrad is the amount of open water (the shoreline of the Gulf of Finland, and the city's famous canals and rivers), which attracts waterfowl, shorebirds, and gulls. The author observes that although birds can carry diseases, they add aesthetically and are a check on insect populations, and he urges that places suitable for birds be included in plans for Leningrad's future growth.—Elizabeth C. Anderson.

44. Ban of DDT and subsequent recovery of reproduction in Bald Eagles. J. W. Grier. 1982. Science 218:1232–1235.—DDE (a metabolite of DDT) has been suspected as a cause of low reproductive rates in Bald Eagles (*Haliaeetus leucocephalus*) as well as many other species. Since the ban of DDT in the U.S. in December 1972, several researchers have reported improvements in avian reproduction. This paper documents such an improvement in eagle reproduction in northwestern Ontario. Eagle production declined from 1.26 young per breeding area in 1966 to a low of 0.46 in 1974 and then increased to 1.12 in 1981. During the same time period the residues of DDE in addled eggs showed a significant decline. These findings suggest that the ban on DDT has been effective and confirm the effects of this pesticide on Bald Eagle reproduction at the population level.

The author notes that the rapid recovery of eagle reproduction is puzzling since DDE is persistent and may be present in the environment for many years. Even if DDE disappeared from eagle prey, it would be expected to remain in the breeding birds and continue to appear in the eggs. If the overall population is showing recovery, it is possible that young, relatively uncontaminated females are replacing older contaminated individuals. This higher turnover among breeding birds might indicate a lower survival rate than expected. Unfortunately we have no good data on survival rates in this species.—J. M. Wunderle, Jr.

PARASITES AND DISEASES

(see also 67)

45. Mallophaga on the eggs of wading birds. G. D. Rankin. 1982. Ibis 124:183–187.—Three species of feather lice (*Actornithophilus gracilis, Austromenopon* spp. *aegialitidis* group, and *Quadraceps junceus*) were found on the eggs of Lapwings (*Vanellus vanellus*). The number of clutches infested and the number of lice on the eggs increased exponentially with the length of incubation. A similar trend was found in the Redshank (*Tringa totanus*), although only one species of louse (*Actornithophilus totani*) was found and infestation of Redshank clutches and eggs was consistently less than among Lapwings. As Rankin points out the data do not necessarily imply an adaptive response to facilitate dispersal between adults as suggested by Mester (J. Ornithol. 112:109–130, 1971). As incubation progresses, parents become more attentive and the eggs approximate body temperature more closely. The lice may not distinguish between microclimatically similar bodies. Increased infestation may reflect the seasonal increase in populations of lice (Eveleigh and Threlfall, Can. J. Zool. 54:1694–1711, 1976) preparatory to dispersal to newly hatched hosts. In short, we need much more data on the ecosystem within birds' feathers.—Edward H. Burtt, Jr.

PHYSIOLOGY

(see also 9, 11)

46. Light experience and asymmetry of brain function in chicken. L. J. Rogers. 1982. Nature 297:223–225.—Rogers and coworkers have previously demonstrated that

single treatments of cycloheximide or glutamate during week 1 posthatch elevated attack and copulatory responses and retarded visual and auditory learning, when applied to the left but not to the right forebrain hemispheres. The present study shows that brief exposure (2 h) to light on day 19 of incubation produces this asymetrical posthatch responsiveness; chicks from eggs incubated in darkness for (a) the last 5 days of incubation or (b) until pipping, may show this lateralization effect because (1) during the last few days of incubation the embryo's right eye is by the air sac and exposed to light, while the left eye is occluded by the wing and body, and (2) light stimulation via the right optic nerve may advance developmental processes in the left forebrain hemisphere ahead of those in right. This paper holds interesting implications for epigenetic ideas about neural plasticity. Apparent minor errors in a legend and captions in 2 of 4 figures detract from the overall presentation.—W. A. Montevecchi.

