

## RECENT LITERATURE

Edited by Robert C. Beason

### NAME CHANGE

1. **Journal of Avian Biology.** In 1971, the Scandinavian Ornithologists' Union began publishing *Ornis Scandinavica* as an outlet for papers written by ornithologists from that region. Since that time, *Ornis Scandinavica* has evolved into one of the top international ornithological journals. Because the emphasis is no longer on Scandinavian ornithology, the Union decided that a name change was in order. Consequently, beginning with volume 25, number 1, *Ornis Scandinavica* changed its name to *Journal of Avian Biology*.

Two new sections have been added. "Point-of-View" will contain reviews written by eminent ornithologists on general themes in avian biology. Doug Mock kicks off this section with some interesting comments on the concept of brood reduction. "Forum" will contain comments on work published previously—much like the "Commentary" sections of *Auk* and *Condor*. The new cover features a striking color photograph of a Great Bustard feather.

Individual subscription rates are \$40.00, including postage. Direct inquiries to Munksgaard International Publishers, P.O. Box 2148, DK-1016 Copenhagen K, Denmark.—Jeff Marks.

### RESEARCH TECHNIQUES

(see 27)

### BEHAVIOR

(see 2, 3, 5, 12, 21)

### FOOD AND FEEDING

(see also 5, 26)

2. **Social hunting in broods of two and five American Kestrels after fledging.** D. Varland and T. Loughin. 1992. *J. Raptor Res.* 26:74-80.—The purpose of this study was to test the hypothesis that imitative social hunting in large broods of American Kestrels (*Falco sparverius*) increases hunting efficiency. Data were collected in central Iowa in 1990. No differences in mean pounce rates and percent success were detected between small and large groups. In addition, no differences in social activity were found between groups or in linear trends in social activity over time. Social hunting was observed at least once in 50% (418) of the small broods and 75% (618) of the large broods. Mean time of dispersal was 23.2 days for small broods and 26.7 days for large broods, the difference was not significant. High mortality during the first week after fledging and signal failure among radio-marked birds left a small sample size. The authors suggest that more research is needed to determine whether social hunting influences hunting efficiency in American Kestrels. [USFWS, IA Coop. Fish & Wildl. Res. Unit, 11 Science II, Iowa State Univ., Ames, IA 50011, USA.]—Robin J. Densmore.

3. **What currency do scatter-hoarding Gray Jays maximize?** T. A. Waite and R. C. Ydenberg. 1994. *Behav. Ecol. Sociobiol.* 34:43-49.—Gray Jays (*Perisoreus canadensis*) store large amounts of excess food during the summer in spatially separated caches, which they subsequently depend on as an energy source during the winter. The authors developed two models that allowed them to ask whether a particular scatter-hoarding decision by Gray Jays is better predicted by: (a) net rate maximization (NRES) (net recoverable food energy stored per unit time), or by (b) efficiency-maximization (EES) (recoverable food energy stored per unit energy expended). In order to test these models, six jays were used as subjects in an experiment in which they were presented with the option of collecting a single food item and then waiting for two additional food items before caching them versus caching single readily available food items one at a time without having to wait. Since during the summer food is usually abundant in Gray Jay habitat, and search and handling time required to harvest it is minimal, the hoarding capacity of jays should not be limited by the need to balance their own daily energy budget. Thus, the authors predicted that the NRES model would provide a more accurate appraisal of the jays' scatter-hoarding behavior than would the EES model. Indeed, for all six jays, the NRES model gave a more accurate account of the data, and in

all six cases the switching point from multiple- to single-item food loads was in closer agreement with the critical waiting time (switching point) that maximizes NRES. Temporal variation in social context or social context in which caching occurred were seemingly not important confounding factors in the experiment. The authors compare their results with the results of previous studies that focused on the provisioning of young in which the EES model provided a closer fit to the data. They suggest that since their study emphasized a different type of provisioning (food delivery), a scatter hoarder such as the Gray Jay, that maximizes the amount of recoverable food energy stored while balancing its energy budget, would only display efficiency-maximizing behavior when its energy expenditure is limited or when time is limiting. [Behavioral Ecology Research Group, Dept. of Biological Sciences, Simon Fraser Univ., Burnaby, B.C. V5A 1S6, Canada.]—Danny J. Ingold.

**4. Foraging patterns of Vesper Sparrows (*Poocetes gramineus*) breeding in cropland.** N. L. Rodenhouse and L. B. Best. 1994. *Am. Midl. Nat.* 131:196–206.—In order to determine the effects of seasonal changes in cropland on the foraging patterns of a passerine species, 18 pairs of color-banded Vesper Sparrows were observed from mid-April through early August 1979–1980 in Story Co., Iowa. Sixteen of the 18 pairs occupied territories along fencerows between cornfields and soybean fields. Vesper Sparrows foraged primarily in weedy and uncropped areas throughout the season; however, as the season progressed a significant foraging trend away from these areas (and more toward row crops) was detected in both males and females ( $P < 0.001$ ). Collectively, Vesper Sparrows did not show a significant preference for foraging in either corn or soybean fields, but did demonstrate a significant preference for foraging in the field with the most crop residue throughout the breeding season ( $P = 0.05$ ). The authors attribute a variety of factors including food abundance, vegetation structure, microclimate, and predation risk to the observed spatial patterning of foraging activity. They also suggest that the tendency for Vesper Sparrows and other bird species to concentrate foraging in field margins should promote their integration into pest management programs and protection from agrochemicals. [Dept. of Animal Ecology, Iowa State Univ., Ames, IA 50011, USA.]—Danny J. Ingold.

