RECENT LITERATURE

Edited by John A. Smallwood

RESEARCH TECHNIQUES

(see also 4, 8)

1. Notes on the at-sea identification of some Pacific gadfly petrels (genus: *Pterodroma*). L. B. Spear, S. N. G. Howell, and D. G. Ainley. 1992. Colon. Waterbirds 15:202-218.—This paper presents new criteria, and analyzes previously published criteria, on the visual identification, at sea, of 14 species (11 to some workers) of *Pterodroma* petrels which regularly occur in the eastern Pacific area. Comparisons are presented of five groups of similar appearing species which are difficult to separate in the field and which have largely overlapping ranges: (1) Juan Fernandez (*P. externa*) and White-necked (*P. cervicalis*), (2) Collared (*P. brevipes*) and White-winged (*P. leucoptera*), (3) Black-winged (*P. nigripennis*), Pycroft's (*P. pycrofti*), Stejneger's (*P. longirostris*), Cook's (*P. cookii*), and Defilippe's (*P. defilippiana*), (4) Kermadec (*P. neglecta*), Murphy's (*P. ultima*), and Herald (*P. arminjoniana heraldica*), and (5) Tahiti (*P. rostrata*) and Phoenix (*P. alba*) petrels. The information presented is based on 6731 hours of observation on 19 cruises from 1983-1992, supported by examination of 692 freshly collected specimens (pertinent measurements reported). Range maps for the eastern Pacific are presented for all groups. Salient features in identification are illustrated by photographs of specimens, including photographs of dorsal and ventral surfaces of extended wings, and three at-sea flight photographs. *Pterodroma* petrels are difficult to identify because they usually pass rapidly through the field of view, are similar in appearance and flight pattern, change in appearance with varying lighting conditions, and observation is often hindered by shipboard motion. The authors emphasize the importance of experience in recognizing key features for separating *Pterodroma* species, and urge caution in identification at sea.

This paper shows the advantage of collecting specimens in groups of avian species where identification is difficult. It is *must* reading for anyone interested in identifying gadfly petrels at sea in the eastern Pacific. [Point Reyes Bird Observatory, Stinson Beach, CA 94970, USA.]—William E. Davis, Jr.

BEHAVIOR

2. Observation of a Ruby-crowned Kinglet (*Regulus calendula*) roosting in Verdin (*Auriparus flaviceps*) nest in winter. G. H. Farley. Southwest. Nat. 38:72-73.—During a 20-day period from 1 February 1992 to 22 February 1992 in southern Sierra Co., New Mexico, the author observed a male Ruby-crowned Kinglet enter an abandoned Verdin nest during the late afternoon hours. The consistency of the kinglet's locations during visits suggests that a single bird used the nest regularly for roosting. Such small, insulated nests may be an important factor which partially limits the winter distribution of small, insectivorous passerines. [U.S. Fish and Wildlife Service and Dept. of Biology, Univ. of New Mexico, Albuquerque, NM 87131, USA.]—Danny J. Ingold.

3. Red colour bands do not improve the mating success of male Rock Ptarmigan. K. Holder and R. Montgomerie. 1993. Ornis Scand. 24:53-58.—Studies of Red-cockaded Woodpeckers (*Picoides borealis*) and Red-winged Blackbirds (*Agelaius phoeniceus*) have shown that red color bands reduce reproductive success of males. Males of both species have red, coverable ornaments used during aggressive interactions. Because color bands cannot be concealed, they could incite aggression from other males continually, thus reducing the bearer's ability to undertake other tasks such as territory maintenance and parental care. Male Rock Ptarmigan (*Lagopus mutus*) have red-orange supraorbital combs that are used in inter- and intrasexual displays. Based on one season of research, Brodsky (1988, Anim. Behav. 36:662-667) found that males with red or orange bands obtained *more* mates than those with bands of other colors. During four subsequent breeding seasons, Holder and Montgomerie found that neither red nor orange bands improved male mating success in the same population of ptarmigan. Consistent with other studies of species with coverable badges, males with red and/or orange bands experienced significantly more aggressive intrusions from other males. Thus, bands of the same color as supraorbital combs seem to elicit aggression from other males rather than make the bearer more attractive to females. [Dept. of Biology, Queen's Univ., Kingston, ON K7L 3N6, Canada.]—Jeff Marks.

4. **Polygyny and extrapair fertilizations in eastern Red-winged Blackbirds (*Agelaius phoeniceus*).** D. F. Westneat. 1993. Behav. Ecol. 4:49–60.—This paper demonstrates the use of molecular genetics (here, DNA fingerprinting) to investigate avian mating strategies. Westneat collected blood samples from adult and nestling blackbirds on a pond near Cornell University, Ithaca, New York, in 1988 and 1989. Birds also were color-banded, and observations of their behaviors recorded. In all, he sampled 235 nestlings, and found that 58 (24%) of them were not descendant from at least one of the parents. This confirms that observed extra-pair copulations (EPCs) actually resulted in fertilized eggs and offspring (EPFs). In every case, Westneat was able to show that the offspring were not sired by the "social" father, but were descended from the mother. Therefore, these offspring are the result of EPCs, and not egg-dumping by females. In most cases, the genetic father was identified as a neighboring male.

