

DO DOWNY WOODPECKERS MIGRATE?

M. RALPH BROWNING

National Biological Survey, MRC-116
National Museum of Natural History
Washington, D.C. 20560 USA

Abstract.—Seasonal movement and migration of Downy Woodpeckers (*Picoides pubescens*) are indicated in several sources in the literature. Analyses of 3784 recoveries of banded birds, with other data, indicate that the species is resident, and that movements of a few individuals may indicate dispersal.

¿MIGRA *PICOIDES PUBESCENS*?

Sinopsis.—A través de la literatura se pueden encontrar informes que indican que *Picoides pubescens*, exhibe movimientos estacionales y que migra. No obstante, el análisis de 3784 recobros de aves anilladas, al igual que otros datos, indican que la especie es residente y que el movimiento de algunos individuos puede ser el efecto de la dispersión natural de la especie.

Migration of Downy Woodpeckers (*Picoides pubescens*) is reported to range from none in most subspecies (e.g., American Ornithologists' Union 1957, Bent 1939, Peters 1948) to regular in most or all northern populations (American Ornithologists' Union 1983, Short 1982). These sources provided little to no information to support their conclusions. Interpretations of behavior and ecology of a species depend on correct information on seasonal distribution. To determine seasonal distributions of Downy Woodpeckers, I surveyed recent literature, compared study skins and analyzed banding recovery data.

METHODS

Recent literature was surveyed for comments on movements and reports of extralimital birds (those collected outside the breeding range of their subspecies). I included literature sources on populations from throughout the range because of possible geographic variation in seasonal movements.

Subspecies and individuals that differ morphologically that were reported in the literature include sources on birds from throughout the species range. The subspecies that have been reported, with their breeding ranges summarized in parentheses, are: *P. p. nelsoni* (north-central Alaska to northern British Columbia, central Alberta, northwestern and probably west-central Ontario); *medianus* (southeastern Alaska to southern Quebec, south to eastern Kansas, Missouri, Kentucky, and east to western North Carolina); *leucurus* (Kenai Peninsula, Alaska, to Burke Channel, British Columbia, east to southwestern Alberta, and east of the Cascades from Washington to northeastern California, the Great Basin, Rocky Mountains, Montana, and western Nebraska); *glacialis* (southeastern Alaska); *gairdnerii* (southwestern British Columbia to Oregon west of the Cascades, and northwestern California). I also examined specimens

of Downy Woodpeckers in the collections of the National Museum of Natural History and the American Museum of Natural History for possible extralimital subspecies.

I analyzed banding data that for 3784 Downy Woodpeckers recovered at least once each from 1923 to October 1990. The number of recoveries is 4.2% of 89,512 birds that Clapp et al. (1983) estimated were banded from 1923 through August 1981. About 99% of all recoveries were from north of 45°N and east of the 100°W. I determined distances between locations of banding and recovery (= movements) and cardinal directions of individual recoveries, using the program Mundocart CD (Petroconsultants, Ltd., London). I compared movements between and during summer and winter months, and movements between some other periods.

Downy Woodpeckers breed from May to July in Ontario (Speirs 1985), Vermont (Norse and Fichtel 1985), and the Great Plains (Johnsgard 1979), and from April to June in Illinois (Bohlen 1989) and Kentucky (Mengel 1965). Birds in Ohio begin excavating nests in mid-March and most eggs hatch in May (Peterjohn 1989). Egg dates in North Carolina range from early April to late May (Sprunt and Chamberlain 1970), in New York, from May to June (Bull 1974), early May to mid-July in British Columbia (Campbell et al. 1990), and early May in Oregon (Gabrielson and Jewett 1940). Therefore, I chose April to July as the reproductive (= summer) period and mid-November to February as the winter period. I used August to mid-November as fall, and March as spring. The term interseasonal refers to movements between adjacent seasons and between breeding and winter periods. Intraseasonal refers to birds banded and recovered during the same season of the same or subsequent year, or within 1–2 consecutive months. As a result of the small number of recoveries of birds that moved, I included all individuals, regardless of sex or age, and birds banded and recovered in different years. I did not attempt to compare movements of birds from different geographic regions.