#### SONGS AND VOCALIZATIONS

**5. Song as a pursuit-deterrent signal, and its occurrence relative to other anti-predation behaviours of Skylark (*Alauda arvensis*) on attack by Merlins (*Falco columbarius*).** W. Cresswell. 1994. *Behav. Ecol. Sociobiol.* 34:217–223.—Skylarks use a variety of antipredation behaviors during the winter, including crypsis, seeking refuges, flocking prior to an attack, and singing. In order to test the hypothesis that winter singing in Skylarks acts as a pursuit deterrent when fleeing from a predator, the author made observations on Merlin attacks on Skylarks during three winters in East Lothian, Scotland. The mean monthly mortality rate due to Merlins was high (ranging from 23% to 45% among winters). There was a significant relationship between the type of song given by an attacked skylark and the chase length and the success rate of Merlin attacks. Nonsinging Skylarks were more likely to be captured by Merlins (41.7%) versus Skylarks that gave short variable phrases of a song (8.8%) versus Skylarks which sang an entire complex song (4.8%). In addition, those skylarks which sang poorly or not at all were chased significantly longer by Merlins than those which sang fully ( $P < 0.001$ ), and there was no indication that temperature affected any of the attack responses of either species. Merlins did not attack Skylarks in proportion to their occurrence. In fact, they demonstrated a propensity for attacking single Skylarks significantly more frequently than individuals in flocks and attacked Skylarks on the ground significantly more frequently than those in flight ( $P < 0.001$ ). The success rate of attacks was similar across different flock sizes and individual Skylarks were probably safest from a Merlin within a flock size of 11–30. However, the frequency of capture during Merlin attacks depended largely on the type of attack response by Skylarks. Individuals that could sing well were more likely to escape if they flew whereas nonsingers had a greater chance of escape if they used a refuge. These data seem to demonstrate that the occurrence of song during a chase was a reliable indicator of the outcome of the chase (as well as Skylark fitness), and that both Skylarks and Merlins benefited from the Skylark's communication to elude capture. [Institute of Cell,

Animal, and Population Biology, Edinburgh Univ., Ashworth Labs, West Mains Road, Edinburgh, EH9 3JT, UK.]—Danny J. Ingold.

### NESTING AND REPRODUCTION

(see also 15)

**6. Nest site and breeding biology of the Song Thrush *Turdus philomelos* in the Zürichbergwald.** [Neststandort und Brutbiologie der Singdrossel *Turdus philomelos* im Zürichbergwald.] R. Spaar and J. Hegelbach. 1994. Ornithol. Beob. 91:31–41. (German, English summary).—Only 2 of the 56 nests studied were not in coniferous trees, and 48 were built in *Picea abies*. The median nest height was 2.9 m above ground in a 7.4 m tall spruce. Of 267 eggs laid (mean = 3.9 eggs/nest), 63% hatched and 33% of the nestlings were lost. [Schweizerische Vogelwarte, CH-6204 Sempach, Switzerland.]—Robert C. Beason.

**7. The effect of edge on avian nest success: how strong is the evidence?** P. W. C. Paton. 1994. Conserv. Biol. 8:17–26.—This review of published literature (1978–1992) contains an evaluation of the relationship between edge habitat and bird nesting success. A range of methodological and interpretive issues were revealed. Inconsistent experimental designs made generalizations about edge-effect patterns difficult. In the a majority of studies nest success was found to decrease near edges, with predation and parasitism increasing near edges. Nest success and patch size were directly related. From the most conclusive studies it was suggested that edge effects occur within 50 m of the edge, thus future research should be designed to examine smaller scales such as 100–200 m from an edge at 25 m intervals. Relatively arbitrary definitions have been used to identify an edge; a problem that could be resolved with a uniform concept. The author suggests a definition of edge as openings in the forest canopy with a diameter 3 times the height of adjacent trees. The available literature dealt with north temperate forests. It would be useful to extend this evaluation to other forested regions. [Department of Fisheries and Wildlife, Utah State University, Logan UT 84322, USA.]—Kristin E. Brugger.

**8. Bald Eagle nest site characteristics in south Florida.** J. L. Curnutt and W. B. Robertson, Jr. 1994. J. Wildl. Manage. 58:218–221.—Data were collected on Bald Eagle (*Haliaeetus leucocephalus*) nest site characteristics from 206 nests at 156 sites over a 26-year period in Florida Bay, Florida. Black mangrove (*Avicennia germinans*) was the most commonly used nest tree species (86%), while 10.9% were red mangrove (*Rhizophora mangle*). Seventeen and 19% of black and red mangrove nest trees respectively were partially alive and 57.8% of black mangrove nest trees were snags. The dbh of nest trees averaged 33.4 cm and the average nest-tree height was 4.08 m. Nests averaged 1.29 m in diameter and 0.89 m deep. Nest tree species and condition had no effect on nest longevity, averaging 3.9 seasons. Bald Eagles nested on 52 of 237 keys, selecting higher drier and larger keys. Bald Eagles nesting in Florida Bay differ from those nesting in other parts of their range in their use of mangrove trees (no pines were available) and snags. The authors suggest the preservation of black mangroves and the protection of large, dry islands in the Florida Keys from human intrusion in order to facilitate eagle recovery projects. [South Florida Research Center, Everglades National Park, 40001 State Rd. 9336, Homestead, FL 33034-6733, USA.]—Robin J. Densmore.

