

## RECENT LITERATURE

Edited by Robert C. Beason

## RESEARCH TECHNIQUES

(see also 20, 42)

**1. Importance of sampling duration and strip width in use of the fixed-width strip transect method for estimation of bird abundance and species diversity.** K. B. H. Er, A. P. Robinson, and C. R. Tidemann. 1995. *Corella* 19:109-114.—The fixed-width strip transect has become a very popular method for sampling birds in Australia. The authors report on a survey in three Yellow Box (*Eucalyptus melliodora*) woodland remnants in the Australian Capital Territory, that assesses the affect of varying sampling duration (5, 10, and 15 min per 50 m transect) and strip width (40, 60, and 80 m) on four parameters of bird distribution: number of individual birds and number of species detected, population density, and the Shannon-Wiener species diversity index. In this survey only bird sightings were recorded; calls were used to aid in location and identification. Increased sampling duration produced significant increases in all variables, but the rate of increase diminished with increased duration. Increases in strip width produced significant increases in the Shannon-Weiner index and number of individual birds per transect, but decreased density estimates. The number of species was not affected significantly, which the authors relate to the lack of single or mixed species flocks. There were no significant sampling duration and strip width interaction effects. Workers using a fixed-width strip transect for sampling populations of birds may wish to read this paper. [Dept. of Forestry, School of Resource and Environmental Management, Australian National Univ., ACT 0200, Australia.]—William E. Davis, Jr.

**2. Great Blue Heron (*Ardea herodias*) populations in Ontario: data from and insights on the use of volunteers.** K. Graham, B. Collier, M. Bradstreet, and B. Collins. 1996. *Colon. Waterbirds* 19:39-44.—In this paper the authors attempt to deal with the always difficult problem of error in censusing nesting herons, as part of a census of Great Blue Herons in 1986-1991 in Ontario, Canada. The objectives of this study were to determine the accuracy of volunteers participating in the heron census, use this information to correct 1976-1981 census estimates of Great Blue Herons in Ontario, and determine any population changes that may have occurred. Eastern and southern areas of the province were especially targeted, and previous protocols followed. To assess count error among volunteers and staff, 43 colonies were censused by a volunteer, and three times by project staff members, with the highest count recorded as the "true count." Compared to the "true counts" volunteers had an average count error of 40%, while staff had an error of 11%. These figures were used to develop correction factors which were applied to count data in generating final estimates of nesting pairs. Correction factors were also generated for other count types such as nest count estimates during the breeding season where the exact nest count was not known. The higher errors by volunteers were largely due to their missing entire nest trees, and the authors present a list of protocol changes to minimize these errors in the future (e.g., making post season visits after leaf-fall to more accurately determine the number of nest trees, and making more than one census per breeding season). Census results indicated that 67% of the colonies were new since 1976-1981, but that 48% of colonies then present were extinct in 1991. The average colony life was nine years, with a maximum of 93. The growth in the southern census area was 44% from 1976-1981 to 1986-1991 (from about 5000 to 7000 pairs), and 103% in the eastern (from about 1200 to 2400 pairs). The authors conclude that Great Blue Herons have a healthy and growing population. This is an interesting, although complicated, attempt to improve census estimates for a colonial waterbird species. It should be of interest to anyone working with colonially nesting birds. [Long Point Bird Observatory, P.O. Box 160, Port Rowan, Ontario, N0E 1M0, Canada.]—William E. Davis, Jr.

**3. Surveys of large forest owls in northern New South Wales: methodology, calling behaviour and owl responses.** S. J. S. Debus. 1995. *Corella* 19:38-50.—From 1990-1992 surveys were made of Powerful Owls (*Ninox strenua*), Sooty Owls (*Tyto tenebricosa*), and Masked Owls (*T. novaehollandiae*) which are rare or uncommon, sensitive to logging practices, and are useful environmental indicators. This paper discusses the methodologies used in the field

surveys, and includes a probability assessment of detecting owls on one or a few visits. Sampling was done at 401 sites in a wide variety of forest types and structures (e.g., rainforest, wet and dry sclerophyll) from sea level to 1000 m. Most sites were visited at least twice and 48 sites were censused five times to provide data on repeatability of owl detections and for calculations of probabilities of detection. Survey points were located approximately 1 km apart, and at each site a 15 minute listening period was followed by a sequence of tape recorded owl calls. The various calls of the three species are described in detail. Powerful Owls were heard or seen at 76 sites, Sooty owls at 74, and Masked Owls at 35, with some overlap (two owl species at 24 sites, three at 7). Playback response accounted for 56% of Powerful and Masked Owl detections, 62% for Sooty Owls. Tables contain the correlation between owl calling and environmental variables such as rain, wind, moon, time of year, and time of night. Detection probabilities for a single visit for sites where owls were eventually recorded were for Powerful Owls 26%, for Sooty 21%, and for Masked 20% (based on mark-recapture analysis from the 48 sites visited 5 times). Response behavior analysis suggests that owls generally either called spontaneously or responded to tapes (but not both), and playing tapes did not improve the chance of detection in wind or rain. The authors summarize and analyze their survey protocols and present a detailed list of conclusions and recommendations about survey techniques. This paper is full of descriptive detail and interesting data analysis. It should be of interest to anyone studying owls, especially Australian owls, or using playback of taped calls techniques. [Zoology Dept., Univ. of New England, Armidale, NSW 2351, Australia.]—William E. Davis, Jr.

4. **Testing three cage traps for House Sparrow capture.** J. E. Therrien. 1996. *Sialia* 18: 105–109.—The author examined the efficiency of three types of cage traps, similarly baited, to capture House Sparrows (*Passer domesticus*) during the non-breeding season (October through early November) in Schoharie County, New York. Of a total of 15 House Sparrows captured during 37.5 trapping hours, 12 (80%) were caught in the Havahart trap with a 8 × 13 cm entrance and a 5 cm one-way door leading into a main holding area. Only three sparrows were captured in the Trio and Funnel traps combined. Twelve of the 15 sparrows were captured using live sparrows as bait. The Havahart trap was the only trap that captured sparrows without using a live bird lure (three sparrows were captured this way). The funnel trap did the poorest, possibly because of its enclosed appearance; moreover, once sparrows were captured in the funnel trap, they often were able to get back out. The main limitation of the trio trap is that it can only capture two sparrows at a time (one in each of two compartments that snap shut when the bird enters), and requires a live bird in the central chamber to act as a lure. The author attributes the success of the Havahart trap to its two-stage arrangement, in which the first entrance is separated from the main cage, and somewhat resembles the roost of a bird feeder. The Havahart cage is significantly more successful at capturing sparrows when a live sparrow is placed inside to act as a lure. [P.O. Box 21, Central Bridge, NY 12035, USA.]—Danny J. Ingold.

#### BEHAVIOR

(see also 10, 14)

5. **Movement patterns of Pied Currawongs *Strepera graculina* in central western New South Wales.** J. R. Farrell. 1995. *Corella* 19:95–102.—This study in Springwood was designed to test the assumption that winter flocks of Pied Currawongs were moving to lower altitudes in the Blue Mountains. A total of 125 currawongs were color banded in 1988 and another 129 in 1989. Peak numbers of immature birds were banded in April with adults peaking in June. Adults spent longer periods in the banding area than immatures. For immature birds 48% were resighted in the year banded for 1988, 52% in 1989. In contrast 74% and 54% of adults were resighted. By 1992 nearly half the birds that were sighted outside of the banding area ( $n = 43$ ), but within the Blue Mountain region had moved to the southeast with 15% to the north and 36% to the west. Seventy percent of these birds were immature when banded. The movement of currawongs away from the Blue Mountains was northward along the coastal plain, with the longest distance 142 km. All identified birds (a few had lost some of their bands) had been banded as immatures. Hence the major movements of currawongs within the Blue Mountains are in an east-west direction but outside the region to the north.

The annual movements to lower altitudes occur in autumn and winter, and to higher altitudes in winter and spring. This paper highlights the importance of color banding in monitoring movements within bird populations. [73 Ellison Rd., Springwood, New South Wales 2777, Australia.]—William E. Davis, Jr.

**6. Notes on the corroboree behaviour of the New Holland Honeyeater.** D. C. McFarland. 1995. *Corella* 19:51–54.—Corroboree behavior involves a congregation display, perhaps derived from submissive displays, that is most pronounced when territories are being established for a new breeding season, and may facilitate recognition of resident birds. It is found in 8 honeyeater species. This paper focuses on the corroboree behavior of the New Holland Honeyeater (*Phylidonyris novaehollandiae*) including time of day and year, and number, sex, and status of birds involved. The study in New England National Park in New South Wales indicated that corroborees were most frequent in the morning, when the birds were most active, and in February and June when increased activity and numbers of birds were associated with autumn and late winter breeding. An average of six birds participated in a corroboree, mostly adult males holding territories near the display site. The author states that the function of the displays is not clear but suggests that corroborees initially evolved as modified appeasement displays that serve to reduce aggression among neighbors with territories in close proximity. This behavior among honeyeaters appears to vary with the degree of co-operative behavior displayed by a species (e.g., corroborees have not been recorded for wattlebirds or friarbirds for which cooperative behavior has not been documented, but is common among miners which show a high degree of cooperative social behavior). [15 Currong St., Kenmore, Qld 4069, Australia.]—William E. Davis, Jr.