Directions of movements are considered “expected” for individuals that moved as in most migratory species, for example, southward from summer to winter. Individuals that moved east or west, regardless of season, were considered to move in an “unexpected” direction. Distances (km) of movements are grouped arbitrarily in five ranges: <32, 33–122, 123–243, 244–365, and >355. Movements of less than 32 km are considered local; direction of these movements were not included in this study. I attempted to verify all recoveries for birds that moved more than 160 km. Verification was not always possible; some records may have involved misread band numbers or other sources of error. There are 21 recoveries of birds that moved over 160 km, and I consider most of these reports accurate.

RESULTS

Comments from the Literature

Many regional works (e.g., Dinsmore et al. 1984, Green and Janssen 1975, Small 1974) simply reported Downy Woodpeckers as permanent

residents. Several sources indicated that the species wanderers (e.g., Peterjohn 1989, Phillips et al. 1964, Salt and Salt 1976). Changes in abundance between summer and winter were reported as possibly indicating migration (e.g., Trautman and Trautman 1968, Wing 1940), and flights of Downy Woodpeckers were referred to as migration (e.g., Norse and Fichtel 1985). Altitudinal movements were mentioned for birds in a few western localities (e.g., Hayward et al. 1976, Littlefield 1990, Verner et al. 1980).

Frequencies of movements of Downy Woodpeckers were characterized by some authors in general terms such as limited (Unitt 1984) and occasional (Hubbard 1978). Movements of birds during fall were reported as occasional flights in Massachusetts (Griscom and Snyder 1955), and as rare and irregular migrants from the "mainland" that augmented local populations at Cape Cod (Hill 1965:204). Bull (1964) mentioned flights in the New York City region, and that the species is a common migrant along the coast (Bull 1974). Yunick (1988:157) concluded that reported movements of Downy Woodpeckers are most likely local, with occasional "irruptive migratory behavior."

Characterizations of movements of Downy Woodpeckers from the same region did not always agree. In Ontario, Lawrence (1967) reported that 81% of the birds in the southern part of the province migrated, but Speirs (1985) reported that there is only "probable" fall migration, and James (1991) considered the species to be a permanent resident. Bailey and Niedrach (1965) wrote that possibly the majority of summer birds migrated southward and their places were occupied by birds from the north, but Johnsgard (1986) reported the species as a resident in the Rocky Mountain states.

Summer (e.g., American Ornithologists' Union 1957; regional works) and winter (e.g., Bock and Lephien 1975, Root 1988) ranges of Downy Woodpeckers are similar, but individuals winter outside the breeding range in southeastern Arizona (Davis and Russell 1990), on the Gulf Coast of Texas (Plaza 1978, Rappole and Blacklock 1985) and south to the Rio Grande, New Mexico (Hubbard 1978). The species is resident at localities just north of the central Gulf Coast of Texas (Oberholser 1974) and in most forested mountains of New Mexico (Ligon 1961).

Extralimital Subspecies

Identifications of extralimital subspecies and reports of non-breeding bird that differ morphologically from breeding populations are as follows.

East of the Rocky Mountains.—Sutton (1967) believed that some of the longer-winged specimens from Oklahoma collected in fall and winter were northern birds. The subspecies *nelsoni* was reported as extralimital in Massachusetts (Griscom and Snyder 1955) and Minnesota (Green and Jansen 1975). Oberholser (1974) identified extralimital specimens of *medianus* and *leucurus* from Texas and Sprunt and Chamberlain (1970) reported specimens of *medianus* from southern South Carolina. Wetmore (1940) identified a specimen from Kentucky as *nelsoni*, but Mengel

TABLE 1. Interseasonal distances and directions of Downy Woodpeckers that moved >32 km within 1 yr and between years (*).

Time	Age ¹	Sex	Distance (km)	Direction	
				Degrees	Expected ²
Summer to winter	HY	female	1080	223	yes
	HY	?	76	11	
	AHY	female	214	195	yes
	*AHY	female	75	180	yes
	*AHY	female	170	270	
Winter to summer	?	female	79	134	
	?	female	37	360	yes
	*AHY	female	45	116	
	*HY	female	583	322	yes
	*?	female	37	360	yes
Summer to fall	HY	female	154	147	yes
	HY	male	152	270	
	AHY	female	120	61	
	*AHY	female	75	180	yes
Fall to winter	AHY	female	102	248	yes
	*HY	female	133	174	yes
	*AHY	female	79	225	yes
	*HY	?	591	204	yes
	*?	?	327	232	yes
Spring to summer	AHY	female	236	323	yes

¹ AHY = after hatching year; HY = hatching year; ? = unknown.

