

## SPRING AND SUMMER SPARROW HAWK FOOD HABITS

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THE order Falconiformes contains some of the most interesting members of the bird world. Despite the work reported by Bendire (1892), Sherman (1913), Bent (1938), and Roest (1957), the life history, including food habits, of one of the most common American falconiform birds, the Sparrow Hawk (*Falco sparverius*), is still not known intimately.

This paper, therefore, explores spring and summer food habits of nestling and adult Sparrow Hawks in Albany Township, Berks County, Pennsylvania, during the years 1960 to 1963 inclusive. This information also is compared with a general food survey representing North American subspecies of the Sparrow Hawk during various seasons of the year.

### SPRING-SUMMER FOOD HABITS

*Introduction.*—In Berks County, Pennsylvania, the Sparrow Hawk is “a common resident, nesting in all the larger valleys” (Poole, 1947:40). It is common in Albany Township.

The zoogeography of Albany Township is characterized by an overlapping of the Carolinian and the Alleghanian life zones (Poole, 1947:3). The northern boundary of the township is formed by the Kittatinny Ridge which reaches a maximum elevation of 1,657 feet above mean sea level.

In 1959 I selected Charlex Farm and adjacent land as a study area. Located in the northern portion of the township, it covers an area of approximately 0.5 square mile. Elevations range from 500 to 600 feet above mean sea level. It is almost entirely agricultural in land use. Domestic cattle and sheep are pastured, and wheat, oats, and corn are cultivated. Bicolor lespedeza, Russian olive, bayberry, highbush-cranberry, and multiflora rose are planted in odd land corners (Nagy, 1962:15–16). Seven ponds are on the area.

*Animal populations.*—From 1960 to 1963, 13 Sparrow Hawk nests were on the study area; 11 of these are shown in Fig. 1. Seven of these, in nest boxes, were used for this food habits study. Nest densities per 0.5 square mile ranged from an extreme high of seven in 1961 (Nagy, 1963:93)<sup>1</sup> to a low of one in 1963. The overall 4-year mean was 3.25 nests per 0.5 square mile.

About 45 species of birds, at least three species of mammals, and several reptiles and amphibians, all characteristic of the Carolinian–Alleghanian life zone, were potential vertebrate prey species. Numerous insects were potential invertebrate prey species.

<sup>1</sup> Stockard (1905:153) records a similarly high nesting density in Mississippi.

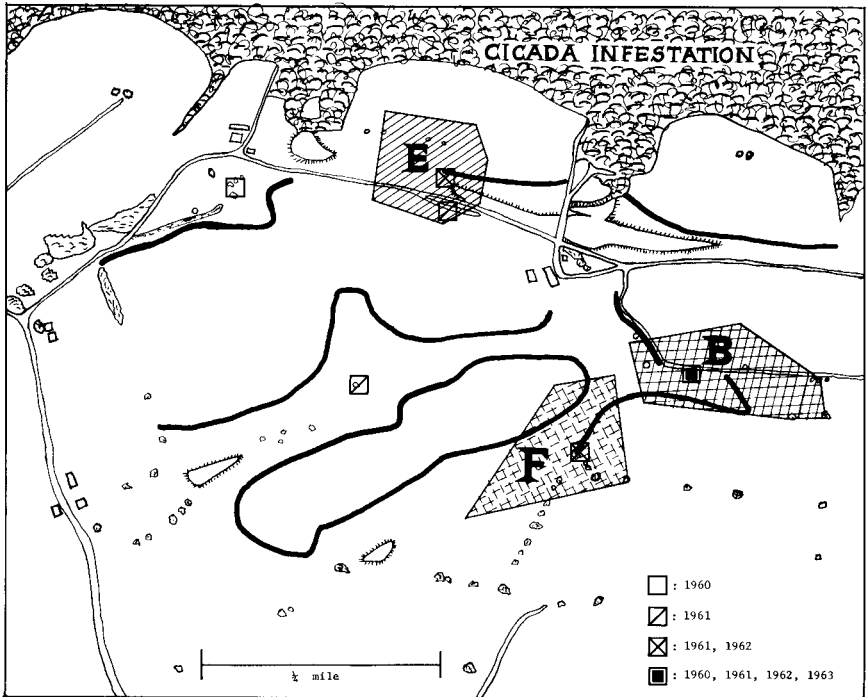


FIG. 1. The Charlex Farm study area showing locations of 11 Sparrow Hawk nest sites during the period 1960 to 1963, and the relationship of the 1962 nest territories B, E, and F to the cicada infestation. In 1961 two additional nests were slightly outside the area covered by this map. Heavy black lines are multiflora rose plantings.