**9. Nesting ecology of Attwater's Prairie Chicken.** R. Lutz, J. Lawrence and N. Silvy. 1994. J. Wildl. Manage. 58:230–233.—The reproductive ecology of Attwater's Prairie Chicken (*Tympanuchus cupido attwateri*) was studied in order to provide management guidelines for this endangered species. Data were collected in Refugio County, Texas from 1977–1981. Nest initiation occurred in mid- to late March and renesting continued through early May. Initial nest attempts averaged 12.8 eggs, nest success ranged from 19 to 64% annually, and 86% of eggs hatched in initial nests. Renesting attempts averaged 8.8 eggs, nest success ranged from 0 to 51% annually, and 93% of eggs hatched in renests. Nests were found exclusively in the midgrass vegetation type. Obstruction of vision values at all nests averaged 2.3 and were greater at successful nests than unsuccessful nests. Distance from human-made edge averaged 187 m. Hen survival during nesting averaged 36% and survival estimates were not different among years or between ages of hens. The authors suggest that population declines are the result of low female survival during nesting and/or limited renesting success. Grazing and

fire management levels during April should allow for a grass height of 25 cm and a mean obstruction of vision value of 2.46. The authors also suggest that further research is needed on brood survival. [Dept. of Wildlife and Fisheries Sciences, Texas A & M Univ., College Station, TX 77845, USA.]—Robin J. Densmore.

**10. Risk-taking by female ducks: intra- and interspecific tests of nest defense theory.** M. R. L. Forbes, R. G. Clark, P. J. Weatherhead, and T. Armstrong. 1994. *Behav. Ecol. Sociobiol.* 34:79–85.—The authors tested several predictions of nest defense theory using flushing distance as the principal measure of risk taking, within and between six duck species during eight breeding seasons. Flushing distances of females decreased as incubation progressed in all species, although significant correlations ( $P < 0.05$ ) were detected only in Mallards (*Anas platyrhynchos*), Northern Shovelers (*A. clypeata*), and Gadwalls (*A. strepera*). However, when time of season (Julian date) was considered, the relationship between flushing distance and days of incubation was significant only in Mallards. With increased clutch sizes, three species, Mallards, shovelers, and Blue-winged Teal (*A. discors*) demonstrated a predicted decrease in flushing distance. A significant positive correlation ( $P < 0.05$ ) between flushing distances and the number of nest visits was detected for Mallards and American Wigeons (*A. americana*), demonstrating that females of some species were more “risky” during subsequent visits by observers. Minimum estimates of percent yearly mortality were related to measures of reproductive output (clutch mass relative to lean body mass) per breeding attempt in all six species. Moreover, females from species with the highest minimum estimates of yearly mortality (Blue-winged Teal and shovelers) were more “risky” (stayed on nests) and had lower rates of nest abandonment compared to females from species with lower minimum rates of yearly mortality (e.g., Mallards). These data generally support most predictions of nest defense theory, and demonstrate that some duck species are more susceptible to human disturbances than others while nesting. [Dept. of Biology, Carleton Univ., 1125 Colonel By Drive, Ottawa, Ontario, K1S 5B6, Canada.]—Danny J. Ingold.

**11. Movements and nesting habitat of Lesser Prairie-Chicken hens in Colorado.** K. M. Giesen. 1994. *Southwest. Nat.* 39:96–98.—The author presents data on the movements of 31 radio-tagged Lesser Prairie-Chickens (*Tympanuchus pallidicinctus*) from leks to nests between 1986 and 1990 in southeastern Colorado. Mean distance from lek-of-capture to nest site was 1.80 km, a distance that was significantly greater ( $P < 0.001$ ) than the mean distance between nests and the nearest lek (1.04 km). Sixty-nine percent of prairie chicken nests were located beneath shrubs, primarily sand sagebrush (*Artemisia filifolia*) and small soapweed (*Yucca glauca*), and the vegetation around 69% of the nests was at least 40 cm in height. Vegetation height and density at nest bowls was significantly greater ( $P < 0.001$ ) than along paired dependent transects. These data suggest that management for prairie chickens on rangelands in Colorado should allow for sufficient growth of bunchgrasses and sagebrush (>40 cm) around prairie chicken leks and nest sites. Livestock grazing should be closely monitored since the reduction in height of nesting cover may result in increased hen movement and possibly increased predation. [Colorado Div. of Wildlife, 317 West Prospect Rd., Ft. Collins, CO 80526, USA.]—Danny J. Ingold.