² A migratory bird would be expected to move northward in spring and southward in fall.

(1965) reidentified it as *medianus*, the local subspecies of the state. Many authors identified extralimital specimens as intermediate between the subspecies *leucurus* and *medianus* (e.g., Pettingill and Whitney 1965), and between *nelsoni* and *medianus* (e.g., Green and Janssen 1975, Wood 1951).

West of the Rocky Mountains.—Munro and Cowan (1947) reported a specimen of *glacialis* from Queen Charlotte Island, British Columbia, and I tentatively identify a male and female from Victoria, British Columbia, as *leucurus*. Jewett et al. (1953) reported a female of *nelsoni* from Washington and Alcorn (1988) identified a specimen from Nevada as *leucurus*. In addition, I found a female of *gairdnerii* from the east slope of the Cascade Mountains at Ft. Klamath, Oregon.

Recoveries of Banded Birds

Only 0.03% of all recovered birds moved; 97% were recaptured at the same locality. Of those birds that moved, 55% moved up to 32 km, 19% moved 33–122 km, 12% moved 123–243 km, 4% moved 244–365 km, and 9% moved >366 km.

Sex and age of moving birds.—Of the sexed birds, females made 94% of interseasonal movements (Table 1) and 67% of intraseasonal movements

TABLE 2. Intra-seasonal distances and directions of movements of Downy Woodpeckers that moved >32 km within summer, winter, and fall seasons. Data include birds that moved within one year of banding and those that moved between years (*).

Time	Age ¹	Sex	Distance (km)	Direction
Summer	AHY	female	458	245
	AHY	female	97	344
	*AHY	male	96	101
	*AHY	?	390	43
Winter	AHY	female	45	294
	*?	male	322	331
	*?	female	719	309
	*AHY	?	501	314
	*?	?	156	126
Aug.-Sept.	HY	female	57	229
Sept.-Oct.	?	?	41	90
22-29 Oct.	HY	female	42	90
Oct.-Nov.	*HY	male	34	305

¹ AHY = after hatching year; HY = hatching year; ? = unknown.

(Table 2). Interseasonal AHY females moved an average of 124 km; HY females averaged 455.6 km and females of unknown age averaged 51 km. Intra-seasonal movements by AHY females averaged 200 km and HY females averaged 49.5 km. Interseasonal movements by all males averaged 150.6 km. The sex ratios of AHY birds that moved 32 km or less between seasons was about 1:1. Too few HY individuals moved for analysis.

Interseasonal movements.—Birds that were banded and recovered at the same locality between the summer and winter within a 12-mo period included 313 AHY individuals and eight HY males. These birds are 8.3% of all recoveries and are 96.6% of all recoveries between summer and winter.

There were 20 (0.5% of all recoveries) interseasonal recoveries of birds that moved >32 km. Ten of the movements occurred within 12 mo (Table 1). Only 60% of the individuals moving to and from summer and winter that were banded and recovered within a 12-mo period moved in a direction expected of migratory birds (Table 1). Movements of six recovered within 12 mo averaged 297 km. One HY female banded in northern Ohio on 27 Jul. 1964 and recaptured at the same locality on 17 August (H. K. Meahl, in litt.), was shot in northern Mississippi on 26 Nov. 1964. Four birds banded in summer that were recovered during fall averaged 125 km and five banded in fall and recovered in winter averaged 246 km. Except for the summer HY female, all birds that moved more than 160 km were recovered more than 1 yr from the date banded.

Intra-seasonal movements.—There were 13 (0.3% of all recoveries) intra-seasonal recoveries, six of which occurred within 12 mo (Table 2). Birds that were recovered during summer within a year moved an average distance of 260 km. A female that moved 458 km was banded 16 April and was recovered the same year on 28 May; another female was banded 4

April and was recovered the same year on 1 May. Fourteen birds that moved >32 km could not be categorized as interseasonal or intraseasonal. The average distance between banding and recovery localities for these birds was 242 km. Three of the movements were reported by Lincoln (1939) and Bull (1974).