MORPHOLOGY AND ANATOMY

(see also 72)

47. Geographic variation of the Fulmar *Fulmarus glacialis* in the north Atlantic. J. A. van Franeker and J. Wattel. 1982. Ardea 70:31–49.—New material that recently became available sparked the reexamination of this species. A clinal decrease in bill length and probably also in tarsus length and weight was found from warmer to colder regions; deviations from the clinal pattern are too small, or insufficiently known, to show historical instead of environmental influences. Variation in coloration was clearly not clinal, the large majority of each population being either colored or white. The differences between the populations may be considered sufficiently pronounced in color and size to maintain a purely morphological separation in *F. g. glacialis* and *F. g. auduboni.* Franeker and Wattel argue that these morphologically different forms could be considered evolutionary units.—Clayton M. White.

48. Eye colour, age and breeding performance in Sparrowhawks *Accipiter nisus*. I. Newton and M. Marquiss. 1982. Bird Study 29:195–200.—This paper assesses the usefulness of eye color as a method of aging Sparrowhawks and the extent to which eye color correlates with Sparrowhawk breeding performance. Sparrowhawk eye color changes from greenish-yellow at fledging to dark wine red in some old males. Eye color was correlated with age, but within age group variation was so great that it was of no value as a method of aging. Eye color was significantly correlated with clutch size and the number of young produced for the male population overall ($r^2 = 0.30$, 0.29, respectively, $P < 0.002$), but no significant correlation was found between eye color and breeding performance among males or females of the same age classes.

To test Snyder and Snyder's (Condor 76:219–222, 1974) hypothesis that females might be selecting dark-eyed males, the relationships between male eye color and female eye color, wing length, and age were determined. No significant correlations were found in this analysis, but the hypothesis was not rejected because a female may only be able to select among the males within her home range. Newton and Marquiss provide an alternative hypothesis, that the red eye color of males is simply a sign of aging and that it has no social implications. Their data are insufficient to reject either hypothesis.—Stephen R. Patton.

49. Sexual dimorphism in Snow Petrels (*Pagodroma nivea*). J. P. Croxall. 1982. Notornis 29:171–180.—The Snow Petrel remains as the only truly Antarctic bird for which racial variation is acknowledged (see also J. Field Ornithol. 53:195–196, 1982, review **44**). But sexual dimorphism may be great in petrels, and Coxall argues that this has not been considered adequately in earlier discussion of variation. Although birds from Adelieland (*P. n. major*) are larger than those from other areas, the pattern of variation within the species cannot be understood until samples of sexed birds are examined from Casey Station and other localities. Croxall speculates on the possible advantages of sexual size differences. It must be pointed out, however, that despite much verbiage to the contrary, sexual dimorphism cannot *originate* as a means of reducing intraspecific competition for food (see Power, Ornithol. Monogr. no. 28:1–2, 1980).—J. R. Jehl, Jr.

50. The adaptive significance of local variations in the bill and jaw anatomy of North European Red-necked Grebes *Podiceps grisegena*. J. Fjeldsa. 1982. Ornis Fenn. 59: 84–98.—Fish-eating Red-necked Grebes from northern populations in Finland and Russia have longer, more slender bills than their southern counterparts that feed on invertebrates. Fjeldsa proposes that these anatomical trends result from a change in diet from invertebrates in southern areas to fish in northern areas where the piscivorous Great Crested Grebe (*Podiceps cristatus*) is absent. The jaw musculature, bill, and neck characteristics of 87 Red-necked Grebes and 6 Great Crested Grebes killed in an oil spill at a Danish wintering area were examined for anatomical similarities. The identity and number of prey items in the stomach contents of these specimens were determined. The anatomical comparison and indices of diet similarity demonstrated that northern Red-necked Grebes converge with allopatric Great Crested Grebes. Fjeldsa repeatedly stated that while these investigations did not prove character displacement, his data suggest that displacement is a likely explanation for the morphological variation observed in Red-necked Grebes.—Lise A. Hanners.