## MIGRATION, ORIENTATION, AND HOMING

(see also 19, 21)

**12. Migration by soaring or flapping flight in birds: the relative importance of energy cost and speed.** A. Hedenstrom. 1993. *Phil. Trans. Roy. Soc. Lond. B* 342:353–361.—Because soaring/gliding flight is much less expensive energetically, the question is raised as to why all birds don't adopt soaring flight for migration. Several factors appear to limit the usefulness of soaring flight for migration by many species. The most significant limitation is that the speed of soaring flight is about half that of flapping flight. Thus, species that are time limited would be at a disadvantage using soaring flight. Wing morphology can limit the usefulness of soaring flight. Passerines have a low aspect ratio wing and as a result, a low glide ratio. To soar they would require an abundance of closely spaced thermals. Soaring migrants are highly susceptible to wind drift, and the amount of drift increases as the wind speed increases beyond the bird's flight speed. Thermal availability further limits the use-

fulness of soaring flight. Species that migrate over water, at night, or other conditions unsuitable for thermal development are prevented from soaring migration. For many species, the limitations of soaring flight for migration would so greatly lengthen the path they must follow that the gains in lower cost of transport would probably be lost. [Dept. of Ecology, Lund of Univ., S-223 62 Lund, Sweden.]—Robert C. Beason.

#### HABITAT USE AND TERRITORIALITY

(see also 7, 17, 20, 25, 26)

**13. Apparent site fidelity by an immature Northern Waterthrush *Seiurus noveboracensis* in the Virgin Islands.** R. L. Norton. 1993. *Ornithol. Neotrop.* 4:65–66.—A Northern Waterthrush was banded as a hatching year bird at Trunk Bay and recaptured 62 days later. The interval (15 Sept.–16 Nov.) indicates that the bird was defending a territory. [961 Clopper Rd. B1, Gaithersburg, MD 20878, USA.]—Robert C. Beason.

**14. Agricultural land use and grassland habitat in Illinois: future shock for midwestern birds?** R. E. Warner. 1994. *Conserv. Biol.* 8:147–156.—Habitat deterioration in Illinois has proceeded since the early 1800s. Conversion of natural grasslands to cereal cropping resulted in habitat fragmentation unlike that in forested systems, with extensive linear habitat (fencerows, field edges) and severely depleted plant species diversity. Surveys of Ring-necked Pheasants (*Phasianus colchicus*, RNPH) were conducted from 1973–1981 and surveys of passerines were conducted from 1976–1981 on the 5182-ha Ford County Management Unit (FCMU) to describe avian species diversity and nest success in relation to grassland habitat distribution. Avian species diversity was low in FCMU; 8 species were identified. Birds nested in low densities (271 nests total of which 103 were RNPH and 145 were Red-winged Blackbird (*Agelaius phoeniceus*, RWBL), with an average of 2.2 passerine nests/ha/year. The number of passerine nests (i.e., RWBL) was directly related to number of edge habitats. The number of RNPH nests was related to total area and number of edge habitats. The percentage of RNPH eggs that hatched was related to total area of grassland. Predation of RNPH eggs was thought to be unrelated to linearity of habitat, in part because of unmeasured factors such as predator densities, their search patterns, and habitat context of the study plots within the FCMU. What is needed to improve an understanding of nest success in this depauperate habitat would be studies of hatching success of passerines and dispersal patterns of offspring. [Illinois Natural History Survey, Champaign, Illinois 61820, USA.]—Kristin E. Brugger.

**15. Components of Northern Bobwhite brood habitat in southern Texas.** J. S. Taylor and F. S. Guthery. 1994. *Southwest. Nat.* 39:73–77.—The authors quantified brush canopy cover, vegetation structure, and moisture content of herbaceous vegetation at microhabitat sites for five radiomarked Northern Bobwhite (*Colinus virginianus*) hens with broods at 95 locations during two breeding seasons. Moisture content of herbaceous vegetation varied significantly ( $P = 0.002$ ) among types of activity and along transect sites, with the highest moisture levels found at feeding sites. Although the thickness of ground vegetation did not differ significantly between sites, brush canopy cover did ( $P = 0.076$ ; a small sample size obtained from the means of each habitat variable, necessitated that the authors set the significance level at  $P < 0.1$ ), with more canopy at midday loafing sites than at feeding sites. Five brush species, mesquite (*Prosopis glandulosa*), spiny hackberry (*Celtis pallida*), cenizo (*Leucophyllum frutescens*), lotebush (*Ziziphus obtusifolia*), and goldenweed (*Isocoma coronopifolia*) provided most of the shade at all midday loafing sites combined, and the percent shade provided by these species did not differ between loafing and random transect sites. These data suggest that habitat at various types of brood activity sites was similar in terms of structure but variable in terms of moisture content. These findings could benefit Bobwhite managers when manipulating habitat components to benefit quail populations. [Caesar Kleberg Wildlife Research Institute, Campus Box 218, Texas A & I Univ., Kingsville, TX 78363, USA.]—Danny J. Ingold.