DISCUSSION

Reports of flights (e.g., Griscom and Snyder 1955, Norse and Fitchel 1985) and increases in winter populations (e.g., Trautman and Trautman 1968, Wood 1951, Yunick 1988) of Downy Woodpeckers rarely provided the number of individuals or direction of movements, and provided little or no comparison between summer and winter abundances. For example, Koenig (1977) reported that according to Christmas Bird Counts of 1951–1975, north to south increases in densities of Downy Woodpeckers in Iowa may indicate some migration. Densities based on unpublished Breeding Bird Surveys in Iowa of 1966–1975, however, also increase from north to south.

There are several explanations for reported differences between summer and winter densities of Downy Woodpeckers. Individuals are more conspicuous after breeding and molting (Peterjohn 1989), and are more visible in winter (Bohlen 1989, Wood 1951) because of loss of deciduous leaves. Kilham (1970) found that birds in New Hampshire occupied the same territories in summer and winter, but birds from other geographic regions may occupy wider niches during fall (Scherrer and Morneau 1987) and winter (Williams and Batzli 1979) than during summer. During winter birds sometimes move into open areas (Dinsmore et al. 1984, Hall 1983), select more tree species (Conner 1981), and prefer rough-barked trees (Travis 1977) and/or dead trees (Jackson 1970a,b) rather than smoother barked and live trees. The species is also more visible in winter because individuals commonly visit feeding stations (Lawrence 1967) and frequently travel in mixed flocks of other species (e.g., *Parus*) (Kilham 1983). These flocks occur from July to February in Georgia (Stoddard 1978), and, during fall, might be perceived as migratory birds.

Identifications of extralimital subspecies contribute useful information on migration and winter ranges (Phillips 1986, Winker et al. 1991), but the value of identifications is limited by the availability of specimens and the morphological differences between subspecies. Differences between many subspecies of Downy Woodpecker are not great (Godfrey 1986). Populations east of the Rocky Mountains are so similar (James 1970) that Bull (1974) did not identify birds from New York to subspecies, and Short (1982) synonymized *nelsoni* with *medianus*. Although there are greater morphological differences between many of the western populations (pers. obs.), few extralimital individuals have been identified.

There is little information on marked birds in the literature. Movements of two birds banded in New York and recovered in Alabama (Bull 1974) were not acknowledged by Imhof (1976) and one of the movements reported by Lincoln (1939) were rejected by the Bird Banding

Office because of questionable data (D. Bystrak, pers. comm.). Smith's (1973) report that birds marked during winter in South Dakota were not found after March does not indicate migration. Although Lawrence (1967) stated that 81% of the birds she color-banded in southern Ontario migrated, she did not provide further details. The disappearance of marked individuals does not necessarily prove that birds migrated. The number of captured birds at a banding station on coastal Maryland led Van Velzen (1968:115) to conclude that Downy Woodpeckers undergo a "very discernable [sic] movement during the fall migration period, at least in some years." That one of the birds banded at the coastal station was recovered indicates only that a single bird moved.

Terrill and Able (1988) applied the term annual migration to species in which all individuals migrate annually from their breeding grounds, and the term partial migration to those in which some individuals of a resident population migrate. There is no evidence in the literature, from specimens reported and examined in this study, or from banding data to suggest that Downy Woodpeckers are migratory. Individuals that moved in an unexpected direction may be dispersing, a behavior Gauthreaux (1982) defined generally as a movement of an individual from its point of origin to a locality where it might reproduce. Greenwood (1983) found that dispersal in birds was usually by females as is indicated in this study.

ACKNOWLEDGMENTS

I thank Danny Bystrak of the Bird Banding Laboratory and Sam Droege of the Breeding Bird Survey, both U.S. Fish and Wildlife Service, for information on banding and breeding surveys. I also thank Dan G. Cole, Automatic Data Processing, Smithsonian Institution, for determining the distances and directions of recovered birds, and the American Museum of Natural History for access to their specimens. I thank Richard C. Banks, Roger B. Clapp, Carla Dove, George A. Hall, Jerome Jackson and Robert P. Yunick for reading an earlier draft of the manuscript.