PLUMAGES AND MOLT

(see also 7, 67)

51. Moult in the Sparrowhawk. I. Newton and M. Marquiss. 1982. Ardea 70:163–172.—Sparrowhawks (*Accipiter nisus*) resident in south Scotland molted once each year, mainly in the period May (females) or June (males) to September/October. For most of this period, the birds were also breeding. In some birds of both sexes, molt was arrested for a period during the time the young were being fed. Birds in arrested molt were found between late June and mid-August, and some individuals that were re-trapped were in the same state for periods up to 37 days. Among females, the onset of molt was strongly correlated with the onset of egg laying, and birds which began laying late also began molting late. At least up to age 3 years, molt began progressively later with respect to laying date. Males began on average about 26 days later than females. The later start in males meant that they retained full wing efficiency while they were hunting to provision their incubating mates. On average, birds of both sexes started molting earlier in lowland, where laying was earlier, than in upland.—Clayton M. White.

52. Completion of primary moult in the Black-headed Gull *Larus ridibundus*. J. Walters. 1982. Bird Study 29:217–220.—This note assesses the value of field observations of living birds for studying molt. Counts of Black-headed Gulls were made at an Amsterdam sewage farm from August through November. For each bird observed flying into the farm, the condition of the 10th primary was recorded. Average completion date of primary molt was similar to that reported by other methods of molt analysis (late September), but the range of dates for molt completion was greater than reported in the literature, presumably because of the large samples obtained by the observation method. Disadvantages of the observation method include: (1) detailed molt criteria cannot be scored, (2) younger age classes that cannot be separated reliably in the field may influence molt data if younger age classes molt on different schedules than adults, and (3) the composition of the population may change during the course of study. The latter disadvantage is a problem common to other methods of molt study. Clearly, the usefulness of the observation method in the study of molt is very restricted.—Stephen R. Patton.

53. Moult and biometry of the Golden Plover *Pluvialis apricaria*. J. Jukema. 1982. Limosa 55:79–84.—Molt, weight, and wing length of about 1250 Golden Plovers were studied. Molt and weight data from about 250 museum skins were used. Primary molt started between early June and late July and was completed mid September–early November. Duration of primary molt is estimated at 125 days. Some birds begin to molt in the breeding area, others upon arrival on their migration area in the Netherlands. Only about half the secondaries were replaced annually except the outermost and innermost secondary which are molted more often. Tail molt is rather irregular. Head and body feathers were molted twice a year. Weight showed a maximum in December and a minimum in the molting period. Golden Plovers can be aged by abrasion of the second-

aries. Immatures up to an age of 14–16 months retain all juvenile secondaries which are all fresh or equally worn. In adults part of the secondaries are worn and part are fresh and blackish.—Clayton M. White.

54. Why are the wings of *Larus f. fuscus* so dark? G. Bergman. 1982. Ornis Fenn. 59:77–83.—Bergman shows that ultraviolet irradiation of feathers reduces their abrasion-resistance and that irradiated black feathers are more abrasion-resistant than irradiated gray feathers. Based on these data Bergman argues that the extreme blackness of the Scandinavian Lesser Black-backed Gull's primaries results from the increased sensitivity to abrasion caused by exposure to high insolation in the species' tropical winter range. Bergman's analysis of color and pattern differences among subspecies of *L. fuscus* is imaginative, supported by his experimental evidence, and underscores the importance of physical forces on the evolution of animal coloration. However, his experimental technique, scraping irradiated feathers with a knife, is of dubious value. Techniques that are more quantifiable and more replicable are available (see Burtt, **The Behavioral Significance of Color**, Garland STPM Press, New York, 1979). Furthermore, Bergman appears unaware of recent studies of abrasion-resistance, feather structure, and mechanical properties of biological materials. Citation of such studies might have strengthened the rather loose logic of the paper, although they would not have added to the novelty of his data.—Edward H. Burtt, Jr.