**16. Seasonal differences in habitat selection by Black Grouse *Tetrao tetrix* in the northern Pennines, England.** D. Baines. 1994. *Ibis* 136:39–43.—Populations of Black Grouse have undergone marked declines throughout Great Britain, and in England the species now exists as increasingly isolated and fragmented populations. Previous studies have documented the

grouse's affinity for woodland edges or commercial plantations characterized by heather (*Calluna vulgaris*) and bilberry (*Vaccinium myrtillus*) ground cover. This type of habitat is no longer extensively available in the northern Pennines, where the study areas was located. In this study the author compared habitat availability to its use during spring, summer, fall, and winter. During spring moor and bog, and rough sheep pasture were used more than expected by their availability, while grass moor and woodland were used far below their availability. Pasture was preferred during summer, while moor and bog, grass moor, inbye fields (enclosed pastures or meadows that had been "improved" for agriculture), and woodland were avoided. Habitat preferences were significantly different between all seasons except fall and winter, when grouse showed a strong preference for inbye fields and moor and bog, while avoiding grass moor and pasture. The seasonal changes in habitat preference corresponded to the availability of cotton-grass (*Eriophorum vaginatum*) flowers, although heather was more important in fall and winter. The loss of heather habitats has been attributed to overgrazing by sheep. Currently, heather is nearly restricted to the higher elevations (above 500 m) in the Pennines, where deeper winter snow for longer periods reduce the foraging opportunities for grouse. Clearly, an effective conservation and management strategy for Black Grouse will need to address the stocking densities and grazing schedules of sheep. The analytical methods employed in this study were particularly interesting. In habitat preference studies the researcher typically is faced with two statistical problems of nonindependence, (1) multiple observations of the same animals during repeated surveys, and (2) both use and availability being expressed as proportions of unity. In this study the author transformed the proportions to log-ratios by dividing the proportions of four of the habitats by the fifth, and then log-transforming the ratios, yielding four independent variables suitable for multivariate analysis. [Upland Research Group, The Game Conservancy, Crubenmore Lodge, Newtonmore, Inverness-shire PH20 1BE, United Kingdom.]—John A. Smallwood.

## ECOLOGY

(see also 24)

**17. Field study of allopatry, sympatry, parapatry, and reproductive isolation in steppe birds of Patagonia.** F. Vuilleumier. 1993. *Ornithol. Neotrop.* 4:1–41.—About 70 of the 90 species inhabiting the steppe vegetation of Patagonia forage on or near the ground. This paper is a highly descriptive comparison of the distribution and foraging habitats of these species as pairs or trios to estimate the amount of speciation that has occurred in the area. The observations provide some insights into possible mechanisms of habitat allocation, but no insights into speciation mechanisms. The species comparisons were grouped into allopatric patterns or sympatric and parapatric patterns. Allopatric patterns were the result of distinct habitat preferences between congeners or subtle habitat differences. In the latter case, allopatry occurred as a result of elevational or latitudinal differences. Sympatric/parapatric distributions were divided into 3 patterns: sympatry with habitat overlap, sympatry without habitat overlap, and parapatry with habitat overlap. Sympatry with habitat overlap was a common pattern with species pairs foraging and nesting in the same area. Sympatry with habitat separation occurred when one species was restricted to grassy areas and its congeners to shrub in the same locale. As the author points out, there are many unanswered questions regarding the ecology and evolution of avian communities in the Patagonian steppe. A more quantitative study probably would have provided information to test theories on the role of competition on the structure of these avian communities. [Dept. of Ornithology, American Museum of Natural History, Central Park West at 79th St., New York, NY 10024, USA.]—Robert C. Beason.

**18. Comparison of cloud-forest avifaunas in southeastern Brazil and western Colombia.** E. O. Willis and K.-L. Schuchmann. 1993. *Ornithol. Neotrop.* 4:55–63.—The avifaunas of the La Planada cloud-forest (1800 m elevation) in Colombia was compared to that of the Intervales cloud-forest (800 m elevation) of southeastern Brazil. The two forests had similar numbers of species of birds (202 versus 194), and in 167 cases these species were functionally "paired." In 100 of the cases, the pairing was by congeneric species, often superspecies. There were more species of hummingbirds and canopy frugivores in Colombia, because there were more altitudinal and latitudinal replacements there. Long-distance migrants filled

different roles in the different forests. There were more long-distance migrants in Brazil as canopy insectivores than in Colombia, but long-distance migrants in Colombia were more commonly understory insectivores and frugivores. There was little local migration in either forest, except for hummingbirds and frugivores. The smaller number of hummingbirds in the Brazilian cloud forest is attributed to a lack of appropriate flowers. [Dept. Zoologia, Univ. Estadual Paulista, Caixa Postal 199, 13506-900-Rio Claro, São Paulo, Brazil.]—Robert C. Beason.

### POPULATION DYNAMICS

(see also 9, 24)

**19. North American bird band recoveries from the Lesser Antilles.** D. W. Buden and R. L. Wetenkamp. 1993. *Ornithol. Neotrop.* 4:83-90.—All of the 595 recoveries from 37 species banded in the USA and Canada recovered in the Lesser Antilles were from nonpasserine species. Over half were from Blue-winged Teal (*Anas discors*), and most of the other species were waterfowl and other potential game species. Other groups included terns (24%), shorebirds (17%), herons and egrets (6%), hawks (1%) and gulls (1%). The lack of passerine recoveries probably is due to a combination of bias towards gamebirds and location (distance from North America and far eastern position). Most of the recoveries occurred between August and November (88%), especially in October (49%). There was a strong bias towards first and second year birds (92%), indicating a high mortality rate of young birds. [Dept. of Math. and Science, College of Micronesia, Kolonia, Pohnpei, FSM 96941.]—Robert C. Beason.