**7. Skylark optimal flight speeds for flying nowhere and somewhere.** A. Hedeström and T. Alerstam. 1996. *Behavioral Ecology* 7:121–126.—Optimality models have long been used to study the foraging and mating decision of animals. Here, Hedeström and Alerstam use aerodynamic biomechanical models to predict the flight speeds of male skylarks (*Alauda arvensis*) performing song flights, and when migrating. For airplanes as well as birds, the speed that maximizes time aloft is slower than the speed that maximizes the distance traveled on a given store of energy. The former is the speed that minimizes the number of liters (calories) used per hour, while the later is the speed that minimizes the number of liters (calories) per kilometer. Hedeström and Alerstam argue that during song flight, males should be flying at the speed that minimizes energy use per hour: since it is not going anywhere while displaying above its territory, distance traveled is not relevant. When migrating, it should travel at the faster, distance-maximizing speed. Song flight speeds fit the predictions reasonably well, but migration speeds were substantially faster than predicted. The predicted “optimal” speed may be inaccurate for a number of reasons (the power curve used to determine the optimal speeds was calculated from theory rather than determined empirically for skylarks). However, the authors doubt that such inaccuracies could account for the large discrepancy. Apparently, migrating skylarks fly faster than the most efficient traveling speed. Perhaps skylarks are in a hurry? If there are advantages to arriving at the end of migration early (first choice of territories, avoiding dangerous weather, etc.), the faster speeds may be worth the expense. [Dept. of Ecology, Ecology Bldg., S-223 62 Lund, Sweden.]—Peter D. Smallwood.

## FOOD AND FEEDING

(see also 17, 34)

**8. Contribution of introduced fruits to the winter diet of Pied Currawongs in Armidale, New South Wales.** D. A. Bass. 1995. *Corella* 19:127–132.—Pied Currawongs (*Strepera graculina*) shift from a largely insectivorous diet during the breeding season to a largely frugivorous diet in winter, form large foraging flocks, invade residential areas, and feed heavily on ornamental garden plants and street trees. Five to 15 minutes after feeding currawongs regurgitate pellets containing undigested fruit parts including seeds, and thus act as seed dispersers. This paper contains documentation of the role of Pied Currawongs in seed dispersal for fleshy fruiting plants and investigates the ecological implications of this dispersal role. Currawongs were censused from 1988–1990 and regurgitated pellets collected from April to

August, 1989, at two sites where currawongs were present in large numbers. Analysis showed that from the first site 20 plant species were represented in 20,576 seeds, with 16 species from 13,949 seeds at site two. *Pyracantha* spp. and *Ligustrum lucidum* were the two plants constituting >90% of the samples. The pattern of fruit ingestion correlates with the progression of fruit ripening in Armidale. Large numbers of *Pyracantha* and *Ligustrum* are also found in Armidale State Forest 6 km from town along winter flight paths suggesting that currawongs are a major cause of the invasion of bushland by these plants. Currawongs are significant nest predators of small birds and the use of introduced fruiting plants in winter may have contributed to an increase in currawong numbers. The author thus suggests that management options might include replacing introduced plants with native ones, developing ornamental plants with infertile seeds, and intensively culling Pied Currawongs. This is an interesting paper involving the interactions of plant and animal species, with lots of management problems and options. [Centre for Coastal Management, Faculty of Resource Science and Management, Southern Cross Univ., P.O. Box 157, Lismore, NSW 2480, Australia.]—William E. Davis, Jr.

**9. Diet of Ring-billed Gull chicks in urban and non-urban colonies in Quebec.** P. Brousseau, J. Lefebvre, and J.-F. Giroux. 1996. *Colon. Waterbirds* 19:22–30.—The rapid increase in populations of several gull species world-wide has been linked to anthropogenic factors, particularly those related to availability of garbage. The Ring-billed Gull (*Larus delawarensis*) population along the St. Lawrence River in Quebec had increased to 43,000 pairs in 1978, and to 125,000 by 1991 with 47% nesting in urban colonies in Montreal and Quebec cities, and 53% nesting in rural, largely agricultural areas. This 1992–1993 study (including nearly half of the breeding Ring-billed Gulls in Quebec) at urban colonies in Quebec and Montreal cities and a rural site colony at Ile St. Ours was designed to determine the importance of garbage in gull chick diets, any dietary changes that may have occurred in the preceding 15 years, and any impact gulls may have had on nesting waterfowl. During breeding season visits to the three colonies, gull chicks were forced to regurgitate recent meals and 877 boli were subsequently analyzed. In the three colonies garbage was the most important food (ranging from 32–59% by volume), followed by arthropods, earthworms, fish, and small mammals. Garbage increased in importance in the Montreal colony from 28% in 1978 to 37% in 1993. Garbage increased as a food item and arthropods decreased with chick age at two colonies. Gulls at the rural colony ate more garbage than gulls at the urban colonies, and the type of garbage was different—88% of the garbage at Ile St. Ours consisted of poultry remains used by farmers for fertilizer. No trace of duck eggs or ducklings was found in boli from the rural site where waterfowl nested in abundance and local concerns about possible gull predation had been expressed. The authors conclude that in both Quebec and Montreal cities increased urbanization has resulted in increased availability of garbage (litter and handouts) even though sanitary landfill regulation may have reduced available landfill garbage. This is an interesting study about a human-generated problem. [Canadian Wildlife Service, 1141 Route de l'Église, P.O. Box 10100, 9th Floor, Ste. Foy, Quebec, G1V 4H5, Canada.]—William E. Davis, Jr.

**10. Effects of substrate on prey use by Belted Kingfishers (*Ceryle alcyon*): a test of the prey abundance-availability assumption.** J. F. Kelly. 1996. *Can. J. Zool.* 74:693–697.—Research involving predator/prey relationships is sometimes based on questionable assumptions about the relationships among prey abundance, availability, preference, and use. Abundance and availability are not necessarily equal, and prey use is a function of preference and availability. One factor affecting prey availability is habitat structure, which was the focus of this study. An artificial feeding station was established in each of 12 kingfisher territories. Four feeding trials were run at each station, in which the station substrate was alternately sand, gravel, cobble, or a plain white background. Equal numbers, sizes, and species of prey fish were offered in each trial. Prey taken during the trial with a plain white background (when all prey should have been equally available and fish taken should have reflected kingfisher preference) were compared with prey taken during the trials with other substrates to determine changes in prey availability due to changes in habitat. As substrate element size increased, the mean size of prey taken decreased and the variability in size increased, with the results of the cobble treatment showing the most marked difference. Also, the number of

fish taken was significantly lower in the cobble treatment than the other treatments. The author concluded that changes in the complexity of the habitat structure altered prey availability, thus affecting prey use. This conclusion could only have been reached by first determining prey preference in the absence of habitat structure as a confounding variable. Without this step, sometimes overlooked in studies of prey abundance and use, researchers could arrive at erroneous conclusions about the importance of certain prey selections. [Dept. of Biology, Colorado State Univ., Fort Collins, CO 80523, USA.]—Scott W. Gillihan.

## SONGS AND VOCALIZATIONS

**11. On the geographic variation in the song of the Willow Tit *Parus montanus*.** [Neues zur geographischen Gesangsvariation der Mönchsmeise *Parus montanus* Conrad.] W. Thönen. 1996. Ornithol. Beob. 93:1–34. (German, English summary.)—Songs of the Willow Tit of Eurasia can be distinguished into three types: normal, alpine, and sino-Japanese; with some intermediates. The normal song type occurs throughout Europe, except the Alps, Carpathians and Scandinavia, to western Poland; with isolated populations in the southern Balkans. The alpine song type is found through the mountains from the SW Alps through Austria and the Tara Mts. to S Carpathians. An isolated population occurs on Hokkaido Island, Japan. Birds in the Eurasian Taiga from the Bering Sea to Norway and E Poland sing a mixed song type, as do birds in the contact zone between the normal and alpine song types. In Japan all the birds, except for those on the island of Hokkaido, sing the sino-Japanese song type. Thönen interprets this pattern as representing the pattern of dispersal and colonization in this species. The birds of the Jura Mts. sing the normal song type instead of the alpine as do their neighbors in the Alps, supporting earlier claims that this population is distinct from the other mountain races. The birds of southern Bulgaria also sing the normal song type rather than the alpine of their neighbors. Because the birds of Hokkaido sing the alpine song type instead of the sino-Japanese of the other island birds, Thönen concludes that the birds of this island are from an earlier, interglacial colonization from Siberia. Because the Willow Tit is thought to have arisen from eastern Asia, the sino-Japanese song type is probably the oldest. The normal and alpine song types later evolved from it as a result of two colonization events in the last two interglacial periods. Mixed song types are result of an extended secondary contact between the alpine and normal song type birds. The author presents very good arguments for his case, including the similarities with morphological data. [Faugersweg 54, CH-3232 Ins, Switzerland.]—Robert C. Beason.