Almost half of the territorial male blackbirds in this population had more than one female nesting on his territory, which is typical for this polygynous species. This raises the possibility of costs to polygyny for males: if it is difficult to guard additional mates, the polygynous male may be more vulnerable to cuckoldry. However, Westneat found no evidence for such a trade-off. The relationship between parentage (proportion of nestlings on a territory sired by the territory-holder) and harem size was not statistically significant. In fact, graphs of this relationship suggest that if anything, males with larger harems may be less vulnerable to cuckoldry. Further, males with larger harems may be more successful in obtaining EPFs (significantly so in 1988, but not in 1989). These results suggest that female preferences play a large role in determining the success of EPC attempts.

Westneat walks the reader through the process of scoring and interpreting DNA electrophoresis gels. Thus, by reading the methods section carefully, those not familiar with DNA fingerprinting can discern some of the assumptions that must be made when using this technique, and some of the ambiguities in assigning parentage. [Center for Evolutionary Ecology, T. H. Morgan School of Biological Sciences, Univ. of Kentucky, Lexington, KY 40506, USA.]—Peter D. Smallwood.

FOOD AND FEEDING

(see also 9, 18, 23)

5. **Blue Jay preys on Tree Swallow nestlings.** J. R. Kunz. 1993. Sialia 15:59.—The author attached two nest boxes made of cedar shake shingles with 3.8-cm entrance diameters to trees using wire. Both boxes were occupied by Tree Swallows (*Tachycineta bicolor*) during the breeding season. At the nestling stage, a Blue Jay (*Cyanocitta cristata*), clinging to the wire that supported the boxes, was able to reach in and extract four nestlings from one box and several nestlings from the second box. Two swallow nestlings eventually fledged from one of the boxes. [21 Carol Ct., Endwell, NY 13760, USA.]—Danny J. Ingold.

6. **Proximal costs and benefits of heterospecific social foraging in the Great Tit (*Parus major*).** L. M. Carrascal and E. Moreno. 1992. Can. J. Zool. 70:1947–1952.—While at the feeders, Great Tits alternate vigilance and feeding activities. Factors that affect the time spent performing each of these activities include the presence or absence of a subordinate species, dominant species, and conspecific. Great Tits occurred less frequently with other *Parus* species than expected and aggressive interactions with dominant species limited the number of occurrences of Great Tits feeding with such species. The longest time spent at feeding points was with a subordinate species. Time spent at the feeder alone or with a conspecific was significantly less than with a subordinate species. Time spent with a dominant species was intermediate. The duration of vigilant behavior was significantly greater when Great Tits were alone than when a subordinate species, a dominant species, or a conspecific was present, yet there was no significant difference among the latter three. Sample size was adequate for Carrascal and Moreno to conclude that the difference was due in part to intraspecific competition. [U.E.I. Vertebrados, Museo Nacional Ciencias Naturales, CSIC, J. Guttierrez Abscal 2, 28006 Madrid, Spain.]—K. M. Boggs.

SONGS AND VOCALIZATIONS

(see also 15, 19)

7. Individually distinct hooting in male Pygmy[-]Owls (*Glaucidium passerinum*: a multivariate approach. P. Galeotti, M. Paladin, and G. Pavan. 1993. Ornis Scand. 24: 15–20.—Within species, owls seem to have stereotypic songs with little evidence of variation among individuals. Consequently, few workers have attempted to quantify owl vocalizations.

Using playbacks to elicit vocal activity, Galeotti et al. recorded the advertising songs of 10 male Eurasian Pygmy-Owls in Italy. Note duration, inter-note interval, and mean fundamental frequency were measured from sonograms. The songs consisted of a monotonous series of single notes that looked very similar on paper. However, most of the males differed significantly from one another in the measured parameters. Stepwise DFA revealed that mean fundamental frequency provided the greatest separation among males; overall, the DFA classified 85% of the songs correctly. Males reacted aggressively (including "dive bombing" the speaker) to playback of stranger's songs but merely countersang when their neighbors vocalized.

The results suggest that sonographic analyses can be used to assess territory size and turnover of males and that males can recognize one another's vocalizations. Similar studies of other owl species may prove equally fruitful. [Dipart. di Biologia Animale, Univ. di Pavia, 27100 Pavia, Italy.]—Jeff Marks.