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 1, 12, 20, 47, 70, 72, 73)

55. Materials for the avifauna of People's Democratic Republic of Korea. Z. Bochenski, T. Oles, and T. Tomek. 1981. Acta Zool. Cracov. 25:13–32.—A brief survey of the birds of Korea was undertaken from 18 September to 31 October 1978. Visual observations and netting yielded 86 species during this period. Several Siberian and Far East species were collected, prepared, and deposited in the collection of the Institute of Systematic and Experimental Zoology, Polish Academy of Sciences, Cracow. The authors indicate that about 25% of the birds observed at this time of year are migrants with a number of nesting species having left the area by this time.—R. W. Colburn.

56. Ruddy Shelducks in Britain in 1965–79. M. J. Rogers. 1982. Br. Birds 75:446–455.—As early as 1889, records of Ruddy Shelducks (*Tadorna ferruginea*) in Britain were thought to be escapes from captivity or semi-captivity. From 1965–1979 "about 123 individuals" were sighted in Britain. About two-thirds of these were seen from July to December. Comparative data from other European countries also suggest that the rare sightings of Ruddy Shelducks are escaped captives rather than African vagrants. The increase in sightings in Britain is apparently due to greater observer activity and "a greater number of individual shelducks wandering from the proliferation of wildfowl collections throughout Europe."—Patricia Adair Gowaty.

57. Immigration and recruitment of Ring-billed Gulls and Common Terns on the lower Great Lakes. H. Blokpoel and P. A. Courtney. 1982. Can. Wildl. Serv. Prog. Notes No. 133, 12 p.—This paper reports movements of Ring-billed Gulls (*Larus delawarensis*), and Common Terns (*Sterna hirundo*) from natal colonies to colonies in which they nested. Tables and maps depict locations of natal colonies on 4 of the Great Lakes (19 colonies for Gulls, 11 for Terns) and 2 subsequent nesting colonies on Lake Erie and Lake Ontario. A questionable (because of inexact mortality and band-return rates) model is used to index immigration rates of the 2 species to the 2 nesting colonies. Models indicate that distance from the natal to the subsequent nesting colony was a significant factor affecting immigration rates. The disappearance of one large Tern colony (~10,000 pairs) remains unexplained.

This paper is very difficult to understand and is built on numerous assumptions and extrapolations. Even though results are mostly consistent with the authors' expectations and past research, I feel the results reported here should be viewed with caution (which the authors partially admit).—Richard M. Zammuto.

58. Population variability and extinction in the avifauna of a tropical land bridge island. J. R. Karr. 1982. Ecology 63:1975–1978.—Islands have fewer species than similarly-sized portions of mainland. But why exactly do habitat islands created from portions of mainland, e.g., by flooding of surrounding low lying areas, lose some of their species? In this paper and another (Karr, Am. Nat. 119:220–239, 1982) Karr examines this question for the undergrowth forest birds of Barro Colorado Island, Panama, an island formed during construction of the Panama Canal. The first hypothesis examined—and subsequently rejected—is the rarity hypothesis: species rare on the mainland are the ones most likely to go extinct. Karr's mainland sampling not only failed to corroborate this hypothesis but even indicated that several of the most common mainland species were lost on the island. The other hypothesis covered in this paper is the population variability hypothesis: species whose population sizes fluctuate most highly are the ones most likely to go extinct. To test this hypothesis, Karr determined coefficients of variation (CV) of numbers of captures per sample in 8 annual samples on a 2 ha mainland plot for 38 species of forest birds. In this case, the prediction was supported as CVs for species lost from the island avifauna were significantly higher than CVs for species still present on Barro Colorado Island. Karr points out that the CVs he measured can be high either because of large total population fluctuations or due to local movements of a species in or out of the sampling area. Either way, whether by fluctuations from a small initial population size or by lack of ability to make small localized movements on the confines of an island, the species with high CVs of population size would be especially prone to extinction on habitat islands.—A. John Gatz, Jr.