**12. The significance of song perches in the Marsh Warbler (*Acrocephalus palustris*) in its breeding habitat.** [Zur Bedeutung der Singwarten bei der Habitatwahl des Sumpfrohrsängers (*Acrocephalus palustris*) im Brutgebiet.] W. Stelte and R. Sossinka. 1996. Vogelwarte 38: 199–193. (German, English summary.)—Male Marsh Warblers produce three types of vocalizations: full song, short song and alarm calls. Full song was most common from arrival on the breeding grounds until the nest was constructed. Short song was most common during incubation and alarm calls after the young hatched. Full songs were most commonly given from exposed perches, but short song and especially alarm calls were given from hidden perches. Consequently the most common perches were shrubs which provided both types of perches. [Univ. Bielefeld, Fakultät für Biologie, Verhaltensforschg., Morgenbreite 45, D-33615 Bielefeld, Germany.]—Robert C. Beason.

**13. The dawn chorus is linked with female fertility in the Willow Tit *Parus montanus*.** P. Welling, K. Koivula, and K. Lahti. 1995. J. Avian Biol. 26:241–246.—In many passerines, singing rates peak just before sunrise. Among the explanations for this “dawn chorus” is that it is part of a mixed reproductive strategy of males who are striving to acquire extrapair matings while avoiding cuckoldry. The dawn chorus is associated with the female fertility period in some species. It also could be a form of honest advertisement if higher-quality males have more time and energy to sing. Toward understanding the function of the dawn chorus, Welling et al. examined singing behavior in Willow Tits relative to the fertile period of females and determined whether singing rates differ between adults and yearlings. Data were collected from 57 pairs, each monitored for one morning. The fertile period of females was considered to begin 11 days before egg laying and to end with the penultimate egg. The

amount of time males sang peaked 10 days before their mates began laying and declined afterwards, and older males sang more than did yearling males. Males also tended to begin singing earlier in the morning when their mates were fertile, but the trend was not significant. The difference in singing rates between older and yearling males was due largely to the higher number of yearlings that did not sing at all during the observation period. When these males were ignored, singing rates did not differ between older and yearling males. The results were consistent with the idea that the dawn chorus functions (in part) in communication associated with sperm competition (i.e., mate guarding and/or seeking extrapair matings) and that older males invest more in singing than do yearlings. The door clearly is open for further study, including experimentation. [Dept. of Zoology, Univ. of Oulu, Linnanmaa, FIN-90570 Oulu, Finland.]—Jeff Marks.

## NESTING AND REPRODUCTION

(see also 12, 13, 39, 40)

**14. Co-operative breeding in Australian birds: a review of hypotheses and evidence.** M. F. Clarke. 1995. *Corella* 19:73–90.—In this comprehensive paper the author reviews the substantial contributions of studies of Australian and New Zealand birds to the understanding of cooperative breeding. Included as cooperative breeding are situations where parentage and care of young is shared by more than two individuals (e.g., communal breeding), or where a bird provides parent-like behavior to young that are not its offspring (usually young birds from a previous brood who act as “helpers”). The author reviews the problems with explaining the evolution of a behavior that appears to run counter to individual natural selection, and hence, why cooperative breeding has held such fascination for biologists. In Australia cooperative breeding has been documented for 80 species of 667 (12%), and among species of Gondwanan origin the percentage may be as high as 22%. Two fundamental questions are addressed: why do some individual birds remain philopatric (stay on their natal territory), and why should they help to raise another bird’s offspring? Explanations that try to explain philopatry include ecological constraints hypotheses (e.g., shortage of habitat, mates, or skills to successfully breed) or benefits hypotheses (e.g., cooperative hunting, reduced predation). Each hypothesis is reviewed by the author with special reference to experimental studies. In reviewing the suggested answers to the question “Why do helpers help?” the author addresses 11 hypotheses: group selection, unselected, experience, payment, budding-off, predator avoidance, social bonding, mate acquisition, reciprocity, indirect fitness benefits, and parentage. For each he considers the strengths, weaknesses, and evidence for and against. Since 6 of the hypotheses assume that the help given by the helper enhances the fitness of the breeding pair, the author devotes a section to the arguments and experimental evidence relating to the question “Does helping help?” The next question addressed is “Why are there so many cooperatively breeding species in Australia?” One major hypothesis is that cooperative breeding is an adaptation for a harsh, erratic, environment, and a second suggests that the relative aseasonality of past Australian conditions was conducive to its evolution. The author concludes that comparisons between cooperative breeding and non-cooperative breeding species will become easier when the life histories of Australian birds become better known, and states that it is striking how many hypotheses related to cooperative breeding have not been rigorously tested. This is an important review paper with 125 references. It is well organized, well written, and documents the importance of experimental studies. [School of Zoology, La Trobe Univ., Bundoora, Victoria, 3083, Australia.]—William E. Davis, Jr.

**15. Brood parasitism in herons.** M. Gonzalez-Martin and X. Ruiz. 1996. *Colon. Waterbirds* 19:31–38.—This paper has three facets: a review of the rather meager literature on brood parasitism in herons, a description of six instances of brood parasitism in a breeding colony in the Ebro Delta in Spain, and a report on the results of a brood parasitism experiment at the same colony. Four of the six instances of brood parasitism involved either Cattle Egrets (*Bubulcus ibis*) or Little egrets (*Egretta garzetta*), which have indistinguishable eggs, parasitizing Squacco Herons (*Ardeola ralloides*) which have smaller eggs. None of the parasitic eggs hatched. A fifth case involved a Little Egret parasitizing a Squacco Heron (the parasitic egg hatched and the Little Egret chick was raised to fledging). The sixth case was of intra-

specific brood parasitism in Purple Herons (*Ardea purpurea*), in which the evidence for parasitism was an irregular hatching sequence in which the fifth chick hatched seven days after the fourth. In addition, three other cases of intra- or interspecific parasitism among Little and Cattle egrets was suspected due to abnormally large clutch size or irregular hatching sequence. In all cases there was a single parasitic egg. In the experimental procedure chicken eggs were painted to simulate Cattle or Little egret eggs and quail eggs were used to simulate Squacco Heron eggs. One dummy egg per nest was added to simulate either intraspecific brood parasitism (same-size eggs) or interspecific parasitism (different-size eggs). One case of egg ejection was recorded in the interspecific experimental nests ( $n = 38$ ) and one in the intraspecific nests ( $n = 81$ ) for egrets, and two cases in interspecific nests ( $n = 15$ ) in Squacco Herons. Egrets deserted more in intra- than interspecific-simulated cases, while Squacco Herons deserted significantly more in interspecific trials. The authors state that brood parasitism in herons seems rare but suggest that cases may be under-reported. They suggest that theoretically brood parasitism should be rather common because of synchronous breeding, colonial conditions, and other factors. They discuss, however, a number of possible deterrents to the evolution of brood parasitism in herons (e.g., herons continuously attend and defend nests, and facultative brood reduction). This paper has a nice blend of experimental approach and natural history observation. [Xavier Ruiz, Dept. de Biologic Animal (Vertebrats), Univ. de Barcelona, Av. Diagonal, 645, Barcelona, 08028, Spain.]—William E. Davis, Jr.