**20. Demography of wintering Rough-legged Hawks in New Jersey.** T. Bosakowski and D. Smith. 1992. *J. Raptor Res.* 26:61-65.—Christmas bird count records from 1954 to 1989 were compiled in order to examine relationships between wintering Rough-legged Hawks (*Buteo lagopus*) and macrohabitat preferences in New Jersey. State-wide analysis showed preference for southern New Jersey coastal areas and an avoidance of highland and inland areas. The abundance of wetlands correlated significantly with the abundance of Rough-legged Hawks along the outer coastal plains. The outer coastal plain wetlands consist of open-marsh environments dominated by emergent vegetation resembling the foraging vegetational communities of their tundra foraging grounds during the nesting season. Rough-legged Hawk abundance decreased within the inner coastal plain and pinelands area, and other inland and highland areas of northern New Jersey. A positive correlation was found between hawk abundance and warmer climate when comparing hawk distribution in the number of frost-free days. Winter abundance showed wide variations between years, but no significant changes in population size were detected. The authors conclude that coastal areas of southern New Jersey provide the proper habitat-climate gradient favored by Rough-legged Hawks. They suggest that the protection of these wintering areas is critical to Rough-legged hawk conservation. [Dept. of Biological Sciences, Rutgers Univ., Newark, NJ 01702, USA.]—Robin J. Densmore.

### ZOOGEOGRAPHY AND DISTRIBUTION

(see 17)

### EVOLUTION AND GENETICS

(see 17)

### PHYSIOLOGY AND DEVELOPMENT

(see also 23, 27)

**21. Persistence of circannual cycles in a migratory bird held in constant dim light.** R. L. Holberton and K. P. Able. 1992. *J. Comp. Physiol.* 171:477-481.—The results of the research described in this report provide the strongest evidence for the existence of avian circannual rhythms. Unlike other studies in which wild birds were maintained under a constant L:D cycle (usually 12:12), the Dark-eyed Juncos (*Junco hyemalis*) used in this study were maintained under constant dim illumination. Six birds survived 3 years and 2 others survived

2 years. Testicular cycles, molt, premigratory fattening, and nocturnal *Zugunruhe* displayed annual cycles in the appropriate sequential relationships. The annual cycles of individual birds were not synchronized with one another, but appeared to free-run with a mean period of 13.7 months for testicular cycles and a mean of 15.0 months for molt. There was no decrease in amplitude of the testicular cycles, indicating the annual cycle in this species is based on an endogenous, free-running long-term oscillator. Synchronization is based on seasonal changes in daylength. This study is the first that eliminates other possible hypotheses to explain annual rhythms of wild birds maintained in captivity. It also provides a potential mechanism to test hypotheses regarding the cellular basis of daily and annual rhythms. [Dept. of Biological Sciences, State Univ. of New York at Albany, Albany, NY 12222, USA.]—Robert C. Beason.

**22. Seasonal changes in the metabolic properties of muscle in blue-winged teal, *Anas discors*.** D. K. Saunders and R. D. Klemm. 1994. *Comp. Biochem. Physiol.* 107A:63–68.—Blue-winged Teal undergo a postnuptial molt of the flight feathers, during which the capacity for flight is lost for several weeks. At the same time, there is an atrophy of the flight muscles from disuse, and a hypertrophy of the leg muscles. Before the birds are capable of undertaking the fall migration, the flight muscles must regain sufficient aerobic capacity to allow for sustained flapping flight. The authors examined changes in the aerobic and anaerobic capacities of the flight and leg muscles during the flightless period. They found that the aerobic capacity of teal flight muscles decreased significantly during the early and mid-molt periods, then increased significantly during the late molt. In other birds and small mammals, an increase in muscle aerobic capacity has been linked with an increase in muscle use; in this study, however, the increase in aerobic capacity of the flight muscles of Blue-winged Teal began *before* the onset of flight, i.e., before any increase in muscle use. The authors concluded that this preconditioning serves to give the flight muscles a “jump-start” on development and thereby advance the onset of prolonged flight capability. [Div. of Biological Sciences, Box 4050, Emporia State Univ., Emporia, KS 66801, USA.]—Scott W. Gillihan.

## PLUMAGES AND MOLTS

(see also 21)

**23. Seasonal changes of thermal conductance in *Zonotrichia capensis* (Emberizidae), from central Chile: the role of plumage.** F. F. Novoa, F. Bozinovic, M. Rosenmann. 1994. *Comp. Biochem. Physiol.* 107A:297–300.—Survival of small birds in temperate winters is facilitated by a variety of behavioral, physiological, and morphological adaptations. One strategy utilized is to increase thermal insulation, thereby decreasing thermal conductance and contributing to the balance of the energy equation. However, published evidence for this strategy is apparently contradictory. The authors attempted to cast light on this phenomenon by examining the Chilean Rufous-collared Sparrow (*Zonotrichia capensis*). They captured birds every two months over a two-year period and submitted them to metabolic trials; from those trials they determined thermal conductance. Their results indicated that conductance is significantly lower in winter than summer ( $P < 0.005$ ). They also compared cooling curves of intact and defeathered carcasses of birds collected in summer and winter, in both cases finding significantly lower conductance during winter ( $P < 0.05$ ). Although the total weight of feathers averaged 20% greater in winter than summer, this difference was not statistically significant ( $P > 0.05$ ). They concluded that the decreased conductance was due in part to increased fat content in winter, but was primarily due to some seasonal change in the insulative properties of feathers. [Departamento de Ciencias Ecológicas, Facultad de Ciencias, Universidad de Chile, Casilla 653, Santiago, Chile.]—Scott W. Gillihan.