59. On the sex ratio of Shovelers (*Anas clypeata*) in autumn and winter. T. Lebret. 1982. Limosa 55:73–78.—This is a nice identification study with a good black-and-white plate showing sex and age differences. Sex ratios were studied between August 1980 and January 1981. The proportion of females was only 8–15%. They were more numerous at sites which are used as molting places by dabbling ducks. Short cold spells caused no significant changes in sex ratio. In Senegal (West Africa) females dominated only in one out of three counts.—Clayton M. White.

60. The Black-winged Petrel (*Pterodroma nigripennis*) in the southwest Pacific and the Tasman Sea. J. A. F. Jenkins and N. G. Cheshire. 1982. Notornis 29:293–310.—This is another in the impressive series of papers on seabird distribution by Jenkins and colleagues based on many years of observations from a merchant ship. The Black-winged Petrel arrives in the New Zealand area in November. Numbers remain high through March, then drop as the birds move northward. In July–September they are absent from New Zealand and have moved into the central Pacific. The paper includes a good summary of breeding localities.—J. R. Jehl, Jr.

61. The status of birds at the Bounty Islands. C. J. R. Robertson and C. F. van Tets. 1982. Notornis 29:311–336.—The barren Bounty Islands, discovered by Captain Bligh in 1788, are almost unstudied. In 1978, for the first time, 3 biologists camped there for 2 weeks and made a detailed study of the avifauna, which consists of 11 species. Among the most abundant are: *Eudyptes sclateri,* 115,000 pairs; *Diomedea cauta salvini,* 76,000 pairs; *Pachyptila crassirostris,* 76,000 pairs. The meager earlier literature is reviewed and corrected, and the displays of *Leucocarbo campbelli ranfurlyi* are described and illustrated.—J. R. Jehl, Jr.

62. The Arctic Tern *Sterna paradisaea*—a new inhabitant of the inshore archipelago. L. v. Haartman. 1982. Ornis Fenn. 59:63–76.—From 1935 to the present, von Haartman has monitored the habitat expansion of Arctic Terns to inshore regions of the Finnish Archipelago. Concomittant with this expansion, there has been a shift in the terns' diet to include increasing proportions of chironomid pupae. Eutrophication of nearshore waters is proposed as a cause for increasing insect populations on which the terns are capitalizing. Census data indicate a slight increase in Common Tern (*S. hirundo*) populations in inshore waters although the heavier Common Terns apparently are less able to exploit this burgeoning food resource. Population data in this paper are well documented and von Haartman's informal writing style makes the paper interesting and informative. Sections of the

paper provide profuse background information on the geography of the archipelago, and detailed descriptions of feeding methods and reproductive parameters of Arctic and Common terns; this was interesting but distracting from the major thesis of the paper.—Lise A. Hanners.

SYSTEMATICS AND PALEONTOLOGY

(see also 47, 54, 72)

63. A new tiny raptor from the lower Eocene of England. C. J. O. Harrison. 1982. Ardea 70:77–80.—The foot of a small raptor from the Lower London Clay, Division A, of the Lower Eocene of England, comprises the distal end of a tarsometatarsus with some phalanges. It is probably a tiny falcon, *Parvulivenator watteli* gen. et sp. nov., and appears to have been about three-quarters to two-thirds the size of the smallest known bird of prey, the Black-thighed Falconet *Microhierax fringillarius.* It lacks any medial displacement of the outer flange for the trochlea for the second digit, and the phalanges indicate proportionally longer and narrower toes than in Recent species.—Clayton M. White.