**16. Nesting habitat of Wood Storks in north and central Florida, USA.** J. A. Rodgers Jr., S. T. Schwikert, and A. Shapiro-Wenner. 1996. *Colon. Waterbirds* 19:1–21.—The Wood Stork (*Mycteria americana*) is currently listed as endangered in North America, but little is known about breeding habitat and surrounding land use for most Florida colonies. In this paper the authors describe these parameters for 15 colonies on a macrohabitat scale in north and central Florida. Nest locations were recorded from 1981–1985, and vegetation parameters from 1983–1988. For each colony a habitat description includes canopy and understory vegetation parameters supplemented with tables presented for major tree species: trees/ha, relative density, total basal area/ha, relative dominance, and a section comparing colony habitat versus nesting substrate. A section on nesting substrate contains further comparisons of available trees in the colony to those used for nesting (e.g., similarity of nesting tree size to available trees of the same species), and the percentage of the available colony containing nests. The number of breeding seasons that each colony was monitored ranged from 1–5. Several tables facilitate comparisons of parameters among colonies. Storks used a variety of wetland habitats, both fresh water and estuarine, and tree species for nesting. Storks consistently nested in larger, older trees at freshwater sites, a factor that the authors suggest should be considered in conservation planning. Further, the authors conclude that nest trees must be inundated at the beginning and throughout most of the breeding cycle (to reduce predation, nest abandonment, and non-breeding). Water levels need only be shallow, and continued impoundment may alter vegetation and destabilize nesting substrate. Hence they recommend a strategy of maintaining elevated water levels during stork breeding cycles, followed by drawdowns to stabilize vegetation. Storks in the 3 estuarine colonies nested on islands that were either dry or subject to tidal inundation. The authors, on the basis of nest numbers and nesting area and density, suggest that neither nest-tree nor suitable habitat availability are limiting factors at the colonies studied. This paper is loaded with descriptive information and inter-colony comparisons and should be of interest to anyone working with colonial waterbirds and their conservation. [Florida Game and Fresh Water Fish Comm., 4005 South Main St., Gainesville, FL 32601, USA.]—William E. Davis, Jr.

**17. Effects of supplemental calcium on the reproductive output of a small passerine bird, the House Wren (*Troglodytes aedon*).** L. S. Johnson and R. M. R. Barclay. 1996. *Can. J. Zool.* 74:278–282.—Egg production and nestling skeletal development require substantial amounts of calcium, an uncommon element in the insect diets of many birds. In some areas this problem is exacerbated by acid precipitation, which reduces the availability of calcium sources such as gastropod shells. Such shortages have been linked with reduced reproductive output by songbirds. The authors supplied nesting House Wrens with crushed oyster shells and chicken eggs during the nesting cycle, and compared reproductive output with a control

group. They found no pronounced difference between the two groups in egg volume, clutch volume, clutch size, percentage of eggs hatched, number of fledglings, fledgling mass, or fledgling tarsus length. The only statistically significant difference was in fledgling feather length (longer in the experimental group), although the difference was probably not biologically significant. The authors concluded that House Wrens on their study area had access to sufficient natural calcium sources for successful reproduction, perhaps because of the buffering capacity of the local soils, and suggested that further studies be done in areas with other soil types. [Dept. of Biological Sciences, Towson State Univ., Towson, MD 21204, USA.]—Scott W. Gillihan.

**18. Sexual selection and extrapair fertilization in socially monogamous passerine, the Zebra Finch (*Taeniopygia guttata*).** N. T. Burley, P. G. Parker, and K. Lundy. 1996. *Behav. Ecol.* 7:218–226.—The Zebra Finch mating system is remarkably amenable to study. Burley long ago established that the mating preferences of females and males can be manipulated by color bands. For example, males with red color bands are preferred by females, while males with green color bands are accepted less often than unbanded males. Over the years, Burley has used this system to report on a remarkable variety of facultative behaviors finches employ in response to their attractiveness. Here, she employs behavioral observations and DNA fingerprinting techniques to examine the frequency of EPCs achieved by attractive and nonattractive males, and the consequences of these behaviors in terms of the parental exclusion rate (the number of nestlings in his nest that are not his genetic progeny—formerly called cuckoldry). She found that 28% of nestlings were not fathered by the social parent. Parental exclusion rates were more than twice as high for green-banded males than for red-banded males. Females were more likely to participate in EPCs with red-banded males, and were less likely to be involved in EPCs if they were mated with a red-banded male. Interestingly, it seems that females have some control over whether an EPC (which sometimes appear to be forced) result in fertilization, and fertilizations appear more likely if the EPC involved a red-banded male. The results suggest that red-banded males maximize their fitness by reducing parental investment in the nest to pursue EPCs, while green-banded (unattractive) males benefit more by investing more in parental investment to the nest. [Dept. of Ecology and Evolutionary Biology, Univ. of California, Irvine, Irvine, CA 92717-2525, USA.]—Peter D. Smallwood.

**19. Female choice in Sage Grouse: the roles of attraction and active comparison.** R. M. Gibson. 1996. *Behav. Ecol. Sociobiol.* 39:55–59.—The author examined the premating behavior of female Sage Grouse (*Centrocercus urophasianus*) on a lek in Mono County, California during five breeding seasons in order to determine the extent to which passive attraction of female Sage Grouse to courting males selects for different components of male courtship displays versus active female comparison of males. Females typically traversed the territories of five or six males on a daily basis, subsequently visiting three or four individuals, and ultimately choosing one with whom to mate. Ten of 14 hens that visited more than one male, mated with the last male they visited, which was significantly greater than what is expected if order of encounter is not a factor ( $P < 0.001$ ). Male courtship display apparently influenced both initial attraction and active choice, but in different ways. Males whose vocalizations had longer interpopulation intervals were visited significantly more by females; however, the probability that a male mated with a visiting female increased with the rate of his display but not with interpopulation interval. A logistic regression model revealed partial effects for both display components (inter-population interval and display rate); moreover interpopulation interval and display rates tended to covary inversely. These data suggest that indeed attraction and active choice involve different cues and that sexual selection via mate attraction may be opposed to sexual selection via active choice. [Dept. Of Biology, UCLA, Los Angeles, CA 90095-1606, USA.]—Danny J. Ingold.

**20. The high frequency of extra-pair paternity in Tree Swallows is not an artifact of nestboxes.** C. A. Barber, R. J. Robertson, and P. T. Boag. 1996. *Behav. Ecol. Sociobiol.* 38: 425–430.—A criticism that has begun to surface in nest box studies of cavity-nesting birds is whether such artificial nesting conditions alter the reproductive strategies of the population being studied. The purpose of this study was to compare the frequency of extra-pair paternity of a population of Tree Swallows (*Tachycineta bicolor*) using natural nest cavities versus a



nearby population using nest boxes. The authors examined a small population of Tree Swallows nesting in tree cavities during two breeding seasons in Ontario, Canada and compared the extra-pair paternity data with those from previous nestbox studies at a nearby location. Of 25 female swallows nesting in tree cavities, 21 (84%) engaged in extra-pair fertilizations, and of 111 nestlings, 76 (69%) were fathered by extra-pair males. No difference was detected in the extra-pair paternity of second year versus after-second-year females. The frequency of extra-pair paternity in the natural-cavity population of swallows did not differ significantly from the nestbox population (84% vs. 72%), although natural-cavity broods contained a significantly higher frequency of extra-pair nestlings than did the nestbox population. These data suggest that nestboxes do not artificially inflate the frequency of extra-pair paternity in Tree Swallows; in addition, differences in breeding density, internest distances, habitat homogeneity and predation frequency in this study, did not influence the frequency of extra-pair paternity present in the two populations. The authors suggest that the visual obstruction present in a natural cavity habitat may permit for greater numbers of uninterrupted extra-pair copulations, thus increasing the number of fertilizations in Tree Swallow populations nesting in natural cavities. [Dept. of Biology, Queen's Univ., Kingston, Ontario K7L 3N6, Canada.]—Danny J. Ingold.

**21. Extra pair paternity uncommon in the cooperatively breeding Bicolored Wren.** J. Haydock, P. G. Parker, and K. N. Rabenold. 1996. *Behav. Ecol. Sociobiol.* 38:1–16.—Bicolored Wrens (*Campylorhynchus griseus*) are a cooperatively breeding species which form social groups consisting of a behaviorally dominant pair (principal pair) and one to five subordinate adults (auxiliaries) that assist in rearing young. In order to determine the extent to which principal pairs are the sole breeders within social groups, parentage was investigated in 222 juvenile Bicolored Wrens using multilocus DNA fingerprinting during 99 group years in the central savanna of Venezuela. Principal pairs produced 91% of the juveniles found on territories, while principal females produced 96% of all juveniles on territories. Auxiliary males rarely sired young (2.3% overall) and only did so when they were unrelated to principal females (produced 9.6% of juveniles in such groups). Two principal females mated outside of their group, producing five offspring (2.3% overall), while nine juveniles (4.1%) were not linked to any adults in their group. The data from color-band observations, suggest that these juveniles (produced completely outside the group), were likely immigrants rather than the product of brood parasitism. In no instances were juveniles the product of close relatives (e.g., mother and son). These data demonstrate that monogamy is the rule in Bicolored Wrens and that extra-pair matings are rare; thus, most inclusive fitness obtained by principals is achieved directly through offspring production, whereas most inclusive fitness accrued by auxiliaries is obtained indirectly by helping rearing close relatives. Indeed, the behavioral dominants in a social group (particularly females), monopolize breeding opportunities; on the other hand, the authors demonstrate that auxiliaries related to both parents in a breeding trio potentially have a lot to gain (0.95 offspring equivalents for such auxiliaries versus 0.91 for males and 0.94 for females that breed without auxiliaries). [Dept. Of Biological Sciences, Purdue Univ., West Lafayette, IN 47907, USA.]—Danny J. Ingold.