NESTING AND REPRODUCTION

(see also 3, 4, 13, 15, 17, 18, 19, 25, 26)

8. Avian hatching asynchrony: brood classification based on discriminant function analysis of nestling masses. R. G. Harper, S. A. Juliano, and C. F. Thompson. 1993. Ecology 74:1191–1196.—In many bird species, the eggs of a brood hatch asynchronously. Of course, avian ecologists hope to understand the ecological conditions that might select for asynchrony. However, any attempt to study asynchrony in hatching is beset with the problem of detecting it. The obvious method of peering into every nest every day is not only time consuming, but disruptive for the birds as well. To circumvent this difficulty, ecologists have used "informal rules" to classify broods as synchronous or asynchronous, based on data taken from a single visit to each nest, a few days after all eggs have hatched. Harper et al. propose a more formalized method, using the multivariate statistical tool of discriminant functional analysis (DFA) of the weights of the nestlings at one point in time. They demonstrate this procedure on a population of House Wrens (*Troglodytes aedon*) in Illinois. The broods of this population exhibited a range of synchronous/asynchronous hatchings. Moreover, the birds in this study bred in nest boxes, facilitating daily surveys of each of the 90 broods studied. Thus, the authors were able to assess the accuracy of their method, as well as compare it to two of the "informal rules" currently used.

Broods where any two consecutive hatchings were more than one day apart were classified as asynchronous. The informal methods, based on (1) the magnitude of the difference in weight between the largest and smallest nestling, or (2) using the weights to estimate hatching date, misclassified about one quarter of the broods (23% and 27% errors, respectively). Seven variants of DFA were tried. The best had error rates of 17–18%, not much better than the informal methods (the differences were not statistically significant). In fact, these DFAs depended on a prior estimate of the total proportion of asynchronous broods in the population. Repeating the analyses without a prior estimate, the error rate rose to nearly 30%. The authors note that the best DFAs tended to err by classifying asynchronous broods as synchronous. However, this was due to the fact that the DFAs relied on a prior estimate of the total proportion of synchronous broods in the population, which turned out to be an over-estimate, biasing classifications towards synchrony. Therefore, the direction of bias is not a consistent property of DFA. In short, it appears that the DFAs used here were no better than the informal methods already in use. However, this first attempt used only the masses of the nestlings. As a multivariate procedure, one could easily include tarsus length, culmen length, or many other metrics in DFA. Including additional metrics may very well decrease the error rate of this method of classification to below that of previous methods.

[Dept. of Biology, P.O. Box 2900, Illinois Wesleyan University, Bloomington, IL 61702, USA.]—Peter D. Smallwood.

9. **Nesting and foraging of Least Terns on sand pits in central Nebraska.** E. C. Wilson, W. A. Hubert, and S. H. Anderson. 1993. Southwest. Nat. 38:9–14.—As a result of changing hydrological and vegetational conditions along the Platte River in Nebraska, sandbars in the river channel have become increasingly less suitable for nesting Least Terns (*Sterna antillarum*) during the past several decades. Concomitantly, spoil piles next to sand and gravel excavation sites in the Platte River Valley have become more important as nest sites for inland terns. During two breeding seasons (1989–1990), the nesting and foraging ecology of Least Terns was studied at a group of sand pits 1.5 km south of the Platte River near Elm Creek. All pits on the study area were either permanently or seasonally connected by channels to the main channel of the Platte River. Fourteen nests were located during both seasons, all but one of which was located on sand and small gravel (<6.3 mm in diameter) substrates. All nests were on the most recently excavated sites where herbaceous vegetation was absent or minimal, although as the season progressed cottonwood and willow saplings formed visual barriers for nests close to the shore.

Adults foraged at sand pits and on the Platte >1.5 km from the nest sites, and fed their young mostly small (<3.8 cm) cyprinid fish. Ten of 14 nest attempts during the study produced nestlings; two nests were preyed upon, one was abandoned, and one was flooded. As riverine nesting habitat declines, spoil piles near sand pits can provide valuable nesting habitat for Least Terns. However, such piles are vulnerable to rapid encroachment of vegetation since they are not usually flooded. Thus, in order for such habitats to be maintained as viable nest sites for terns, plant succession will have to be set back periodically. [U.S. Fish and Wildlife Service, Wyoming Coop. Fish and Wildlife Research Unit, Univ. of Wyoming, Laramie, WY 82071, USA.]—Danny J. Ingold.

10. **Breeding biology of the Eastern White-winged Dove in southern Texas.** D. A. Swanson and J. H. Rappole. 1993. Southwest. Nat. 38:68–71.—Eastern White-winged Doves (*Zenaida asiatica asiatica*) were observed during the 1987 and 1988 breeding seasons on the Las Palomas Wildlife Area in Cameron Co., Texas, in order to determine the effects of intraspecific competition for nesting territories on the breeding population size of this species. There was no indication in either year that whitewings fully occupied high density nesting areas (HDNA) before settling in low density nesting areas (LDNA). Survival probabilities of whitewing nests were significantly higher on LDNAs than HDNAs ($P < 0.0001$), and predation was higher on eggs than nestlings. When six incubating males were removed from a HDNA in 1988, no whitewings established nesting territories within 10 m of the removals. These data thus suggest that intraspecific competition among whitewings for nesting territories did not limit the breeding size of this population in southern Texas. [West Virginia Univ., P.O. Box 6125, Morgantown, WV 26506, USA.]—Danny J. Ingold.