## WILDLIFE MANAGEMENT AND ENVIRONMENTAL QUALITY

(see also 4, 7, 8, 11, 14, 16, 27)

**24. Forest fragmentation and bird extinctions: San Antonio eighty years later.** G. H. Kattan, H. Alvarez-Lopez, and M. Giraldo. 1994. *Conserv. Biol.* 8:138–146.—Bird extinctions in the western Andes cloud forests of San Antonio were estimated for the period 1911 to 1991. Field notes and publications from available sources were compared to identify historical



trends in species presence (an American Museum of Natural History survey from 1911, single year studies in 1959 and 1985, and field surveys performed by the authors in 1989–1990). Although the precise areas of coverage for the early studies are not known, the most recent surveys were designed to cover what was thought to be a larger geographic region. By 1959 19% (24/128) and by 1990 31% (40/128) of the original species were locally extinct. Large-bodied canopy frugivores, understory insectivores, and species at the upper limit of their altitudinal distribution were especially at risk. The authors stress the need to establish data bases and long-term monitoring projects for the highly fragmented forests of the northern Andes, where the lack of baseline data limits development of conservation plans. [Museo de Ciencias Naturales, Cali, Colombia.]—Kristin E. Brugger.

**25. Evaluating spatial pattern of wildlife habitat: a case study of the Wild Turkey (*Meleagris gallopavo*).** E. J. Gustafson and G. R. Parker. 1994. *Am. Midl. Nat.* 131:24–33.—An objective and quantitative assessment of the spatial components that relate to the quality of wildlife habitat is often difficult to obtain because of large geographic areas and the subjective nature of assessing spatial patterns. Habitat quality for the eastern Wild Turkey (*M. gallopavo silvestris*) depends on a variety of factors, but the spatial relation of forests to nonforests is critical. Indices of habitat fragmentation were used to describe quantitatively the spatial components of turkey habitat in west- and north-central Indiana. Of particular importance was the proximity index (PX) which distinguishes isolated forest patches from those that are part of a larger cluster of forest patches. These indices were then used to classify landscapes mathematically into discrete quality categories using a technique derived from image processing. Combinations of indices which included PX and proportion of forest cover (p) correctly classified all landscapes when compared to qualitative expert judgements. Conversely, the use of any one index alone was not adequate for correct habitat classification. When the mean values of these indices were compared between habitats of different quality it was determined that differences between optimal and suboptimal habitat were greater than differences between suboptimal and poor habitat. The data suggest that p and PX are the indices most likely to differ among quality levels and that PX is a valuable quantitative measure of habitat spatial pattern for Wild Turkeys that is comparable to subjective, expert assessments of turkey habitat. The authors suggest that the methods described in this paper may be readily applied to habitat evaluation of other wildlife species in which the spatial arrangement of habitat is an important component of habitat quality and population dynamics. [Dept. of Forestry and Natural Resources, Purdue Univ., W. Lafayette, IN 47907-1159, USA.]—Danny J. Ingold.

**26. Wintering Peregrine Falcon (*Falco peregrinus*) habitat utilization near Sequim, Washington.** F. C. Dobler. 1993. *Northwest Sci.* 67:231–237.—Human population increases in western Washington, with concomitant residential and commercial development, may pose a threat to the habitat of Peregrine Falcons wintering there. In order to compile information useful for making land-use decisions, the author observed Peregrines during the winter of 1983–1984 to collect data on behavior, movements, hunting activities, and perch sites. Three birds were fitted with radio transmitters and tracked to determine their patterns of habitat utilization. An immature female's home range was calculated to be 65.79 km<sup>2</sup>; she used shoreline and open water habitats more frequently than expected ( $\alpha = 0.05$ ) and forested habitats less frequently than expected. The home range of an immature male was calculated to be 85.69 km<sup>2</sup>; he used grass and cropland habitats more frequently than expected ( $\alpha = 0.05$ ), and forested and open water areas less frequently than expected. Both birds used depressions in bluff faces for night roosts. Conifer snags were the most important daytime perch sites. Passerines were the most important prey group, comprising 42% of the kills confirmed by the author's collection of prey remains, and 26% of unsuccessful pursuits and kills where the remains were not collected. American Robins (*Turdus migratorius*) and Varied Thrush (*Ixoreus naevulus*) were the most commonly taken passerines. Waterfowl were the second most important prey group, comprising 27% of confirmed kills and 44% of unsuccessful pursuits and kills where the remains were not recovered. Five species accounted for 65% of the waterfowl prey items: Bufflehead (*Bucephala albeola*), Mallard (*Anas platyrhynchos*), American Wigeon (*A. americana*), American Green-winged Teal (*A. crecca*), and Common Goldeneye (*B. clangula*). The author concludes that, while Peregrines will tolerate some

increased pressure from human activities, their continued conservation in this area will require preservation of large open areas in which the birds can hunt, including beaches and marshes, and also snags and bluff faces for perch and roost sites. [Washington Department of Wildlife, 600 Capitol Way N., Olympia, WA 98501-1091, USA.]—Scott W. Gillihan.