**22. Seasonal effects of timing and reproduction in the King Penguin: a unique breeding cycle.** O. Olsson. 1996. *J. Avian Biol.* 27:7–14.—King Penguins (*Aptenodytes patagonicus*) breed on islands throughout the subantarctic latitudes. They undergo a complete molt in summer, at which time they also initiate breeding. Clutch size is one, and chicks do not reach independence in the summer that they hatch. Olsson marked nearly all of the breeders and monitored nesting activities at a small colony (<200 individuals) of King Penguins nesting on South Georgia Island from 1991–1994. Timing of breeding was bimodal, with egg-laying peaks separated by 2–3 months. The first peak was composed of birds that had failed in the preceding year, and second peak was composed of previously successful breeders. King Penguins required more than 14 months to molt and raise a chick. Most birds tried to nest every year, but late nesters never were successful. Thus, differences in the outcome of breeding attempts result in staggered breeding schedules within the population, and even the most successful breeders could raise only two chicks every three years. Why successful breeders do not skip a year between attempts remains a mystery. Interestingly, the “wasted attempts” do

not delay subsequent breeding attempts nor result in increased mortality. [Dept. of Zoology, Uppsala Univ., Villavägen 9, S-752 36 Uppsala, Sweden.]—Jeff Marks.

**23. Nest site selection: a trade-off between concealment and view of the surroundings?**

F. Götmark, D. Blomqvist, O. C. Johansson, and J. Bergkvist. 1995. *J. Avian Biol.* 26:305–312.—Nest predation is the main cause of breeding failure in birds and is thought to select for nest concealment in many species. Götmark et al. suggest that nest-site selection can be a tradeoff between the need for concealment and the need to maintain a view of the nest surroundings. Good visibility at the nest could: (1) reduce predation on incubating or brooding adults, (2) allow adults and chicks to detect predators more quickly, (3) facilitate communication among conspecifics, and (4) allow attending adults to detect food or foraging conspecifics. Using both artificial nests and natural nests of the Song Thrush (*Turdus philomelos*), Götmark et al. examined the relationship between nest concealment and predation in a forested habitat in Sweden. Thrush nests ( $n = 202$ ) were located from 1990–1992 and placed into one of five subjective concealment categories. Tree density was quantified near 33 nests in 1990. Also in 1990, 176 artificial nests were placed along forest roads in a roughly even distribution among the five concealment categories. In 1991, 70 artificial nests were placed in sites classified by tree density to evaluate the relationship between tree density and nest predation. Thrush nests were distributed in an approximately normal distribution among concealment categories, and tree densities at nests were intermediate relative to availability. Thus, thrushes selected sites of intermediate concealment. Survival of artificial nests increased with increasing cover, but nest concealment did not vary between successful and depredated thrush nests. Tree density had no significant effect on survival of artificial nests. Data for Song Thrushes are consistent with the tradeoff hypothesis, although Götmark et al. admit that their results are not “strong evidence” for it. Rather, their results suggest that the hypothesis merits attention in future studies of nest-site selection. [Dept. of Zoology, Univ. of Göteborg, Medicinargatan 18, S-413 90 Göteborg, Sweden.]—Jeff Marks.

**24. Extra-pair fertilizations increase the opportunity for sexual selection in the monogamous House Martin *Delichon urbica*.** L. A. Whittingham and J. T. Lifjeld. 1995. *J. Avian Biol.* 26:283–288.—The growing number of avian paternity studies has shown that extra-pair fertilizations (EPFs) are commonplace. Thus, variance in male reproductive success (and the opportunity for sexual selection) may be higher than previous estimates derived from social relationships. Because males may gain EPFs at the expense of losing within-pair fertilizations, one cannot fully understand the ramifications of extra-pair matings without determining parentage for most or all of the extra-pair young in a study population. Whittingham and Lifjeld used DNA fingerprinting to assign parentage to all young in a small colony (9–11 nests) of House Martins nesting during a two-year period in Norway. House Martins are socially monogamous and sexually monomorphic, traits that traditionally are associated with low opportunities for sexual selection. EPFs occurred in 35% of the broods and accounted for 19% of all young. All of the extra-pair young were fathered by only four males, who sometimes lost paternity to each other. Variance in total fertilization success was higher than that in apparent reproductive success (based on brood size), suggesting that EPFs increased the opportunity for sexual selection. Male fertilization success was positively correlated with body mass, and the most successful males had the highest survival (measured as the tendency to return to the study site in subsequent years). Thus, male quality in House Martins seems to be correlated with fertilization success. It remains to be determined whether fertilization success results from female choice, male-male competition, or a combination of the two. [Museum of Natural Science, 119 Foster Hall, Louisiana State Univ., Baton Rouge, LA 70803, USA.]—Jeff Marks.

**25. Breeding success and reproductive strategies of two *Acrocephalus* warblers.** K.

Schulze-Hagen, B. Leisler, and H. Winkler. 1996. *J. fur Ornithol.* 137:181–192.—This study uses data from 29 previously published studies to compare the strategies of Marsh (4765 nests) and Reed (1127 nests) warblers (*Acrocephalus palustris* and *A. scirpaceus*) to minimize losses to predation. Although both species are long-distance migrants, the Marsh Warbler (MR) remains in the breeding area only about half as long (ca 52–55 days) as the Reed Warbler (RW) and the central European laying period of the species is similarly different. Nesting habitat (persistent reeds in RW; ephemeral herbaceous vegetation in the MW) may

be the ultimate cause for these differences in nesting phenology, although the species coexist in successional reed beds. Clutch size of MW averages larger by one egg than those of RW. Regardless of clutch size, MW breeding success was about 1.5 times higher than that of RW. Parasitism by the cuckoo (*Cuculus canorus*) and predation account for 71% of RW and 49% of MW losses. Losses due to predation and parasitism by the cuckoo seem to account for the major differences observed. Reed Warblers readily begin a second clutch following a loss; MW are much less likely to begin anew. Marsh Warblers may be more successful as a result of better concealed nests, a function of the ephemeral habitat it favors. Reed Warblers have the chance to balance losses with replacement clutches, a longer nesting season, and a lower nesting density. Other factors such as rate of rejection of cuckoo eggs (15% in RW; 85% in MW) are discussed. [Bergerstr. 163, D-41068 Monchengladbach, Germany.]—Jerome A. Jackson.

### MIGRATION, ORIENTATION, AND HOMING

(see also 7, 37)

**26. Spring migration patterns of male Red-winged Blackbirds (*Agelaius phoeniceus*) from two migratory roosts in South Dakota and Minnesota.** C. E. Knittle, G. M. Linz, J. L. Cummings, J. E. Davis, Jr., B. E. Johns, and J. F. Besser. 1996. *Am. Midl. Nat.* 136:134–142.—During March 1985 male Red-winged Blackbirds at two roosts were aurally marked with fluorescent pigments to determine their subsequent spring breeding locations, and the extent to which migrating males might be segregated from females on the breeding grounds. Post spray samples taken at the southeastern South Dakota stopover site revealed that about 984,000 male redwings had been marked; similar post-spray samples in western Minnesota revealed that about 599,000 males had been marked. From late spring to early summer 1985, 3289 territorial, adult male redwings were collected at 16 predetermined riparian habitats in the north-central U.S. and south-central Canada. Of these, 555 (16.9%) were marked with at least one pigment; 482 (86.6%) were marked at the South Dakota location and the remaining 73 (13.2%) were marked at the western Minnesota site. Although marked redwings that were recovered were dispersed over a broad region extending from southwest Canada to the northcentral U.S., a significant majority ( $P < 0.01$ ) of birds marked in South Dakota (76%) were collected in southern Saskatchewan and northern North Dakota, while the majority of birds marked in western Minnesota were collected to the east in southern Manitoba, northeastern North Dakota, and northwestern Minnesota (74%). The temporal distribution of marked birds (early vs. late birds) was also unequal among the collecting regions ( $P < 0.001$ ) with birds marked early dispersing the shortest distances and birds marked late dispersing greater distances. Distances traveled by redwings from marking to collecting sites ranged from 856 km to 1093 km. The authors suggest that these data on migration patterns of Red-winged Blackbirds may help when developing management strategies to reduce damage done to agricultural crops in certain portions of the U.S. and Canada. [U.S. Dept. of Agriculture, Animal & Plant Health Inspection Service, National Wildlife Research Center, 1716 Heath Pkwy, Ft. Collins, CO, USA.]—Danny J. Ingold.