11. **Reproductive success of three species of herons relative to habitat in southern Florida.** P. C. Frederick, R. Bjork, G. T. Bancroft, and G. V. N. Powell. 1992. Colon. Waterbirds 15:192–201.—This paper investigates the effect of location on reproductive success in the Tricolored Heron (*Egretta tricolor*), Little Blue Heron (*E. caerulea*), and Snowy Egret (*E. thula*) in freshwater, estuarine, and marine colonies in southern Florida. Tricolored Herons were most common in marine colonies, Little Blue Herons in freshwater, and Snowy Egrets in estuarine habitats. Clutch size was largest in freshwater colonies, and differences among habitats were not related to egg laying dates. The authors concluded that energetic cost of flights to foraging sites is not a likely explanation for reduced clutch size in the two saline environments. They suggest that more likely explanations are related to energetic costs of salt excretion and/or differences in food availability. The probability of a nest producing a fledgling was lowest at estuarine colonies for all species and highest in freshwater colonies. Nesting success differences are largely explained by heavy crow predation of chicks and especially of eggs in estuarine colonies. In general, nesting success was less in marine and estuarine (coastal) habitats, which makes the apparent preference for these habitats by Tricolored Herons and Snowy Egrets strange. This habitat preference pattern might be innate, and hence maladaptive due to recent habitat degradation in the Everglades (which the authors think unlikely), or may be related to the higher predictability

of coastal habitats. Freshwater marshes, although productive, tend to be ephemeral, and hence herons might gain in lifetime reproductive success by choosing more stable saline environments.

This is a clear and well written paper containing several interesting hypotheses. [Dept. of Wildlife and Range Sciences, Univ. of Florida, Gainesville, FL 32611, USA.]—William E. Davis, Jr.

MIGRATION, ORIENTATION, AND HOMING

(see also 20, 21)

12. Hudsonian Godwit *Limosa haemastica* migration in southern Argentina. B. A. Harrington, C. Picone, S. L. Resende, and F. Leeuwenberg. 1993. Wader Study Group Bull. 67:41–44.—Hudsonian Godwits have one of the most spectacular and enigmatic migrations of any landbird. They breed at arctic latitudes in North America and winter mostly in southern Argentina and Chile. Evidence suggests that they fly >4500 km nonstop from James Bay to northern South America, but South American stopover sites are unknown. The timing of their arrival on the wintering grounds suggests that the birds spend considerable time at stopover sites somewhere between northern and southern South America. Possible stopovers are near Asuncion, Paraguay, where small numbers are seen during southward migration, and at Lagoa de Peixe, Brazil, where more than 1000 have been counted in November. In spring, large numbers are seen along the coast of Buenos Aires Province. Godwits are almost nonexistent there during autumn, suggesting that northward and southward migration routes are distinctly different. The decline in numbers from April to May in Argentina and Brazil, and the absence of spring sightings in Paraguay, suggest a rapid northward migration out of South America. [Manomet Bird Observatory, Manomet, MA 02345, USA.]—Jeff Marks.

HABITAT USE AND TERRITORIALITY

(see also 11, 16, 20)

13. Habitat preference of nesting Wedge-tailed Shearwaters: the effect of soil strength. D. T. Neil and P. K. Dyer. 1992. Corella 16:34–37.—This paper reports on an experiment designed to determine if soil strength influences nest-site selection in Wedge-tailed Shearwaters (*Puffinus pacificus*) on Heron Island in the Great Barrier Reef, Queensland, Australia. The shearwaters dig burrows up to 2 m long and 1 m deep. The number of shearwater burrows was counted, measurements of soil strength were made, and habitat type recorded for 224 3 × 10-m quadrats. Soil strength is an indicator of the tendency of a burrow to collapse and the resistance of soil to excavation. Burrow densities were highest for each habitat type in the mid range of soil strength, were soil was loose enough to permit burrowing, but strong enough to prevent collapse. There were sufficient differences in burrow density among habitat types to suggest that vegetation type and quantity of ground debris also influence burrow-site selection. Artificial habitats (turf and buildings) had the highest percentage of soil strengths in which shearwaters rarely burrow, and hence the authors suggest that soil compaction resulting from human development will adversely affect shearwater nesting. [Dept. of Geographical Sciences, Univ. of Queensland, St. Lucia 4072, Queensland, Australia.]—William E. Davis, Jr.

