

Ten caught, including some recently fledged young. One seen building a nest.

**Cyanerpes cyaneus*. Red-legged Honeycreeper. Ma, P, SG; 4. A female had largest ovum 4 mm diameter.

Tangara nigrocincta. Masked Tanager. C, P, SG; 3.

Thraupis episcopus. Blue-gray Tanager. C, P, SG; 2.

Thraupis palmarum. Palm Tanager. SG; 1.

**Ramphocelus icteronotus*. Yellow-rumped Tanager. Ma, C, P, SG; 5.

Tachyphonus rufus. White-lined Tanager. C, P; 3.

Tachyphonus delatrii. Tawny-crested Tanager. SG; 4. Four caught, including an immature (unossified skull, brown eye).

Saltator albicollis. Streaked Saltator. C, P, SG; 3.

**Sporophila americana*. Variable Seedeater. C, P, SG; 5. Ten caught, including an immature (skull unossified) and a male with testes 4 mm diameter.

Volatinia jacarina. Blue-black Grassquit. P; 5. Often singing.

The study was made possible by Capt. Robert Early and the Colegio Bolivar of Cali. Several students of the colegio helped net birds and prepare skins. José Ignacio Borrero was a helpful consultant. The work was done during our tenure on a grant from the Rockefeller Foundation.

Accepted for publication 15 February 1973.

WHITE-TAILED KITE PREDATION ON A FLUCTUATING VOLE POPULATION

REY C. STENDELL

AND

PHILIP MYERS

Museum of Vertebrate Zoology
University of California
Berkeley, California 94720

White-tailed Kites (*Elanus leucurus*) are obligate predators of diurnal small mammals (Waian and Stendell, Calif. Fish & Game 56:188, 1970). Brown and Amadon (Eagles, Hawks and Falcons of the World, vol. 1, Hamlyn House, Feltham, 414 p. 1968) indicate that movement and nesting of kites are governed to a considerable extent by concentrations of mice, usually voles. Throughout much of the kite's range in California, the vole (*Microtus californicus*) is the major prey species. Hawbecker (Condor 42:106, 1940) noted a correlation between the nesting of White-Tailed Kites and vole density and suggested that a high population of voles is necessary for successful nesting of kites. This note compares annual changes in food habits of White-Tailed Kites with measured changes in the density of California voles in fields over which the kites were hunting.

At Hastings Natural History Reservation in Monterey County, California, populations of small mammals have been censused during the summers of 1969, 1970, and 1971, by means of mark and recapture techniques. The Reservation is a mosaic of grassland, oak woodland, and chaparral. *Microtus* predominately utilize the grassland areas. Estimated vole densities are shown in table 1. Although only one field was censused accurately, search for runways and occasional trapping in all other suitable fields within a 2-mile radius of the kite roosting site indicated vole densities similar to those of the censused field.

TABLE 2. Species composition (%) of prey in kite pellets, 1969-71.

Prey species	Per cent of total prey		
	1969	1970	1971
<i>Microtus</i>	83	85	88
<i>Thomomys</i>	11		8
<i>Reithrodontomys</i>	3	9	3
<i>Dipodomys</i>		4	
<i>Perognathus</i>		2	
Aves			1
Insecta	3		
Number of animals	35	55	129
Number of pellets	28	39	99

Other rodents sharing the grassland with *Microtus* include harvest mice (*Reithrodontomys megalotis*), pocket mice (*Perognathus californicus*), kangaroo rats (*Dipodomys* sp.), and gophers (*Thomomys bottae*). Their relative abundances during the three summers are also given in table 1.

During at least the last 4 years, White-Tailed Kites have occurred on the Hastings Reservation from late winter until late summer. In 1969 and 1970 they nested on the area, but fledged young only in 1970. Although no nest was found in 1971, two adults and four juveniles were seen during the summer months. During 1969 through 1971, kites were observed hunting on the Reservation, particularly over that field where small mammals were censused.

Kite pellets were collected at nests or roosts in the early summer of each year. Pellets were soaked in a dilute solution of potassium hydroxide to dissolve the fur; identification of small mammal remains was based on elements of the skull, particularly teeth.

Voles were the major prey species taken, making up 83%, 84%, and 88% of the individuals for the 3 years (table 2). Gophers were the second most common species taken in 1969 and 1971; none were

TABLE 1. Vole density and abundance of other prey species, 1969-71.

Year	Voles per acre	Relative abundance of other prey species			
		<i>Thomomys</i>	<i>Perognathus</i>	<i>Dipodomys</i>	<i>Reithrodontomys</i>
1969	25	common	uncommon	uncommon	uncommon
1970	> 45	common	common	uncommon	uncommon
1971	< 1	abundant	uncommon	uncommon	abundant

found in 1970. Harvest mice were present each year and were most numerous in 1970. Other items taken were two *Dipodomys*, one *Perognathus*, one bird (unidentified), and one grasshopper.