**27. Migratory disposition of small passerines in central Europe: molt, body mass, fat deposition, and stopover length.** [Zugdisposition mitteleuropäischer Kleinvogel: Mauser, Körpermasse, Fettdeposition und Verweildauer.] A. Kaiser. 1996. *J. fur Ornithol.* 137:141–180. (German, English summary, table, and figure captions.)—More than 200,000 southbound migrants captured at Lake Constance in SW Germany were included in this study. Detailed analyses were done with data from a subset of 13,000 first captures of 58 species (primarily old world warblers, tits, and thrushes). About 90% of individuals were captured only once; 72% of all birds were molting. Fat deposition increased with decrease in molt intensity. Rate of molt was fastest, fat levels highest, and minimum stopover period only 4.8 days in long-distance migrants. Multi-factor analyses suggested that short distance movements and long stopovers were characteristic of most species. Body mass data (corrected for time of capture) suggested that within species mass was greater for transients than for those in a longer stopover. For the Reed Warbler (*Acrocephalus scirpaceus*), sufficient data were available to suggest no significant differences in habitats used by transients when compared to birds on

a longer stopover. [Max-Planck-Institut für Verhaltenphysiologie, Vogelwarte Radolfzell, Am Obstberg, D-78315 Radolfzell-Moggingen, Germany.]—Jerome A. Jackson.

**28. Bird migration research in the Alps 1980–1995.** [Vogelzugforschung im Bereich der Alpen 1980–1995.] B. Bruderer. 1996. *Ornithol. Beob.* 93:119–130. (German, English summary.)—In this paper the author summarizes 15 years of research on bird migration through the Swiss Alps, most of which was conducted by the author and his collaborators. The direction of bird migration through the Alps is greatly influenced by the orientation of the mountain ranges and locally by individual ridges. The influence of topography increased as the headwind component and cloud cover increased and as flight altitude decreased. Even with clear skies moderate headwinds produced a concentration of birds along the Alps, greater than seen north or south of the Alps. Birds overflying the Alps do so at greater speeds than birds over the lowlands. Birds captured during migration in the Alps have more fat reserves and longer wings than birds captured in the lowlands. Raptors that have a larger proportion of flapping flight pass through the Alps more commonly than soaring raptors. [Schweizerische Vogelwarte, CH-6204 Sempach, Switzerland.]—Robert C. Beason.

**29. Autumn migration in the Alps based on moonwatching—topography and wind influences on migratory direction.** [Herbstlicher Vogelzug im Alpenraum nach Mondbeobachtungen—Topographie und Wind beeinflussen den Zugverlauf.] F. Liechti, D. Peter, R. Lardelli, and B. Bruderer. 1996. *Ornithol. Beob.* 93:131–152. (German, English summary.)—Based on data from 300 observation stations, the authors found that autumn bird migration was funneled between the Jural Mountains and the Alps. The greatest concentration occurred along the norther border of the Alps. The peak migratory density over the Alps was only 30% that over the lowlands, with only 10–20% of the total birds crossing the mountains on any individual night. [Schweizerische Vogelwarte, CH-6204 Sempach, Switzerland.]—Robert C. Beason.

#### HABITAT USE AND TERRITORIALITY

(see 16, 27, 31)

#### ECOLOGY

(see also 32, 33, 34)

**30. Songbird responses to sagebrush removal in a high elevation sagebrush steppe ecosystem.** L. L. Kerley and S. H. Anderson. 1995. *Prairie Nat.* 27:129–146.—Sagebrush (*Artemisia* spp.) removal to increase livestock and big-game forage is a common practice in the western U.S. However, the long-term impacts of this practice on songbirds have not been investigated. This study compared the bird communities in an area of undisturbed sagebrush with areas where sagebrush had been removed by herbicide spraying (performed 22 years ago) and controlled burning (9 years ago). Analysis of vegetation data revealed that the untreated control area had the most shrubs and the least grass, while the burned area had the fewest shrubs and the most grass. Bird species diversity was not significantly different among the three areas, although species richness and number of individuals declined from untreated to sprayed to burned. The proportion of shrub nesting species declined similarly, while the proportion of ground-nesting species followed an opposite trend; a generalist-nesting species (Vesper Sparrow, *Pooecetes gramineus*) was equally common in all three areas. The results support the notion that habitat alteration affects habitat specialists more than habitat generalists. Perhaps the most important conclusion reached by the authors is that sagebrush alteration has long-term consequences, affecting the composition of the bird community and the numbers of individuals until sagebrush regeneration returns the area to its predisturbance condition, a slow process in the arid West. [Wyoming Cooperative Research Unit, Dept. of Zoology and Physiology, Univ. of Wyoming, P.O. Box 3166, University Station, Laramie, WY 82071, USA.]—Scott W. Gillihan.

**31. Long-term changes of breeding parameters of Nuthatches *Sitta europaea* in two north German study areas.** [Langzeit-Erfassung brutbiologischer Parameter beim Kleiber *Sitta europaea* in zwei norddeutschen Untersuchungsraumen.] W. Winkel and H. Hudde. 1996. *J. fur Ornithol.* 137:193–202. (German, English summary and table and figure captions.)—

Are the earlier hatching dates of nuthatches at Braunschweig and Essen over the period 1970–1995 evidence for greenhouse warming or only a fluke of short-term cyclic variation? The authors looked at nest records for about 1500 first efforts of nuthatches and the regression of hatching date against year is impressive. Clutch size averaged 6.8 eggs (Braunschweig) and number of fledglings averaged 5.6 (Braunschweig) and 5.2 (Essen) per successful brood. Once again the value of long-term data sets is emphasized. [Institut für Vogelforschung "Vogelwarte Helgoland," Aussenstation Braunschweig, Bauernstr. 14, D-38162 Cremlingen Weddel, Germany.]—Jerome A. Jackson.

## POPULATION DYNAMICS

(see also 2, 3, 30, 42)

**32. Mortality of banded adult Eastern Bluebirds.** T. D. Pitts and R. W. Snow. 1996. *Sialia* 18:83–93.—The authors obtained recovery records of banded Eastern Bluebird (*Sialia sialis*) from the Bird Banding Laboratory from 1920–1991. Of approximately 290,000 bluebirds banded during this period, 1931 records of recovered adult bluebirds (e.g., older than 90 days) were reported, 725 (37.6%) of which represented dead birds. Although the majority of these deaths (59%) occurred in March–June, the authors suggest that this number may be disproportionately high since it is during these months that most people inspect their bluebird nest boxes. The number of bluebirds found dead each year varied somewhat on a smaller scale reflecting the severity of winter weather; however, on a broader scale, bluebird mortality generally increased each year, and was likely a reflection of the larger number of bluebirds banded each year. Of 354 bluebird records indicating probable cause of death, eight factors including shooting (15.5%), dead on nest (14.4%), caught by cat (14.4%), found dead in a building (14.1%), and hit by automobile (11.9%) were the major contributors. The authors suggest that these forms of mortality are disproportionately likely to result in a detectable carcass, and do not accurately reflect the actual cause of death in most Eastern Bluebirds. Rather predators, diseases, and parasites were likely responsible for a significantly greater number of bluebird deaths than were indicated on returns. This is supported in part by the fact that 51% of the reports of dead banded bluebirds did not indicate the cause of death. Similarly, the recovery locations of banded bluebirds found dead probably do not accurately represent where most bluebirds die, but rather where most bluebird banding activity and nest-box monitoring occurs (i.e., Tennessee with 92 recoveries compared to Alberta and Manitoba with one recovery each). Of 295 dead bluebirds recovered in which sex was recorded, no significant difference was detected between the number of males versus females; however when the authors examined one subset of mortality (killed by domestic cat), they found that significantly more females were killed. The average age at death of Eastern Bluebirds was 1.4 years and no difference was detected in the age of death for females versus males. Fewer than 20% of all recovered bluebirds were over two years old, and the authors suggest that age/mortality ratios are proportional to the number of individuals in each age class. [Dept. of Biological Sciences, Univ. of Tennessee at Martin, Martin, TN 38238, USA.]—Danny J. Ingold.