64. And then there were twelve: the taxonomic status of *Anomalopteryx oweni* (Aves: Dinornithidae). P. R. Millener. 1982. Notornis 29:165–170.—The moas have had a tough history. Now another "species" has been lost, this time via taxonomic extinction. The type elements of *A. oweni* are shown to belong to different species. The poorly-reconstructed skull, from a juvenile bird, is ascribed to *A. didiformis,* whereas the post-cranial elements are assigned to *Pachyornis mappini.* The family now consists of only 12 species.—J. R. Jehl, Jr.

65. Phylogenetic relationships and monophyly of loons, grebes and hesperornithiform birds, with comments on the early history of birds. J. Cracraft. 1982. Syst. Zool. 31:35–56.—Using cladistic methods, Cracraft finds that loons and grebes are sister taxa, and that, taken together, they are the sister taxon of penguins.

The shapes of skeletal characters are the primary data for this analysis. The difficult problem of determining whether the state of a character is primitive or derived is addressed using procellariiformes and pelecaniformes as outgroups. The strongest support for the hypothesis rests on two characteristics of loons and grebes that are unique to birds, hence assumed to be shared, derived conditions.—George F. Barrowclough.

EVOLUTION AND GENETICS

(see also 19, 28, 30, 47, 49, 50, 58, 64, 65)

66. Evolutionary genetics of birds. VI. A reexamination of protein divergence using varied electrophoretic conditions. C. F. Aquadro and J. C. Avise. 1982. Evolution 36:1003–1019.—Five years of avian electrophoresis have led to the generalization that the extent of genic differentiation among taxa of birds is small in comparison with that of other vertebrates. Aquadro and Avise here check the possibility that this conclusion may be the result of "hidden" variation in birds, subtle variants that are not easily detected in cursory electrophoretic surveys. Such hard-to-resolve variants are known from *Drosophila.* Using 12 distinct electrophoretic conditions, the authors find some previously undetected alleles in this broad survey of passerine and non-passerine birds. However, even with these new polymorphisms, birds are still found to be conservative in the extent of genic differentiation with respect to most other organisms. The cause of this phenomenon remains unknown.—George F. Barrowclough.

67. Heritable true fitness and bright birds: a role for parasites? W. D. Hamilton and M. Zuk. 1982. Science 218:384–387.—Some sexual selection models suggest that females act as if they are choosing males for their "good genes." However, population genetics theory predicts that any balanced polymorphism for a selected trait will result in zero heritability, hence no one mate is better for "good genes" than any other. In this paper, Hamilton and Zuk propose a solution to this problem with a previously unconsidered mechanism of sexual selection.

The authors' sexual selection model is based upon the possibility that animals choose

their mates on the basis of genetic disease resistance by evaluating those characters whose full expression depends upon health and vigor. In addition, they suggest that coadaptational cycles of hosts and parasites produce consistently positive offspring-on-parent regression of fitness. Thus the coadaptational cycles maintain the heritability of disease resistance solving the earlier problem of a loss in heritability. The model is supported if those species which are most subjected to attack by debilitating parasites are the most sexually dimorphic species. They tested this prediction by examining a combination of seven surveys of blood parasites (including 5 genera of protozoa and 1 nematode) in North American passerines. They found weak, but significant associations across species between incidence of chronic blood infections and striking display (3 characteristics: male "brightness," female "brightness," and male song) which conforms to their model. The authors suggest that other explanations might be offered, but leave that difficult task to the future.—J. M. Wunderle, Jr.

FOOD AND FEEDING

(see also 20, 26, 32, 34, 62)

68. Food caching by raptors and caching of nestling by the Broad-winged Hawk. D. Lyons and J. A. Mosher. 1982. Ardea 70:217–219.—This reports the caching of a dead nestling by the parent hawk (*Buteo platypterus*). The adult female brought the dead nestling from a cache and fed part to the surviving nestling. Fratricide was ruled out as the cause of death for the cached nestling. The authors review caching in raptors but offer no new insight as to the reasons for caching.—Clayton M. White.