Kites are dependent on a prey whose numbers fluctuate markedly from year to year. During periods of low vole density, kites must select other prey, move to areas of higher vole density, or continue to prey on voles by increasing their hunting effort (Stendell, unpubl. data). At the Hastings Reservation there is no other small, diurnal mammal to replace the vole during periods of low vole density. Trapping and observations of small mammal signs suggest that the vole populations fluctuate in synchrony over the entire Reservation. Furthermore, kites were observed hunting the same fields during all 3 years. The fact that voles constitute a high, relatively constant percentage of the pellet contents indicates

that the kite strategy at the Hastings Reservation is to remain and to spend more time per mouse capture.

Pearson (J. Mammal. 52:41, 1971) has suggested that carnivores are an important factor in generating microtine cycles by continuing to prey on declining vole populations even after the population has reached its lowest density. Our data suggest that White-Tailed Kite predation may operate on *Microtus* populations in this manner.

We thank O. P. Pearson, C. A. Pearson, N. Verbeek, and L. Myers for their assistance. We gratefully acknowledge the use of the facilities of the Frances Simes Hastings Reservation and the Museum of Vertebrate Zoology, University of California, Berkeley.

Philip Myers is supported by an NSF Graduate Fellowship.

Accepted for publication 9 May 1972.

BREEDING OF SAY'S PHOEBE IN ARCTIC ALASKA

TOM J. CADE

Section of Ecology and Systematics
Cornell University
Ithaca, New York 14850

AND

CLAYTON M. WHITE

Department of Zoology
Brigham Young University
Provo, Utah 84601

The flycatchers of the family Tyrannidae, basically a Neotropical group, have evidently spread into North America from a tropical center of origin (Mayr, Proc. Natl. Acad. Sci., 51:280, 1964). Of the some 30 species breeding north of the Rio Grande River, Texas (8.2% of the total of 365 species), only 7 species (23.3% of the North American breeders and 1.9% of the total species) migrate to breed as far north as Alaska, and only one species, Say's Phoebe (*Sayornis saya*), is known to breed north of the spruce forest in arctic Alaska. We believe Say's Phoebe is a recent arrival in the nonforested regions from the Brooks Range north into the foothills of the Arctic Slope, where we found the species breeding in considerable numbers on the cliffs of the Colville River between 1967 and 1971.

Gabrielson obtained the first Arctic Slope record of this species on the Colville in 1951. He saw a single individual fly up to what he thought was a nest on a bluff near the mouth of the Killik River (see Kessel and Cade, Biol. Pap. Univ. Alaska, No. 2, 1958). Cade, however, did not see the species during his travels on that river in 1952, 1956, 1957, or 1958, even though he was engaged in a study of falcons at the time and thus paid especial attention to the avian inhabitants of river cliffs and bluffs, where this phoebe is conspicuous and most likely to be encountered. In 1959, however, Cade did see phoebes once on bluffs between the mouths of the Oolamnagavik and Killik Rivers (a distance of about 8 miles). In 1964, White found parent birds carrying food in their beaks on three separate cliffs in the vicinity of the Killik's confluence with the Colville (West and White, Condor, 68:302, 1966) and found adults on two cliffs along the Killik.

In 1967 we found one to three pairs of phoebes on all the main cliffs of the Colville (about 20 total cliffs) from the mouth of the Etivluk River (about 50 miles upriver from the Killik) to the mouth of the Anaktuvuk River, a distance of some 130 miles. A similar distribution has occurred in subsequent years. Phoebes have not been seen below the Anaktuvuk. We believe that they have essentially reached their limit of northward distribution in the Colville drainage because of the nature of the changes in the rock near the mouth of the Anaktuvuk; the cracks, crevices, and crannies necessary for nest placement no longer exist.

Typical situations for nests are illustrated by two records in 1967: 28 June, ca. 14 miles downriver from mouth of Etivluk, six recently hatched young in nest of sphagnum moss held together with spider web and lined with white ptarmigan (*Lagopus* sp.) feathers, placed in crack under an overhanging slab of shale about 6 ft above talus, 15 ft above river, and 10 ft below a brushy brink, 80 ft diagonally below a Gyrfalcon (*Falco rusticolus*) aerie; 12 July, near the mouth of the Killik, young covered with body feathers and wing quills still in sheaths about 20 mm long in a nest of sphagnum moss lined with caribou hair and Rough-legged Hawk (*Buteo lagopus*) feathers, placed under a loose slab of projecting sandstone. Fledging data are provided by the following: On 27 July 1967 about 10 miles below the Etivluk, we saw four young recently out of the nest and flying; on 27 July 1969, near the Killik, we found three young about a day or two out of the nest.

Irving (U.S. Natl. Mus. Bull., No. 217, 1960) stated that in both 1950 and 1951 one family of phoebes was seen in the Killik valley and one in the Anaktuvuk Pass region. In 1952 he found them at additional places in both regions. Irving was surprised that the Anaktuvuk Pass Eskimos did not know the bird, nor did they recall having seen it, for the phoebe has conspicuous and distinctive habits. He did not know why these astute natives were unaware of such a conspicuous bird, but Irving believed that the phoebes were nonetheless not newcomers to the Brooks Range.

The available data suggest to us that Say's Phoebe has entered the foothills of the Arctic Slope from the Brooks Range by following down the valleys of the Killik and Etivluk rivers and then rather suddenly spreading up and down the Colville, occupying most of the suitable nesting cliffs within a few years (essentially since 1960). This is the most diagram-