14. Breeding bird distribution in Chihuahuan desert habitats. L. G. Naranjo and R. J. Raitt. 1993. Southwest. Nat. 38:43–51.—Species composition and density of the avian community were examined on a sloping alluvial fan (bajada) in Dona Ana Co., southern New Mexico. Sixty-two bird censuses were conducted along four transects and among three physiographically distinct habitats. Twenty-eight bird species were found and 13 of the more common ones were examined in greater detail. All species except Rufous-crowned Sparrows (*Aimophila ruficeps*) and Eastern Meadowlarks (*Sturnella magna*) were distributed throughout the habitats, although most showed a clear peak of abundance in a particular habitat. Spearman rank correlations between bird densities and vegetation measurements suggest that the community can be divided into open-habitat and scrub birds; however, the low values of all the coefficients indicate that vegetation variables *per se* are not strong predictors of bird abundances. Mean vegetation variables incorporated into a principal component analysis revealed a similar trend in which desert-scrub species are replaced by open-habitat birds along a gradient of decreasing creosote bush and increasing forb and grass cover. [Dept. of Biology, New Mexico State Univ., Las Cruces, NM 88003, USA.]—Danny J. Ingold.

ECOLOGY

(see also 4)

15. The increase in risk of predation with begging activity in broods of Magpies *Pica pica*. T. Redondo and F. Castro. 1992. Ibis 134:180–187.—A number of species of birds reveal the location of the nest to undesireable species, including predators, through their begging sounds. One would expect natural selection to reduce populations of individuals who revealed the location of their nest by emitting loud begging calls. The situation is complicated by the fact that such loud calls are useful for soliciting extra food from parents. Redondo and Castro investigated nests of Magpies in southwestern Spain, and the results suggested that noisy nests attract predators to the nest. However, the nests containing the oldest birds (20 days), birds that produce the loudest begging calls, were not the most heavily preyed upon. The number of variables involved in this study require that the evidence be interpreted carefully; variations in habitat and winds at the nest site, for example, could adversely affect the mortality of nestlings as much as predation. Further studies of this hypothesis should be conducted with tight control of variables that could lead to erroneous conclusions. Variables that may affect the loudness of begging calls include weather and differential sound absorption of various habitats. [Estación Biológica de Doñana, CSIC, Apdo. 1056, E-41080 Sevilla, Spain.]—Tara A. Stipe.

16. Effect of wildfire on birds at Weddin Mountain, New South Wales. R. J. Turner. 1992. Corella 16:65–74.—This paper reports on surveys of bird populations eight months and eight years after a 1975 hot wildfire burned 16,456 ha of mostly dry white cypress pine (*Callitris glaucophylla*) forest in and around Weddin State Forest and Weddin Mountain National Park, New South Wales, Australia. In both surveys about equal time was spent in burned and unburned areas of the forest (about 500 ha each), and both species and numbers of individual birds were recorded. In the 1975 survey 225 individuals of 50 species were recorded in the burned plot and 400 of 59 species in unburned. Eight years later 660 individuals of 87 species were recorded in the burned plot, and 340 of 63 species in unburned. Contingency table analysis indicated significant increases between years in burned plots in numbers of individuals in nectarivorous, granivorous, ground, insectivorous foliage, and aerial foraging guilds. Trunk, bark and branch foraging, and frugivorous guild birds were less affected, and raptors, scavengers, and others did not change. Lower numbers in the burned plots, compared to unburned eight months after the fire, reflect reduced diversity in vegetation, hence reduced feeding opportunities, and increased risk of predation. The larger numbers in the burned plots, compared to the unburned eight years later, suggest that many species may prefer regenerating forest, and the possibility of selectively using fire to enhance avian forest populations. The author reviews other studies of avian population recovery after both controlled burns and wildfires. In the Weddin fire eucalypts regenerated at the expense of white cypress pine, and this may have influenced avian distribution.

This study should be of interest to anyone interested in fire as a management strategy. [Forestry Commission of NSW, P.O. Box 100, Beecroft, NSW 2119, Australia.]—William E. Davis, Jr.

17. Interspecific nest-site competition among cavity-nesting alcids on Southeast Farallon Island, California. G. E. Wallace, B. Collier, and W. J. Sydeman. 1992. Colon. Waterbirds 15:241–244.—Although it has been suggested that interspecific competition for nest sites influences alcid population sizes on Southeast Farallon Island, only anecdotal evidence exists. This 1989 study documented interspecific nest site competition between Cassin's Auklet (*Ptychoramphus aleuticus*), and larger Pigeon Guillemots (*Cepphus columba*) and Rhinoceros Auklets (*Cerorhinca monocerata*). The authors monitored natural cavities and artificial nest sites, mostly wooden nest boxes, for guillemots and Rhinoceros Auklets, noting competitive interactions. They also placed Cassin's Auklet and similar eggs, variously marked, in known guillemot nest sites.