69. Further observations on the food of tawny owls in London. G. Beven. 1982. London Nat. 61:88–94.—Pellets were collected in three locales in London from 1966 to 1980. A total of 3691 items, including 860 insects (858 beetles of 21 species and 2 wasps), were identified from the pellets. Mammals made up 38.3%, birds 50.6%, and frogs/fish 12.1% by biomass. Also recorded were 137 pellets composed of vegetable fibers, earthworm chaetae, and sand from the gut of earthworms eaten by the owls. The "biomass" was arrived at by converting all prey items to "prey units" of 20 g (Southern, Ibis 96:384–410, 1954). A conversion factor whose product when multiplied by 20 yields the animal's approximate weight, is used for computing percent biomass, e.g., a European Kestrel (*Falco tinunculus*) has a Conversion Factor (C.F.) of 10, a rabbit (*Oryctolagus cuniculus*) a C.F. of 10 (Southern suggested a 200 g rabbit was the largest a Tawny Owl (*Strix aluco*) could handle) while a gray squirrel (*Sciurus carolinensis*) gets a C.F. of 25 yielding a 500 g prey item. Why the owl can handle a 500 g squirrel but only a 200 g rabbit is not explained. The author's attempt to put the different prey animals in "perspective" within the diet of the Tawny Owl is weakened by the 20 g "prey unit" which introduces a potentially large bias. Cowan (Murrelet 23:48–53, 1942) used a 6 g "prey unit" which may encourage a closer approximation to the "actual" weight of the prey item. We thus have at least 2 different "prey units." Perhaps ecologists should agree upon a standard way to represent the biomass of prey species in a predator's diet. Storer (Auk 83:423–436, 1966) used a series of weight groups (1–20) arranged as a cubic function, i.e., Group 1 had limits set by 1.5^3 to 2^3 or 3.4 g to 8 g, Group 2 was 2^3 to 2.5^3 or 8 g to 15.6 g, and so on. He then used mean weights of prey species taken largely from data on museum specimens to place the prey species in appropriate weight groups.—Richard J. Clark.

BOOKS AND MONOGRAPHS

70. Bird habitats in Britain. R. J. Fuller. 1982. T. & A. D. Poyser, Calton, England. 320 p. $35.00.—This book is noteworthy both because it presents much new information on the habitat ecology of British birds and because it is one of the first major attempts to integrate data from an extensive, volunteer-based survey—the Register of Ornithological Sites—with the results of numerous intensive, research projects. The Register is an outgrowth of the Atlas of Breeding Birds of Britain and Ireland. Similar atlases are now being prepared in a dozen or more states and provinces, and plans have already been made in North America for several projects like the Register. In **Bird Habitats**, Fuller

uses the Register results in conjunction with a thorough survey of the ornithological literature to address conservation issues and questions about the habitat ecology of British birds. His book thus provides an opportunity to determine what sorts of information are most, and least, useful as we design our own Atlas and Register projects.

The first 4 chapters concern coastal habitats. I was impressed by the detailed subdivision of the coastal habitats and the explanation of factors which account for each species' distribution. Register data are used repeatedly to document the relative importance of breeding and wintering sites for numerous species. The next 2 chapters describe woodland communities. Species' richness in relation to habitat structure and area are emphasized, though without a clearly stated null hypothesis based on random distribution. The author makes a number of interesting observations such as that "British and European woods (have) very few truly canopy nesting passerines" in contrast to "North America where many of the wood warblers nest high in trees." Much of the material in these chapters is synthesized from former published work, but Register data are used to examine geographic and seasonal trends in density. Graphs of abundance vs. frequency of occurrence are used repeatedly here and elsewhere in the book as compact portraits of community composition.

The next 3 chapters concern grasslands, scrub, and heaths. These are restricted habitats, some of which, such as lowland heaths, are being reduced due to development. Lakes, rivers, bogs, and uplands are then discussed. Each of these first 13 chapters includes descriptions of the physical and biological features of the environment that are most important in determining the composition of the bird community. Requirements of the more important breeding, wintering, and migrating species are then discussed. Conservation issues are described in a number of chapters, and each chapter closes with a brief summary.