Bird populations were sampled qualitatively but not quantitatively. One rodent population was determined, on 8–10 June 1962, by saturation trapping small mammals for 192 trap nights on a sample plot measuring 40,000 square feet. An unusually low density of three *Microtus p. pennsylvanicus* and two *Zapus h. hudsonius* was obtained. Reptiles and amphibians were not censused.

During June and July 1962, a major outbreak of Brood II of the Periodical Cicada (*Magicicada septendecim*) occurred on the Kittatinny Ridge. This population exceeded, in density, all other potential prey during that period. Although the forest supporting the cicadas acted as a barrier preventing most of the long-winged, open-field-oriented falcons from hunting there, some of the Sparrow Hawks being studied did enter the forest to kill a few cicadas. No cicadas were found beyond the Kittatinny Ridge, and no Sparrow Hawk nest territories overlapped onto the mountain (Fig. 1), in spite of the fact that Sparrow Hawks (and other falcons) have definite hunting ranges centered around their nests (Bond, 1936:72).

TABLE I  
ANALYSIS OF SPARROW HAWK PELLETS AND REMAINS OF PREY FOR 1960-63

Prey	Number in	
	Pellets	Prey remains
<b>Insects</b>		
Short-horned Grasshopper ( <i>Acrididae</i> ) .....	0	6
Periodical Cicada ( <i>Magicicada septendecim</i> ) .....	0	11
Libellulid Dragonfly ( <i>Libellulidae</i> ) .....	0	3
Beetles ( <i>Coleoptera</i> ) .....	0	5
Ground Beetles ( <i>Carabidae</i> ) .....	54	7
	54	32
Total .....		86
<b>Reptiles</b>		
Five-lined Skink ( <i>Eumeces fasciatus</i> ) .....	0	1
	0	1
Total .....		1
<b>Birds</b>		
Passeriformes .....	0	12
Icteridae .....	1	7
Eastern Meadowlark ( <i>Sturnella magna</i> ) .....	0	1**
Common Grackle ( <i>Quiscalus quiscula</i> ) .....	0	8*
Cowbird ( <i>Molothrus ater</i> ) .....	0	3*
Fringillidae .....	1	2
Cardinal ( <i>Richmondia cardinalis</i> ) .....	0	1**
Grasshopper Sparrow ( <i>Ammodramus savannarum</i> ) .....	0	1**
	2	35
Total .....		37
<b>Mammals</b>		
Short-tailed Shrew ( <i>Blarina brevicauda</i> ) .....	0	1
Microtinae .....	118	5
Meadow Mouse ( <i>Microtus pennsylvanicus</i> ) .....	7	14
Meadow Jumping Mouse ( <i>Zapus hudsonius</i> ) .....	0	2
	125	22
Total .....		147
Grand Total .....		271

\* Prey remains of an immature bird.

\*\* Prey remains of an adult bird.

*Collection and analysis of prey data.*—During May, June, and July 1960-62, and during June 1963, I made 103 trips to Sparrow Hawk nests and collected 125 pellets and 23 prey samples consisting of 90 prey remains. Analysis of all of these materials represents 271 prey items.

Sparrow Hawk pellets are small and compact, and contain broken bones, tufts of hair, and pieces of feathers and insects. I limited identification of this

material to subfamily, although the Microtinae listed in Table 1 were probably *Microtus pennsylvanicus*. Prey remains consisted of partially eaten mammals, reptiles, and insects, along with bird tarsi, skeletons, and feathers. I identified much of this material to genus or species, although the identification of some was limited to family or order.