Cassin's Auklets nest earlier than guillemots and in 12 of 94 monitored sites guillemots usurped auklet nest sites, removing or pithing eggs or killing chicks. Most of the experimental eggs were ultimately removed by guillemots. At least one Rhinoceros Auklet usurped a Cassin's nest site, killing the chick. The high population level of Cassin's Auklets may exacerbate the competition, since intraspecific competition for nest sites drives Cassin's Auklets to exploit traditional guillemot and Rhinoceros Auklet sites. Recent population increases in the latter species make the situation worse. [Point Reyes Bird Observatory, Stinson Beach, CA 94970, USA.]—William E. Davis, Jr.

POPULATION DYNAMICS

(see also 16)

18. Silver Gulls and emerging problems from increasing abundance. G. C. Smith. 1992. Corella 16:39–46.—In Number 5 of the series *Australian Bird Reviews,* the author reviews the biology of Silver Gulls (*Larus novaehollandiae*), including breeding biology (e.g., timing, egg-laying, eggs, incubation, chick feeding), survival and longevity, movement (e.g., daily, dispersal, long distance), and feeding habits. This provides the background information for a discussion of problems associated with recent population increases in this species. Silver Gulls are primarily scavengers and their population is expanding throughout Australia, mostly near centers of human population. For example, on Five Islands, south of Sydney, New South Wales, increases from 1940–1978 were 1000 to 50,000 pairs, and at Mud Island, near Melbourne, Victoria, increases from 1959–1986 were 5 to 50,000 pairs. These rapid increases have been facilitated by the availability of garbage dumps (waste depots). Human problems associated with increased gull numbers include widespread concern at airports, where, for example, 158 bird strikes by aircraft were recorded at Sydney's airport from 1981–1989, and the possible spread of *Salmonella* and *E. coli* bacteria in water supplies. Problems with gulls and other species include predation at tern colonies, and introduction and fertilization of exotic grasses causing habitat alteration which adversely affected nesting shearwaters. The authors stress the need for better information on gull population dynamics and their relation to human refuse.

This paper underscores the global nature of gull problems resulting largely from human alteration of the environment. [Environmental Survey and Research, New South Wales National Parks and Wildlife Service, P.O. Box 1967, Hurstville, NSW 2220, Australia.]—William E. Davis, Jr.

19. Mortality of the pheasant (*Phasianus colchicus*) during the breeding season. M. Grahn. 1993. Behav. Ecol. Sociobiol. 32:95–101.—Wild radio-tagged Ring-necked Pheasants were studied during six breeding seasons in southern Sweden in order to examine the relationship between spur length and mortality in relation to male-male competition. Although mortality rates during the breeding season were similar for males (25%) and females (26%), males died significantly earlier in the season ($P < 0.01$; median male death date was 20 April versus 21 May for females). Goshawks (*Accipiter gentilis*) and red foxes (*Vulpes vulpes*) were the main predators of both sexes. Neither age, size, nor body condition differed significantly between survivors and nonsurvivors of either sex. However, body size and age both were correlated with spur length in males and had to be compensated for when examining the relation between spur length and mortality. This was achieved with a two-way ANOVA which revealed a significant difference in residual spur length between survivors and nonsurvivors ($P < 0.02$), suggesting that males with shorter spurs than would be predicted from their age and body size suffered higher mortality. The ability of males to attract mates did not differ between survivors and nonsurvivors, although calling activity was higher for nonsurvivors early in the breeding season and lower late in the season. Thus, of the males that died, those calling more than average earlier were killed in greater proportion than those calling less than average, suggesting that the cost of calling decreased as the breeding season progressed. Mortality rates among females did not differ according to harem size or between females mated to monogamous versus polygynous males. The results of this study are contrary to the findings of similar studies since male mortality was not higher for less attractive individuals. The data also lend little support to the notion that long-spurred male pheasants survive better because they are more successful in male-male competition. [Dept. of Animal Ecology, Ecology Bldg., Univ. of Lund, S-223 62 Lund, Sweden.]—Danny J. Ingold.

20. Are declines in North American insectivorous songbirds due to causes on the breeding range? K. Bohning-Gaese, M. L. Taper, and J. H. Brown. 1993. Conserv. Biol. 7:76–86.—Data from Breeding Bird Surveys were examined to estimate susceptibility of 47 insectivorous songbird species to declining breeding populations from 1968–1987. Parameters associated with four explanations for avian population size (breeding habitat, predation vulnerability, migratory status, and taxon [family]) were assigned to each species. Nested ANOVAs were used to relate these variables to population trends. In the first decade (1968–1977) no variable correlated with population trends. From 1978–1987 vulnerability to predation, migratory status, and taxon correlated with population. Over the 20-year period, predation vulnerability and taxon explained population trends. Between 1968–1987, species with low, open nests and high cowbird parasitism decreased on average 0.17% per year; species with high, closed nests and low cowbird parasitism increased 0.88% per year; resident or short-distance migrants increased 1.97% per year; and parids increased 2.09% per year. Results suggest that tropical migrants did not experience strong decreases in population size. Rather, predation on the breeding grounds, indicated by nest location and type, may be the primary explanation for declining songbird populations. [Abt. fur Verhaltensphysiologie, Beim Kupferhammer 8, D 7400 Tubingen, Germany.]—Kristin E. Brugger.