LITERATURE CITED

- ALCORN, J. R. 1988. *The birds of Nevada*. Fairview West Publ., Fallon, Nevada. 418 pp.
- AMERICAN ORNITHOLOGISTS' UNION. 1957. *Check-list of North American birds*. 5th ed. American Ornithol. Union, Baltimore, Maryland. 691 pp.
- . 1983. *Check-list of North American birds*. 6th ed. American Ornithol. Union, Lawrence, Kansas. 877 pp.
- BAILEY, A. M., AND R. J. NEIDRACH. 1965. *Birds of Colorado*. Vol. 2. Denver Mus. Nat. Hist., Colorado. 440 pp.
- BENT, A. C. 1939. *Life histories of North American woodpeckers*. U.S. Natl. Mus. Bull. 174. 334 pp.
- BOHLEN, H. D. 1989. *The birds of Illinois*. Indiana Univ. Press, Bloomington, Indiana. 221 pp.
- BOCK, C. E., AND L. W. LEPTHIEN. 1975. A Christmas count analysis of woodpecker abundance in the United States. *Wilson Bull.* 87:355-366.
- BULL, J. 1964. *Birds of the New York area*. Univ. State of New York, Albany. 540 pp.
- . 1974. *Birds of New York state*. 1985 reissue [rev.] Doubleday/Nat. Hist. Press, Garden City, New York. 703 pp.
- CAMPBELL, R. W., N. K. DAWE, I. McTAGGART-COWAN, J. M. COOPER, G. W. KAISER, AND M. C. E. McNALL. 1990. *The birds of British Columbia*. Vol. 2. Royal British Columbia Mus., Victoria, British Columbia. 636 pp.

- CLAPP, R. B., M. K. KLIMKIEWICZ, AND A. C. FUTCHER. 1983. Longevity records of North American birds: Columbidae through Paridae. *J. Field Ornithol.* 54:123-137.
- CONNER, R. N. 1981. Seasonal changes in woodpecker foraging patterns. *Auk* 98:562-570.
- DAVIS, W. A., AND S. M. RUSSELL. 1990. Birds in southeastern Arizona. Tucson Audubon Soc., Tucson, Arizona. 154 pp.
- DINSMORE, J. J., T. H. KENT, D. KOENIG, P. C. PETERSEN, AND D. M. ROOSA. 1984. Iowa birds. Iowa State Univ. Press, Ames, Iowa. 356 pp.
- GABRIELSON, I. N., AND S. G. JEWETT. 1940. Birds of Oregon. Oregon State Monogr. Stud. Zool. No. 2, Oregon State Coll., Corvallis, Oregon. 650 pp.
- GAUTHREUX, JR., S. A. 1982. The ecology and evolution of avian migration systems. *Avian Biol.* 6:93-168.
- GODFREY, W. E. 1986. The birds of Canada. Rev. ed. Natl. Mus. Canada, Ottawa, Ontario. 595 pp.
- GREEN, J. C., AND R. B. JANSSEN. 1975. Minnesota birds. Univ. Minnesota Press, Minneapolis, Minnesota. 217 pp.
- GREENWOOD, P. J. 1983. Mating systems and the evolutionary consequences of dispersal. Pp. 116-131, in I. R. Swingland and P. J. Greenwood, eds. *The ecology of animal movement*. Clarendon, Oxford, United Kingdom.