Mosby (1963:320) states that relatively small samples are accurate for evaluation of food habits of individual species on small homogeneous areas. Since Charlex Farm meets these specifications, I followed this technique in collecting pellets and prey samples.

*Prey taken.*—Food consumed by the Sparrow Hawks studied is shown in Table 1. These data differ somewhat from the general account of Sparrow Hawk food habits for Pennsylvania (McDowell and Luttringer, 1948:22), and for New Jersey (Hausman, 1927:33). This is particularly true in respect to insects and mammals. No doubt local variations in prey density and in vulnerability account for these variations. Bent (1938:112) points out that Sparrow Hawk diets vary “considerably according to season and locality.”

The appearance of the Five-lined Skink (*Eumeces fasciatus*) in the form of one prey remain was totally unexpected, since the species was not known to inhabit the area. However, the habits of this species are such that it could easily have been overlooked.

#### CONCLUSION

The great variations which occur in Sparrow Hawk diets can be seen by comparing Table 1 with Table 2, which summarizes food habits for the species in North America. From 1960 to 1963, the Sparrow Hawks which I studied restricted their predation to a few species of animals, in comparison with the wide variety of food items known to form the diet of the species in North America. This illustrates the importance of seasonal and geographical conditions in dictating the diet of this falcon. In Albany Township, Microtinae (probably *Microtus pennsylvanicus*) were the principal animals taken. Icteridae and Carabidae appeared less frequently. In 1962, the Periodical Cicada formed only 16.5 per cent of the Sparrow Hawk diet, although present locally in great abundance. The falcons did not penetrate the forest to exert great predation pressure on the cicadas.

Prey species possibly not previously reported in the literature include the following animals: Periodical Cicada (*Magicicada septendecim*), Five-lined Skink (*Eumeces fasciatus*), Cowbird (*Molothrus ater*), Common Grackle (*Quiscalus quiscula*), Cardinal (*Richmondia cardinalis*), Grasshopper Sparrow (*Ammodramus savannarum*), and Meadow Jumping Mouse (*Zapus hudsonius*).

TABLE 2  
GENERAL FOOD SURVEY OF SPARROW HAWKS

Prey	Authority
Insects	
Orthoptera	Breckenridge and Errington (1938)
Lesser Migratory Grasshopper ( <i>Melanoplus atlanis</i> )	McAtee (1932:378)
Grasshopper ( <i>Melanoplus devastator</i> )	Bryant (1918:127)
Crickets ( <i>Gryllus</i> )	Breckenridge and Errington (1938)
Jerusalem Crickets ( <i>Stenopelmatus irregularis</i> )	Bryant (1918:127)
Hemiptera	Knowlton and Telford (1947)
Periodical Cicada ( <i>Magicicada septendecim</i> )	This study
Aeshnic Dragonflies (Libellulidae)	Locke (1961:342)
Libellulid Dragonflies (Libellulidae)	Locke (1961:342)
Lepidoptera	Breckenridge and Errington (1938)
Acraea Moth ( <i>Estigmene acraea</i> )	Locke (1961:342)
Coleoptera	Breckenridge and Errington (1938)
Ground Beetle (Carabidae)	This study
Click Beetle (Elateridae)	Knowlton and Telford (1947:311)
Ants (Hymenoptera)	Brodkorb (1928:213)
Diptera maggots	Knowlton and Telford (1947:311)
Reptiles	
Lizard ( <i>Anolis</i> )	Danforth (1934:357)
Six-lined Racerunner ( <i>Cnemidophorus sexlineatus</i> )	Lamore (1963:461)
Five-lined Skink ( <i>Eumeces fasciatus</i> )	This study
Birds	
Ground Dove ( <i>Columbigallina passerina</i> )	McAtee (1935:35)
Passeriformes	This study
Horned Lark ( <i>Eremophila alpestris</i> )	Lamore (1963:461)
Cliff Swallow ( <i>Petrochelidon pyrrhonota</i> )	Bonnot (1921:136)
Winter Wren ( <i>Troglodytes troglodytes</i> )	McAtee (1935:35)
Carolina Wren ( <i>Thyrothorus ludovicianus</i> )	Fisher (1893:125)
Robin ( <i>Turdus migratorius</i> )	Lamore (1963:461)
Eastern Bluebird ( <i>Sialia sialis</i> )	Drinkwater (1953:215)
Vireo (Vireonidae)	Fisher (1893:121)
Warbler (Parulidae)	McAtee (1935:35)
Hermit Warbler ( <i>Dendroica occidentalis</i> )	Grinnell (1933:236)
English Sparrow ( <i>Passer domesticus</i> )	Sage (1893:207)
Icteridae	This study
Cowbird ( <i>Molothrus ater</i> )	This study
Meadowlark ( <i>Sturnella</i> )	McAtee (1935:35)
Eastern Meadowlark ( <i>Sturnella magna</i> )	This study
Red-wing ( <i>Agelaius phoeniceus</i> )	Fisher (1893:125)
Common Grackle ( <i>Quiscalus quiscula</i> )	This study
Cardinal ( <i>Richmondena cardinalis</i> )	This study
Grasshopper Sparrow ( <i>Ammodramus savannarum</i> )	This study
Vesper Sparrow ( <i>Poocetes gramineus</i> )	Fisher (1893:122)