ZOOGEOGRAPHY AND DISTRIBUTION

(see 2, 14)

MORPHOLOGY AND ANATOMY

(see 1, 3, 19)

PLUMAGES AND MOLTS

(see also 1, 3)

21. The adaptation of moult pattern in migratory Dunlins *Calidris alpina*. N. Holmgren, H. Ellegren, and J. Pettersson. 1993. Ornis Scand. 24:21–27.—Timing of molt in Dunlins varies with breeding latitude. Birds from the high arctic replace their primaries while breeding, whereas those breeding at low arctic and subarctic latitudes generally molt on or near their temperate wintering grounds. In this study, more than 5000 Dunlins were captured while migrating through southern Sweden from 1985–1988. The proportion of birds replacing primaries varied from 27–61% each year. The reduction in wing area caused by molting was smaller than that found in molting birds in England, suggesting that the birds adjust the number of primaries shed simultaneously to maintain some semblance of flight efficiency during migration. Overlap of molt and migration in Dunlins appears to be more common than in other shorebirds. Presumably, these birds accrue some advantage by getting a jump on molt before settling on their wintering grounds. [Dept. of Ecology, Lund Univ., S-223 62 Lund, Sweden.]—Jeff Marks.

PARASITES AND DISEASES

22. Birds and zoonoses. J. E. Cooper. 1990. Ibis 132:181–189.—Birds may transmit zoonoses, which include viruses, bacteria, and metazoan parasites. In addition to transfer from birds to humans, birds spread zoonoses within the environment by dispersing pathogenic micro-organisms, ticks, mites, and leeches capable of causing diseases and allergies in both humans and livestock. Birds, like other animals, may harbor disease-causing organisms without contracting the disease. The zoonoses may be transferred mechanically, that is, the organisms do not multiply in the bird, but are carried on its feet or feathers. Alternatively, organisms may be transported biologically, meaning that the organisms multiply within the bird, a condition that maintains their viability.

At highest risk of becoming infected with zoonoses are those working with dead birds. Increased probability of transmission is favored by circumstances, such as man-made lakes, that encourage increased bird and vector populations and bring both in contact with humans. Cooper lists four methods of infection: dermal contact, inhalation, ingestion, or being bitten by vectors (e.g., mosquitos, ticks), and he recommends four ways to reduce the risk: know the dangers, reduce contact with birds and vectors, practice proper hygiene when in contact, and vaccination. Other measures to avoid acquiring zoonoses are to reduce congregating birds around humans and control vectors. As Cooper emphasizes, ornithologists and public health officials must collaborate to research and solve the problem. [Royal College of Surgeons of England, 35-43 Lincoln's Inn Fields, London WC2A 3PN, United Kingdom.]—Dawnn M. Scholz.

WILDLIFE MANAGEMENT AND ENVIRONMENTAL QUALITY

(see also 9, 16)

23. Turbidity as an ecological solution to reduce the impact of fish-eating colonial waterbirds on fish farms. F. Cezilly. 1992. Colon. Waterbirds 15:249–252.—This paper presents the results of an experiment in which increased turbidity produced decreased foraging efficiency by Little Egrets (*Egretta garzetta*), and discusses turbidity as a possible "ecological" solution to protecting fish in fish farms. Nine egrets, foraging alone or in groups of three, were observed foraging in clear and turbid water in a 6 × 3-m pool with a water depth of 10 cm, with three concentrations of fish prey. Capture rates were significantly reduced in turbid water at all prey concentrations.

The author discusses the strengths and weaknesses (e.g., inefficiency and cost) of other strategies which have been employed as protective measures. These include killing or removal of birds, scaring devices, and mechanical protective devices such as wires across ponds, or ecological solutions such as decreasing fish density or increasing pond depth. Turbidity as a protective measure faces problems of cost and possible interference with the protected fish (some fish are visual predators, and respiration and egg development may be adversely affected). The degree to which turbidity or any other ecological solution is successful may depend on the culture demands of individual species of fish.

The increasing problem with avian predation at fish farms (e.g., cormorant predation at catfish farms in the USA) makes this a timely paper. [Station Biologique de la Tour du Valat, Le Sambuc, 13200, Arles, France.]—William E. Davis, Jr.