**33. Experimental prevention of a population cycle in Red Grouse.** R. Moss, A. Watson, and R. Parr. 1996. *Ecology* 77:1512–1530.—The regular population cycles of several boreal species is one of the most well-known of unsolved ecological problems. Who has not heard of the boom and bust cycles of lemmings? As of yet, there is no consensus on the cause(s) of these population cycles. The Red Grouse (*Lagopus lagopus scoticus*) cycles with a long period of 10–11 years in the moors of NE Scotland. The authors conducted a long-term field experiment on a population of red grouse to test some of the hypotheses proposed to explain the population cycles. Basically, their experiment consisted of preventing a population from reaching its peak by removing birds (while tracking a nearby unmanipulated population for control). If the normal cyclic decline is caused by density-dependent factors, then preventing the experimental population from reaching its peak should also prevent the subsequent decline. However, if the declining phase of the population is due to some density-independent factor, then the experimental population should decline along with the control population. The authors also collected a wealth of data on demographic patterns and on potential causes of population change (e.g., age structure, breeding success, recruitment, nutritional

status of the birds, parasite loads) in both populations. The population was due to peak in 1983. The removal phase of the experiment began in 1982 and continued through 1986. In total, the data reported here span the entire decade of 1979–1989. The results: the population remained relatively stable during the removal phase and (with a slight dip) for the remaining years of data collection—preventing the peak seems to have prevented the crash. Thus, whatever factors drive the grouse population cycles, they appear to act in a density-dependent fashion. However, it remains unclear exactly which factor(s) drives the cycles. The authors evaluated hypotheses involving trophic interactions from above (predation pressure on the grouse), from below (the availability or nutritional quality of the heather grouse feed on), and from within (parasite loads in the gut of Red Grouse). None of these hypotheses were supported. The authors argue for a hypothesis that involves changes in the age structure of the population and associated changes in behavior. It appears that the increasing phase of the population cycle is associated with a high ratio of young cocks to older cocks. Red Grouse cocks establish and defend territories on the moor. If there are relatively few older birds on the moor, it appears easier for young birds to squeeze in and establish new territories. A high proportion of older birds seem to inhibit recruitment, causing a decline in the population. Of course, the limitations of this study are obvious: it is an unreplicated experiment on one population over one cycle. Nevertheless, the data presented in this study represent more than a decade of work. Even the longest journey begins with a single step, and we can expect more papers from this continuing study. It will be particularly fascinating to see whether and how the interrupted cycle re-establishes itself. [Inst. of Terrestrial Ecology, Hill of Brathens, Banchory, Kincardineshire, AB31 4BY, Scotland.]—Peter D. Smallwood.

**34. First-year survival of Great Horned Owls during a peak and decline of the snowshoe hare cycle.** C. Rohner and D. B. Hunter. 1996. *Can. J. Zool.* 74:1092–1097.—During a three-year study of Great Horned Owls (*Bubo virginianus*), the authors examined the effect on juvenile survival of a sharp decline in the local snowshoe hare (*Lepus americanus*) population. During the first two years of the study, when hare populations were stable, owl survival followed a general trend of low mortality during the nestling stage, high mortality during the postfledging phase, and low mortality after dispersal from the adults' territories. In the third year of the study, when the hare population declined sharply, mortality during the postfledging phase was considerably higher than in the previous two years. The higher mortality was not due to higher rates of starvation, as might be expected, but was a result of increased predation as other predators shifted away from snowshoe hares, and anemia brought on by parasites; a lack of food may have left the owls weakened and more susceptible to both. The authors speculate that the high mortality rate during the postfledging period in all years, and its relatively long duration, could be due to difficulties newly-independent juveniles face in obtaining prey. [Mitrani Centre for Desert Ecology, Ben-Gurion Univ. of the Negev, Sde Boker, 84990, Israel.]—Scott W. Gillihan.

## ZOOGEOGRAPHY AND DISTRIBUTION

(see also 11, 38)

**35. Birds observed in the Arctic Ocean to the North Pole.** F. Vuilleumier. 1996. *Arctic Alpine Res.* 28:118–122.—The author reports on seabird sightings 18–24 July 1994 while travelling on a Russian ice breaker to the geographic North Pole. Six species were observed north of 83°N; 5 species north of 87°N; and 3 species above 89°N. The most common species were the Black-legged Kittiwake (*Rissa tridactyla*), Ross's Gull (*Thodostethia rosea*), and Ivory Gull (*Pagophila eburnea*). Northern Fulmars (*Fulmarus glacialis*) were next most common, with no landbirds observed. In addition to his own sightings, the author provides a thorough review of the literature on other, similar trip. [Dept. of Ornithology, Amer. Mus. of Natural History, Central Park West at 79th St., New York, NY 10024-5192.]—Robert C. Beason.

## EVOLUTION AND GENETICS

(see also 14, 15, 18, 21, 24, 40)

**36. Species concepts, speciation, and sexual selection.** R. M. Zink. 1996. *J. Avian Biol.* 27:1–6.—In this "Point-of-View" Zink revisits the discussion of species concepts (i.e., biolog-

ical vs. phylogenetic) and adds some new thoughts to his previous treatments of the topic (e.g., Zink and McKittrick, *Auk* 112:701–719, 1995). Included are remarks on the role of studies of geographic variation in analyses of speciation and a brief review of speciation processes. Especially interesting are Zink's thoughts about how sexual selection plays a major role in speciation among passerines. Anyone who has been following the debate over species concepts will want to obtain this paper. [Bell Museum of Natural History, 100 Ecology Bldg., Univ. of Minnesota, St. Paul, MN 55108, USA.]—Jeff Marks.

### PHYSIOLOGY AND DEVELOPMENT

(see also 7, 17, 27)

**37. Metabolic constraints on long-distance migration in birds.** M. Klaassen. 1996. *J. Exp. Biol.* 199:57–64.—The maximum distance a bird can fly depends not only on the fuel stored during stopover, but also on water loss. The primary avenue of water loss during flight is from the lungs, and depends on air temperature and humidity as well as the rate of air flow through the lungs. The interaction of energy reserves and water balance influence several aspects of migratory flight including altitude and mode of flight, nightly flight distance and the length of stop-over for replenishing energy stores. As the author points out, we have very little data on the influences of flight speed, altitude, humidity, air temperature and body mass on water, energy and protein balance. [Centre for Limnology, Netherlands Inst. of Ecology, Rijksstraatweg 6, NL-3631 AC Nieuwersluis, The Netherlands.]—Robert C. Beason.

### MORPHOLOGY AND ANATOMY

**38. Rufous and grey colour morphs in the Italian Tawny Owl: geographical and environmental influences.** P. Galeotti and C. Cesaris. 1996. *J. Avian Biol.* 27:15–20.—Much like Eastern Screech Owls (*Otus asio*) in North America, Tawny Owls (*Strix aluco*) occur in two color morphs. Toward understanding the adaptive significance (if any) of this color polymorphism, the authors compiled information on the current and historic occurrence of the two morphs in Italy relative to various environmental factors. Data were obtained for 379 birds, of which 91% resided in Italian museums, 6.2% were living birds (wild-caught?), and 2.7% were recent roadkills. Approximately 73% of the museum specimens had died of starvation or unknown causes, and 27% had been shot. Of the total sample, 55.6% were gray, 38.6% rufous, and 5.8% were classed as intermediate. Gray birds prevailed throughout the country, and morph ratios did not vary significantly with latitude, elevation, climate (mean annual temperature and precipitation), or habitat. Over a period of 101 years, however, morph ratios varied with weather, with rufous birds having higher mortality during cool, dry years and gray birds having higher mortality during warm, wet years. These results are very similar to those obtained for Eastern Screech Owls. Galeotti and Cesaris cautiously suggest that rufous morphs are more cryptic in humid environments and that enhanced crypticity benefits dispersing juveniles in their attempts to settle among established adults. [Dipartimento di Biologia Animale, Univ. of Pavia, Piazza Botta 9, 27100 Pavia, Italy.]—Jeff Marks.

### PLUMAGES AND MOLTS

**39. Interacting effects of lek placement, display behavior, ambient light, and color patterns in three neotropical forest-dwelling birds.** J. A. Endler and M. Théry. *Amer. Nat.* 148:421–452.—The effects of ambient light on the color and intensity of light reflected from the feathers of three lekking species was examined in the forests of the Nourages field station in French Guiana. The Cock-of-the-rock (*Rupicola rupicola*) leks near the tops of ridges. White-throated Manakins (*Corapipo gutturalis*) are typically on the east slopes in the primary rain forest; and White-fronted Manakins (*Lepidothrix serena*) display in dark, wet understory on the slopes of primary forest or forest edge. Cock-of-the-rock males displayed in the early mornings and late afternoons and only when the sun was not blocked by clouds; and always with part of their bodies in a sun fleck while the rest of their bodies were in the shade. The most commonly illuminated part of the body was the strings. White-throated Manakin activity was greatest at midday and usually within a 1-m sun patch illuminating part of the display

log. Females more commonly visited the site when the sun patch was present. Males typically displayed with their white throat and breast in the sun and their dark head and back in the shade. White-fronted Manakins have 3 peak times of display: dawn, midafternoon, and just before and during dusk. The display locations within the lek were in the shade just ahead of the moving sun flecks as the sun rose. During midday, all displays were made when the sun was blocked by clouds. As a result, Cocks-of-the-rock maximize brightness and color contrast. Because their plumage is black and white, White-throated Manakins maximize their brightness contrast by using the edges of the sun flecks. Although White-fronted Manakins display in lower light intensities than the other species, they select conditions that maximize their average brightness as well as their brightness and color contrasts. Female and juvenile manakins, in contrast, are cryptic presumably to avoid predation. Crypsis is enhanced by their color being similar to the background and the contrast of their plumage being similar to the background and less than that of the males. Thus the timing and location of display behaviors take advantage of changes in ambient light to maximize the bird's conspicuousness during display. [Dept. of Biological Sciences, Univ. of California, Santa Barbara, CA 93106, USA].—Robert C. Beason.