TABLE 2  
(Continued)

Prey	Authority
Birds (Continued)	
Junco ( <i>Junco</i> )	Fisher (1893:122)
Sparrow ( <i>Spizella</i> )	McAtee (1935:35)
Tree Sparrow ( <i>Spizella arborea</i> )	Wharton (1930:141)
Chipping Sparrow ( <i>Spizella passerina</i> )	McAtee (1935:35)
Field Sparrow ( <i>Spizella pusilla</i> )	Fisher (1893:124)
Gambels Sparrow ( <i>Zonotrichia leucophrys gambelii</i> )	Michener (1930:212)
Sparrow ( <i>Melospiza</i> )	McAtee (1935:35)
Song Sparrow ( <i>Melospiza melodia</i> )	Broun (1932:119)
Mammals	
Shrew (Soricidae)	Fisher (1893:122)
Short-tailed Shrew ( <i>Blarina brevicauda</i> )	Fisher (1893:126)
Big Brown Bat ( <i>Eptesicus fuscus</i> )	Stoner (1939:474)
Mexican Free-tailed Bat ( <i>Tadarida brasiliensis mexicana</i> )	Baker (1962:500)
Striped Ground Squirrel ( <i>Citellus tridecemlineatus</i> )	Breckenridge and Errington (1938:669-670)
Gopher (Geomyidae)	Fisher (1893:123)
Mice ( <i>Peromyscus</i> )	Breckenridge and Errington (1938)
Deer Mouse ( <i>Peromyscus maniculatus</i> )	Tordoff (1955:140)
White-footed Mouse ( <i>Peromyscus leucopus</i> )	Fisher (1893:126)
Cotton Rat (Cricetinae)	Fisher (1893:126)
Wood Rat (Cricetinae)	Widmann (1896:222)
Microtinae	This study
Mice ( <i>Microtus</i> )	Breckenridge and Errington (1938)
Meadow Mouse ( <i>Microtus p. pennsylvanicus</i> )	Poole (1932:56)
Prairie Vole ( <i>Microtus ochrogaster</i> )	Tordoff (1955:140)
House Mouse ( <i>Mus musculus</i> )	Fisher (1893:122)
Meadow Jumping Mouse ( <i>Zapus hudsonius</i> )	This study
Rabbit (Leporidae)	Fisher (1893:123)
Miscellaneous	
Bread	Warburton (1952:85)