24. The assessment of pesticide hazards to birds: the problem of variable effects. A. D. M. Hart. 1990. Ibis 132:192–204.—Many synthetic pesticides used in forestry and agriculture are hazardous to birds. The effects depend on factors humans control, such as application rate and the amount of pesticide applied, and on factors beyond human control, such as weather and avian behavior. The U.S. Environmental Protection Agency and others determine the LD_{50} of a pesticide, which is the legal dose capable of killing half the population in a specified time. Carbophenothion is used as an insecticidal treatment of cereal seeds. Unfortunately, unusually wet soils make it easy for Canada Geese (*Branta canadensis*) to uproot treated plants and treated fields, which has led to numerous deaths even though the pesticide concentration at application was below the LD_{50}. Studies of White-throated Sparrows (*Zonotrichia albicollis*) show that fenitrothion, which controls insect forest pests, inhibits acetylcholinesterase, an essential neurochemical, even when fenitrothion is applied in amounts significantly less than the established LD_{50}. Several alternatives to LD_{50} have been proposed to compensate for unpredicted pesticidal circumstances. Replication of field tests to conclude if the predetermined experimental threshold is acceptable in the environment is the best answer. Hart concluded that extended research is essential to establish a better procedure to determine the effects of pesticides on birds. [ADAS Central Science Lab., Ministry of Agriculture, Fisheries and Food, Worplesdon, Guildford, Surrey GU3 3LQ, United Kingdom.]—Dawnn M. Scholz.

25. Augmenting small populations of plovers: an assessment of cross-fostering and captive-rearing. A. N. Powell and F. J. Cuthbert. 1993. Conserv. Biol. 7:160–168.—The growth and behavioral development of cross-fostered (CF) and captive-reared (CR)

Killdeer (*Charadrius vociferus*) were compared with naturally-reared (NR) chicks in northern Michigan to evaluate rearing technique in enhancement of endangered plover populations. Spotted Sandpipers (*Actitis macularia*) were used as foster parents and nested approximately one month later than Killdeer. Hatching success in CR, CF, and NR Killdeer chicks was 81.8%, 46.8%, and 54.4%, respectively; fledging success was 77.8%, 48.3%, and 26.5%, respectively. Chick growth rates did not differ among groups. Time budgets did differ: CF chicks spent 50% more time foraging along shorelines than NR chicks, perhaps related to breeding habitat selection by CF parents. Behaviors of chicks less than one week old were similar among groups. Older CF and NR chicks spent more time foraging than CR chicks. After release at about 35 days of age, CR chicks located and captured natural prey readily. Both CF and CR immatures joined wild Killdeer in premigratory flocks in mid-August. Captive rearing was recommended to enhance population size and (with some planning) genetic variability of endangered plovers. [Dept. of Fisheries and Wildlife, Univ. of Minnesota, 1980 Folwell Ave., St. Paul, MN 55108, USA.]—Kristin E. Brugger.

26. More experiments with raccoons. W. H. Davis. 1993. Sialia 15:49–50.—The author conducted an experiment in which 1.3- and 1.9-cm conduit poles were polished with coarse steel wool and then treated with a layer of carnauba car wax or petroleum jelly. A nest box was mounted at the end of each pole and food was placed on top of the boxes. The distance from the ground to the bottom of the boxes was 0.9 m. Two young adult raccoons (*Procyon lotor*) were allowed to attempt to access the food on top of the boxes. Only after several attempts was the lighter female able to reach the box mounted to a pole treated with car wax; the heavier male was unable to climb the pole at all. Both raccoons licked the poles treated with petroleum jelly, avoiding getting it on their paws. Eventually, they were able to reach the boxes mounted on poles protected by the jelly, but only because they were able to lick most of the jelly off while standing on the ground. The data suggest that the car wax acted as a better deterent since the raccoons were reluctant to lick it off, and had great difficulty climbing the wax-treated poles. [School of Biological Sciences, Univ. of Kentucky, Lexington, KY 40506, USA.]—Danny J. Ingold.

27. Establishing Common Tern habitat. J. Hines. 1993. Loon 65:31–32.—Common Terns (*Sterna hirundo*) are on the concerned species list in Minnesota, and are known to nest consistently at at least four locations in the state. After Common Terns were sighted during several summers on Fish Lake Reservoir (a 1320-ha reservoir located 25 km north of Duluth) a survey of five islands on the reservoir was conducted during the summer of 1991 to determine their potential suitability for tern nesting habitat. The island that ranked the highest for habitat suitability (1 ha in size) was isolated, and all trees and vegetation were removed during the winter of 1991–1992. In addition, the entire island was treated with Rodeo® herbicide to prevent regrowth of vegetation, and 30 tern decoys were set out to attract nesting terns. On 17 July 1992, about 20 adult terns and five active nests were found on the island. By 29 July 1992, three young had fledged, three were still unable to fly, and two nests still contained eggs. About 5–10 breeding pairs used the island. Future management of the tern population will mainly involve controlling encroaching vegetation; if properly managed, the island should support 50–100 breeding pairs. [Minnesota Dept. of Natural Resources, 1201 East Hwy. 2, Grand Rapids, MN 55744, USA.]—Danny J. Ingold.