#### BOOKS AND MONOGRAPHS

##### 27. **Wildlife toxicology and population modeling: integrated studies of agroecosystems.**

R. J. Kendall and T. E. Lacher, Jr., editors. 1994. CRC Press, Inc., Boca Raton, FL, USA. 576 pp. ISBN 0-87371-591-8. \$95, hardcover.—This symposium proceedings consists of 53 papers that evaluate or review the state of knowledge about wildlife toxicology and population ecology as related to agricultural pesticide usage. Papers were presented at an invitation-only conference held in Kiawah Island, SC, July, 1990. The stated conference goal was “to integrate fields of population ecology with wildlife toxicology through new approaches to modeling” with an implicit long-term goal to improve the process of ecological risk assessment (ERA). Participants included well-known scientists and regulators from academia, government, and industry. The book is the best current reference for biologists who are interested in the topics of ecological toxicology and population ecology (whether or not you are an ornithologist). It is a comprehensive compendium of the questions and issues facing scientists who must develop and use ERA techniques or manage ecological risks.

Divided into 10 sections, the volume proceeds stepwise through general concepts that form the foundation of an integrative attempt to model field responses of terrestrial wildlife exposed to toxicants. Part 1 provides an introduction to the problem: how to use existing toxicology data and population ecology models to better understand potential “field” effects of agricultural pesticide usage. The chapter on ERA in the (USEPA) Office of Pesticide Programs provides a newcomer with useful information on the regulatory framework that led to the workshop. Pesticides are registered for use in the USA only if sufficient environmental fate and ecological effects data indicate safety to aquatic and terrestrial systems. In absence of field data, mathematical models of “fate and effects” are supposed to be used to estimate product safety. Since 1992, models have been encouraged by the EPA, in place of field studies.

Parts 2 through 5 are reviews of the biological issues that are intrinsic to a comprehensive effort at extrapolating ecological effects in populations of wild vertebrates. Part 2 (What is measurable in wildlife toxicology?) provides a status report on nonlethal techniques to estimate behavioral and physiological effects associated with pesticide exposure, mostly focusing on biomarkers (e.g., cholinesterase inhibition) and radio telemetry. An introduction to developmental toxicology emphasizes the importance of critical age-classes in population modeling. In parts 3 and 4 the rich complexity of ecological modeling (population parameters; temporal and spatial variation in survivorship, resource abundance, and foraging strategies; application of specific mathematical models) is addressed. Part 5 is an evaluation of the assumption that laboratory results in toxicology experiments can predict field effects. These sections conclude with a biologically reasonable lament about the lack of knowledge of actual exposure and hazards associated with pesticide usage.

Part 6 introduces the idea of monitoring programs as a source of information for modelers. Such programs could be small-scale to answer population or site-specific questions. Alternatively, nationwide incident monitoring programs, such as one in the United Kingdom, could be invoked to collect field data on adverse wildlife effects. Problems with USFWS bird population monitoring programs are reviewed to provide examples of sensitive issues that may affect data quality and ultimate understanding of trends in population dynamics. Part 7 includes additional models available for use in ecological toxicology (life history, food web analysis, population viability and genetic models). In Part 8 the contributions of proper experimental design and statistical analysis in population modeling are reviewed. Standard univariate and multivariate techniques are summarized and uncommon techniques of bioequivalence and Bayesian statistics are introduced to the audience as methods that could be consistent with a researcher's intuitive understanding of ecosystem behavior.

The final sections bring together thoughts of conference participants and organizers. After review of the current terrestrial ERA model (probably the second chapter that should be read by ornithologists unfamiliar with the regulatory framework, after Chapter 3), practical

suggestions are made for a directed research program to identify and evaluate critical parameters in population models. The thought is that some parameters may be best suited to predict the effects of pesticides on populations of terrestrial vertebrates and that models may be used as tools to organize experimental programs. A critical review of the limitations of ERA models points out unstandardized uses of models by theoreticians vs. decision-makers, intrinsic issues that will require a long period of communication to resolve.

The symposium brought attention to many issues that limit ecological toxicology modeling, including a need for better data sets, improved understanding of the constraints associated with some methodological approaches, and improved understanding of the underlying biology of agricultural systems. The "Synthesis Committee" called for carefully designed and controlled experiments under seminatural conditions to provide estimates of the relation between exposure and effects (mortality) by age-class for several key indicator species or animal models. Increased data will be needed concerning avian foraging behavior, food selection, and spatial and temporal use of food resources and habitat to develop reasonable exposure models. Additionally, increased understanding of population dynamics and their regulatory mechanisms will be critical to understanding long-term effects of pesticide usage. Methods of adaptive management and decision-support use models may be useful in developing the body of information that will be required to link population ecology with wildlife toxicology. *Wildlife Toxicology and Population Modeling* offers a wide range of insights to the problems of terrestrial population modeling when used as a tool in ecological decision-making. It is a volume that could be used as a text in graduate courses in ERA or environmental toxicology. It is a substantial reference for scientists and regulators who require in-depth evaluations of specific topics in ecological toxicology. I highly recommend the volume to scientists in academia, government, and industry (and their libraries) as a critical source of information on population ecology and toxicology. [The Institute for Wildlife Toxicology, Clemson University, Clemson, SC, USA.]—Kristin E. Brugger.