- GRISCOM, L., AND D. E. SNYDER. 1955. The birds of Massachusetts. Peabody Mus., Salem, Massachusetts. 295 pp.
- HALL, G. A. 1983. West Virginia birds. Spec. Publ. Carnegie Mus. Nat. Hist. No. 7. 180 pp.
- HAYWARD, C. L., C. COTTAM, A. M. WOODBURY, AND H. H. FROST. 1976. Birds of Utah. Great Basin Nat. Mem. No. 1. 229 pp.
- HILL, N. P. 1965. The birds of Cape Cod, Massachusetts. William Morrow and Co., New York, New York. 364 pp.
- HUBBARD, J. P. 1978. Revised check-list of the birds of New Mexico. New Mexico Ornithol. Soc. Publ. No. 6. 110 pp.
- IMHOF, T. A. 1976. Alabama birds. 2nd ed. Univ. Alabama Press, University, Alabama. 445 pp.
- JACKSON, J. A. 1970a. Some aspects of the population ecology of Downy Woodpeckers in relation to a feeding station. *Iowa Bird Life* 40:27-34.
- . 1970b. A qualitative study of the foraging ecology of Downy Woodpeckers. *Ecology* 51:318-323.
- JAMES, F. C. 1970. Geographic size variation in birds and its relationship to climate. *Ecology* 51:318-323.
- JAMES, R. D. 1991. Annotated checklist of the birds of Ontario. 2nd ed. Royal Ontario Mus., Life Sci. Misc. Publ. 128 pp.
- JEWETT, S. G., W. P. TAYLOR, W. T. SHAW, AND J. W. ALDRICH. 1953. Birds of Washington state. Univ. Washington Press, Seattle, Washington. 767 pp.
- JOHNSGARD, P. A. 1979. Birds of the Great Plains. Univ. Nebraska Press, Lincoln, Nebraska. 539 pp.
- . 1986. Birds of the Rocky Mountains. Colorado Assoc. Univ. Press, Boulder, Colorado. 504 pp.
- JOHNSON, M. L., AND M. S. GAINES. 1990. Evolution of dispersal: theoretical models and empirical tests using birds and mammals. *Annu. Rev. Ecol. Syst.* 21:449-480.
- KILHAM, L. 1970. Feeding behavior of Downy Woodpeckers I. Preference for paper birches and sexual differences. *Auk* 87:544-556.
- . 1983. Life history studies of woodpeckers of eastern North America. *Publ. Nuttall Ornithol. Club No.* 20. 240 pp.
- KOENIG, D. 1977. Winter population trends of woodpeckers in Iowa. *Iowa Bird Life* 47:75-92.
- LAWRENCE, L. DE K. 1967. A comparative life-history study of four species of woodpeckers. *Ornithol. Monogr.* No. 5. 156 pp.
- LIGON, J. S. 1961. New Mexico birds and where to find them. Univ. New Mexico Press, Albuquerque, New Mexico. 360 pp.
- LINCOLN, F. C. 1939. The migration of American birds. Doubleday, Doran and Co., Inc., New York, New York. 189 pp.
- LITTLEFIELD, C. D. 1990. Birds of Malheur National Wildlife Refuge, Oregon. Oregon State Univ. Press, Corvallis, Oregon. 294 pp.