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LITERATURE CITED

- BAKER, J. K.  
1962 The manner and efficiency of raptor depredations on bats. *Condor*, 64:500-504.
- BENDIRE, C.  
1892 Life histories of North American birds *U. S. Natl. Mus., Spec. Bull.* 1.
- BENT, A. C.  
1938 Life histories of North American birds of prey, Part 2. *U. S. Natl. Mus. Bull.* 170.
- BOND, R. M.  
1936 Eating habits of falcons with special reference to pellet analysis. *Condor*, 38:72-76.
- BONNOT, P.  
1921 Sparrow Hawk captures swallow. *Condor*, 23:136.
- BRECKENRIDGE, W. J., AND P. L. ERRINGTON  
1938 Food habits of small falcons in north-central states. *Auk*, 55:668-670.
- BRODKORB, P.  
1928 Notes on the food of some hawks and owls. *Auk*, 45:212-213.
- BROUN, M.  
1932 A return Song Sparrow a victim of a return Sparrow Hawk. *Bird-Banding*, 3:119.
- BRYANT, H. C.  
1918 Evidence on the food of hawks and owls in California. *Condor*, 20:126-127.
- DANFORTH, S. T.  
1934 The birds of Antigua. *Auk*, 51:350-364.
- DRINKWATER, H.  
1953 Young bluebird taken from nest-box by Sparrow Hawk (*Falco sparverius*). *Auk*, 70:215.
- FISHER, A. K.  
1893 The hawks and owls of the United States in their relation to agriculture. *Bull.* 3, *U. S. Dept. of Agric.*, Washington, D. C.
- GRINNELL, J.  
1933 Sparrow Hawk eats Hermit Warbler. *Condor*, 35:236.
- HAUSMAN, L. A.  
1927 The hawks of New Jersey and their relation to agriculture. *Bull.* 439, *N. J. Agric. Expt. Sta.*, New Brunswick, N. J.
- KNOWLTON, G. F., AND P. E. TELFORD  
1947 Insect food of the eastern Sparrow Hawk in Cache Valley, Utah. *Auk*, 64:311.
- LAMORE, D. H.  
1963 Prey of a Sparrow Hawk family when raising young. *Wilson Bull.*, 75:461.
- LOCKE, L. N.  
1961 Sparrow Hawk feeding on dragonflies. *Condor*, 63:342.
- MCATEE, W. L.  
1932 Economic ornithology in recent entomological publications. *Auk*, 49:378.  
1935 Food habits of common hawks. *U. S. Dept. of Agric., Circ.* No. 370, Washington, D. C.
- MCDOWELL, R. D., AND L. A. LUTTRINGER, JR.  
1948 Pennsylvania birds of prey. *Pa. Game Comm.*, Harrisburg, Pa.
- MICHENER, H.  
1930 Hawks unwelcome visitors at banding stations. *Condor*, 32:212.

MOSBY, H. S.

- 1963 Wildlife investigational techniques. The Wildlife Society, Blacksburg, Va.

NAGY, A.

- 1962 Biography of a farm. *Plants & Gardens*, 18 (2):15-16.

- 1963 Population density of Sparrow Hawks in eastern Pennsylvania. *Wilson Bull.*, 75:93.

POOLE, E. L.

- 1932 A survey of the mammals of Berks County, Pennsylvania. *Bull. 13, Reading Pub. Mus. and Art Gallery*, Reading, Pa.

- 1947 A half century of bird life in Berks County, Pennsylvania. *Bull. 19, Reading Pub. Mus. and Art Gallery*, Reading, Pa.

ROEST, A. I.

- 1957 Notes on the American Sparrow Hawk. *Auk*, 74:1-19.

SAGE, J. H.

- 1893 Notes on some Connecticut birds. *Auk*, 9:207.

SHERMAN, A. R.

- 1913 The nest life of the Sparrow Hawk. *Auk*, 30:406-418.

STOCKARD, C. R.

- 1905 Nesting habits of birds in Mississippi. *Auk*, 22:153.

STONER, D.

- 1939 Eastern Sparrow Hawk feeding on big brown bat. *Auk*, 56:474.

TORDOFF, H. B.

- 1955 Food-storing in the Sparrow Hawk. *Wilson Bull.*, 67:139-140.

WARBURTON, F. E.

- 1952 Sparrow Hawk, *Falco sparverius*, eats bread. *Auk*, 69:85.

WHARTON, W. F.

- 1930 A Sparrow Hawk recovery. *Bird-Banding*, 1:141.

WIDMANN, O.

- 1896 The peninsula of Missouri as a winter home for birds. *Auk*, 13:222.

629 GREEN STREET, ALLENTOWN, PENNSYLVANIA, 21 MAY 1964 (ORIGINALLY  
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