Chapter 14, *Structure and composition of bird communities,* presents a synthesis of the earlier chapters. Frequency of occurrence is plotted against rank abundance for the species wintering and breeding in each habitat. The resulting patterns are described but given little interpretation. A dendrogram describing the similarity of 16 communities is also presented without much discussion as are the ratios of non-passerines to passerines and migrants to residents for each habitat. Two short chapters on methods, which might equally well have been included in the appendices or introduction, follow.

Three audiences for the book and the data on which it is based can be identified. First, conservationists attempting to protect a species or a site frequently need survey data complete beyond the wildest challenge. For this purpose, **Bird Habitats** will be of unquestionable value. Second, any field ornithologist visiting Britain will find this book well worth the price because it summarizes a great deal of interesting natural history information, much of which is unavailable elsewhere. The third audience comprises researchers not in the first two categories, and it is less clear that this will be a major work for them. One searches in vain for one or a few major themes in the book, and there are few detailed analyses of the data. As a result, the book is less successful as a research monograph than it is as a detailed natural history. But despite this drawback for the theoretical ecologist, the amount of quantitative information, collected in a standardized way by Register participants, is impressive. One has the feeling that answers to some difficult and important questions are waiting to be uncovered in the figures and tables of **Bird Habitats** and in the data banks of the other major volunteer-based survey programs. Perhaps a sequel to **Bird Habitats** will provide some of these answers.—Jon Bart.

71. Gulls: a guide to identification. P. Grant. 1982. Buteo Books, Vermillion, South Dakota. 280 p. $32.50.—The book is based on an excellent series of articles on gull identification that appeared in **British Birds**. Like the articles the book is outstanding and is no doubt already *the* reference on gull identification. The 23 species covered in the book are grouped according to shared plumage and size characteristics so that the book's organization is essentially 5 large chapters each containing 4 or 5 species accounts. The species accounts include remarks on identification, aging summary (details on plumage changes for each winter and summer up to adult age classes), and detailed descriptions of the birds in each age class. The stippled drawings are quite good and the range maps are adequate though some readers will likely prefer more detailed maps. We have iden-

tified only 2 shortcomings: (1) the title is misleading implying it covers all the world's gulls when in fact it covers only European gulls and accidentals, and (2) the price will discourage some buyers.—Harry LeGrand and Patricia Adair Gowaty.

72. The Great Grey Owl (Der Bartkauz). H. Mikkola. 1981. Die Neue Brehm-Bucherei No. 538. A. Ziemsen Verlag, Wittenberg Lutherstadt. 124 p. 12.4 DDM (East German Marks).—This modern autecological study pulls together much of the literature on the Great Grey Owl (*Strix nebulosa*) as well as contributing significant new information. The contents, as indicated by the chapter headings, are the name, systematics and races, morphology and anatomy, distribution, habitat, colonization, residency and movements, behavior, feeding biology, reproductive biology, sickness, enemies and competition, economic significance and protection. The monograph is well illustrated with 68 photographs and figures.—Richard J. Clark.

73. Falkland Islands Birds. R. W. Woods. 1982. Anglia "Survival" Books. Livesey Ltd., Shropshire, England. 79 p. No price given.—In 1975, Woods wrote **The Birds of the Falkland Islands**, an excellent and detailed treatment of the entire avifauna. The present book is an abbreviated version, aimed at a nonprofessional audience (i.e., tourists). It treats most of the species (69) and is accompanied by a fine series of 55 photographs, nearly all in color. It also includes a general introduction to the islands, their habitats, climate, and vegetation. The book is exactly "right" for its intended audience, and many ornithologists will also find it interesting. I regret that political realities have temporarily diminished its potential sales.—J. R. Jehl, Jr.