- MENGEL, R. M. 1965. The birds of Kentucky. American Ornithol. Union, Ornithol. Monogr. No. 3. 581 pp.
- MUNRO, J. A., AND I. M. COWAN. 1947. A review of the bird fauna of British Columbia. British Columbia Prov. Mus. Spec. Publ. No. 2. 285 pp.
- NORSE, W. J., AND C. FICHTEL. 1985. Downy Woodpecker *Picoides pubescens*. Pp. 158–159, in S. B. Laughlin and D. P. Kibbe, eds. The atlas of breeding birds of Vermont. Univ. Press New England, Hanover, New Hampshire.
- OBERHOLSER, H. C. 1974. The bird life of Texas. Vol. 1. Univ. Texas Press, Austin, Texas. 530 pp.
- PETERJOHN, B. G. 1989. The birds of Ohio. Indiana Univ. Press, Bloomington, Indiana. 237 pp.
- PETERS, J. L. 1948. Check-list of birds of the world. Vol. 6. Harvard Univ. Press, Cambridge, Massachusetts. 259 pp.
- PETTINGILL, O. S., JR., AND N. R. WHITNEY, JR. 1965. Birds of the Black Hills. Cornell Lab. Ornithol., Spec. Pub. No. 1. 139 pp.
- PHILLIPS, A. R. 1986. The known birds of North and Middle America. Part 1. Privately publ., Denver, Colorado. 259 pp.
- , J. MARSHALL, AND G. MONSON. 1964. The birds of Arizona. Univ. Arizona Press, Tucson, Arizona. 220 pp.
- PLAZA, P. D. 1978. Distribution of selected North American picids determined by computer mapping. *Am. Birds* 32:912–922.
- RAPPOLE, J. H., AND G. W. BLACKLOCK. 1985. Birds of the Texas Coastal Bend: abundance and distribution. Texas A & M Univ. Press, College Station, Texas. 126 pp.
- ROOT, T. 1988. Atlas of wintering North American birds. Univ. Chicago Press, Chicago, Illinois. 312 pp.
- SALT, W. R., AND J. R. SALT. 1976. The birds of Alberta. Hurtig Publs., Edmonton, Alberta. 498 pp.
- SCHERRER, B., AND F. MORNEAU. 1987. Seasonal variation of the niche habitat breadth of resident birds in Gatineau Park, Quebec. *Acta Oecologica/Acta Gen.* 8:201–208.
- SHORT, L. L. 1982. Woodpeckers of the world. Delaware Mus. Nat. Hist. Monogr. Ser. No. 4. 676 pp.
- SMALL, A. 1974. The birds of California. Winchester Press, New York, New York. 310 pp.
- SMITH, L. M. 1973. Variation in the horizontal distribution of Downy Woodpeckers. *Iowa Bird Life* 43:23–24.
- SPEIRS, J. M. 1985. Birds of Ontario. Nat. Heritage/ Nat. Hist. Inc., Toronto, Ontario. 986 pp.
- SPRUNT, A., JR., AND E. B. CHAMBERLAIN. 1970. South Carolina bird life. Rev. ed. Univ. South Carolina, Columbia, South Carolina. 658 pp.
- STODDARD, H. L., SR. 1978. Birds of Grady County, Georgia. *Bull. Tall Timbers Res. Stat.* No. 21. 175 pp.
- SUTTON, G. M. 1967. Oklahoma birds. Univ. Oklahoma Press, Norman, Oklahoma. 674 pp.
- TERRILL, S. B., AND K. P. ABLE. 1988. Bird migration terminology. *Auk* 105:205–206.
- TRAUTMAN, M. B., AND M. A. TRAUTMAN. 1968. Annotated list of the birds of Ohio. [reprinted by] *Ohio J. Sci.* 68:257–332.
- TRAVIS, J. 1977. Seasonal foraging in a Downy Woodpecker population. *Condor* 79:371–375.
- UNITT, P. 1984. The birds of San Diego County. *San Diego Soc. Nat. Hist. Mem.* 13. 276 pp.
- VAN VELZEN, W. T. 1968. Migration of a Downy Woodpecker. *Maryland Birdl.* 24:115.
- VERNER, J., E. C. BEEDY, S. L. GRANHOLM, L. V. RITTER, AND E. F. TOTH. 1980. Birds Pp. 75–319, in J. Verner and A. Boss, eds. California wildlife and their habitats: western Sierra Nevada. Pacific Southwest Forest and Range Experim. Stat., Forest Serv., U.S. Dept. Agri., Gen. Tech. Rep. PSW-37, Berkeley, California.
- WETMORE, A. 1940. Notes on the birds of Kentucky. *Proc. U.S. Natl. Mus.* 88:529–574.
- WILLIAMS, J. B., AND G. O. BATZLI. 1979. Interference competition and niche shifts in the bark-foraging guild in central Illinois. *Wilson Bull.* 91:400–411.
- WING, L. W. 1940. Birds of the Upper Peninsula of Michigan. *Res. Stud. State Coll. Washington* 7:163–198.
- WINKER, K., B. A. FALL, J. T. KLICKA, D. F. PARMALEE, AND H. B. TORDOFF. 1991. The importance of avian collections and the need for continued collecting. *Loon* 63:238–246.

WOOD, N. A. 1951. The birds of Michigan. *Miscell. Publ. Mus. Zool., Univ. Michigan* No. 75. 559 pp.

YUNICK, R. P. 1988. An assessment of the Downy Woodpecker and Hairy Woodpecker on recent New York state Christmas Counts. *Kingbird* 38:147-158.

Received 28 Sep. 1993; accepted 1 Feb. 1994.

GRADUATE AND POST-GRADUATE RESEARCH GRANTS

The Biological Research Station of the Edmund Niles Huyck Preserve offers grants of up to \$2500 (US) to support biological research that utilizes the resources of the Preserve. Among the research areas supported are basic and applied ecology, animal behavior, systematics, evolution and conservation. The 800-ha Preserve is located on the Helderberg Plateau, 50 km southwest of Albany, New York. Habitats include northeast hardwood-hemlock forests, conifer plantations, old fields, permanent and intermittent streams, 4- and 40-ha lakes and several waterfalls. Facilities include a wet and dry lab, library and houses/cabins for researchers. Deadline is 1 Feb. 1995. Application material may be obtained from Dr. Richard L. Wyman, Executive Director, E. N. Huyck Preserve and Biological Research Station, P.O. Box 189, Rensselaerville, New York 12147.