**40. Carotenoids and sexual dichromatism in North American passerine birds.** D. A. Gray. 1996. *Amer. Nat.* 148:453–480.—Sexual dichromatism in passerines as a whole is positively correlated with carotenoid-derived breeding plumage in males. Melanin and structural based plumage are not correlated. Three of the five subclades tested (Tyrannidae, Sylvioidea, and Passeroidea) showed the same pattern. Corvoidea show little dichromatism and hence no correlation. The lack of a correlation in Muscicapoidae may be the result of the analysis technique. Because carotenoids are obtained from the diet (melanins and structural colors are synthesized), sexual selection may have used caretonoid based plumage as an honest indicator of the quality of the male. A condition of such selection is that carotenoids be available but not abundant in the diet. [Dept. of Biology, Univ. of New Mexico, Albuquerque, NM 87131, USA].—Robert C. Beason.

## WILDLIFE MANAGEMENT AND ENVIRONMENTAL QUALITY

(see 9, 30)

### MISCELLANEOUS

**41. Can avian biology be useful to the social sciences?** S. T. Emlen. 1995. *J. Avian Biol.* 26:273–276.—In this brief "Point-of-View" Emlen explores whether ornithological research can lead to an increased understanding of the social problems of humans. He begins with three assumptions: (1) the expression of many social behaviors is governed by decision rules that have been shaped by natural selection, (2) some of the variance in expression of human social behavior is influenced by selection that occurred during our long evolutionary history of living in kin groups, and (3) organisms living in similarly structured societies are those most likely to have evolved similar sets of decision rules. Assumption 2 is controversial; many social scientists shun a Darwinian explanation for human behavior, in part because of the perceived overriding influence of culture in shaping what we do. Yet, Emlen points out that increasing numbers of anthropologists and evolutionary psychologists recognize that many of our behaviors are rooted in "information-processing programs . . . that evolved in the Pleistocene." He also posits that "birds, more than any other taxonomic group, live in social groupings similar to those of early humans." For example, long-term, socially monogamous pairbonds are the norm (albeit amidst rampant extrapair matings), and many species (>300) live in multi-generational family groups. After a brief examination of kin selection theory, cooperative breeding in birds, and parental care in intact avian groups versus groups in which a mate has been replaced, Emlen reviews how the behavior of human families parallels that of avian families. He concludes that basic research in animal behavior, especially research directed at birds living in multi-generational family groups, will be useful in providing applied solutions to human social problems. [Section of Neurobiology and Behavior, Cornell Univ., Ithaca, NY 14853, USA].—Jeff Marks.



## BOOKS AND MONOGRAPHS

**42. Monitoring bird populations by point counts.** C. J. Ralph, J. R. Sauer, and S. Droege, eds. 1995. Gen. Tech. Rep. PSW-GTR-149, USDA-Forest Service, Pacific Southwest Research Station, Albany, CA, 187 pp, no charge.—Point counts are the most widely used method for quantifying bird populations. Although they lead to imperfect estimates of population trends and abundances, they often are the best compromise between quantity and quality of data collected. This volume is essential reading for anyone who is conducting point counts now or who is planning to use them in the future. It contains something for everyone interested in point counts: contributing authors discuss a wide range of conceptual and practical topics, including count duration, radius, and number, diverse taxa and habitats, observer training, influences of roads, allocation of observer effort, sampling design, and statistical analysis of data. If you heed advice in this volume, your point counts should better meet your research objectives, and your data will be more useful to those who would include it in analyses at broader temporal and geographical scales. The volume originated at a 1991 workshop held at the USDA Agricultural Research Center in Beltsville, MD. The goal of the workshop was to develop a set of standard procedures that would produce point count data adequate (1) to monitor population changes and (2) to predict population responses to manipulation of habitat. The authors of papers in the volume address diverse aspects of point count methodology, and a final paper contains the standards. All 23 papers were peer reviewed prior to publication. The volume's contributed papers are organized into three sections of unequal length. The first section addresses practical considerations in the design and conduct of point counts. The second compares counts made along roads with those done off road. The third section discusses statistical concerns in the design and analysis of point count studies, including the quantitative basis for using point counts. A concluding paper distills the volume into recommended standards for conducting point counts.

The first section on practical evaluations of point counts occupies most of the volume. Seven of the 13 papers in the section discuss effects of count duration on avian detectability, and five evaluate effects of point radius. As might be expected, most papers report that new detections taper off in time, but that effects of radius are more complex. Hence, most authors recommend brief (5 min) counts in surveys with accessible points, longer (10 min) counts for surveys with lengthy travel between stations, and separate recording of near (<50 m) and distant birds. Three papers include discussions of sample size and survey design. Conclusions vary with species and habitat, but each paper emphasizes considering statistical power in survey design. Two papers draw lessons from established monitoring programs in Ontario and the Nicolet National Forest (WI). Additional topics discussed in this section include when point counts should be conducted, number of counts per season, use of aural stimuli, and comparisons of point counts with territory mapping.

The three papers in section two evaluate biases in the common practice of conducting point counts along roads. John Rotenberry and Steven Knick found that roads in southwestern Idaho had no significant effect on data for any species except Western Meadowlarks. Richard Hutto and coauthors reported little effect of roads on species richness in northwestern Montana, but significant effects on detection rates. Cherry Keller and Mark Fuller found an increase in edge species along roads in Shenandoah National Park, but no difference in non-edge forest species.

The third section contains six papers on statistical aspects of point count sampling design and data analysis. Douglas Johnson developed the conceptual basis for point counts in quantitative form. He outlined potential biases and influences on point count data, but left the task of dealing with them to other authors. Richard Barker and John Sauer quantified biases and variation in point count data, and they recommend ways to optimize allocation of sampling effort. Grey Pendleton discussed effects of sampling strategy, variation in detection rates, and independence among sample points on the accuracy of point count data. Edward Gates analyzed effects of count duration and radius on detection rates in western Maryland: he found that fixed- and unlimited-radius counts best serve different objectives, but that counting beyond 5 minutes had little value. JoAnn Hanowski and Gerald Niemi described their monitoring program in northern Minnesota, including observer training and calculation of statistical power. They offer valuable lessons for monitoring efforts in other regions.

Sauer, Pendelton, and Orsillo reviewed methods and biases in using geostatistics to map species distributions from point count data.

The final paper presents the principal result of the workshop, a set of standards for describing and conducting point count surveys. The standards emerged from interactive sessions during the workshop. They are generally consistent with results presented in other papers in the volume. The paper lists the standards clearly and concisely, but with advice on adapting them for use in monitoring programs with special objectives. The standards have been circulated widely, and they offer valuable advice to researchers about modifying monitoring programs that are in place or about establishing new ones.

Weaknesses of the volume are minor, and stem primarily from gaps in present knowledge about detection rates using point counts. There is a bias toward eastern states and provinces: work on 13 of 17 papers containing field data was done east of the Continental Divide. The largest geographical bias is a temperate one: only one paper contains data from tropical sites (Mexico). Much work needs to be done on avian monitoring in Latin America.

In summary, the volume is an excellent collection of moderately recent work on all aspects of point counts. It is perhaps the most important contribution to the refinement of methods for avian monitoring since the volume edited by Ralph and Scott (1981, *Estimating Numbers of Terrestrial Birds*, *Studies in Avian Biology* 6). Anyone interested in conducting point counts or in analyzing data from them should find something useful here. Finally, the price is right.—John F. McLaughlin.

## ERRATUM

In the paper "Sexual size dimorphism and determination of sex in Yellow-legged Gulls" by M. Bosch published in the *Journal of Field Ornithology* 67 (4):534–541, the combined functions to sex gulls shown in Table 2 were incorrect. The correct versions are:

$$D^1 = 1.430*HL + 5.135*BD + 0.144*W + 0.262*T - 366.988$$

$$D^2 = 1.472*HL + 5.231*BD + 0.154*W - 346.582$$

$$D^3 = 1.539*HL + 5.130*BD - 284.174$$