Journal of the Arkansas Academy of Science

Volume 32 Article 18

1978

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Hanebrink, Earl L.; Sutton, Keith B.; and Posey, Alan F. (1978) "Species Composition and Diversity of Hawk Populations in Northeastern Arkansas," *Journal of the Arkansas Academy of Science*: Vol. 32 , Article 18.
Available at: https://scholarworks.uark.edu/jaas/vol32/iss1/18

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Species Composition and Diversity of Hawk Populations in Northeastern Arkansas

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ABSTRACT

Species composition and diversity of hawk populations were analyzed for northeastern Arkansas by the use of roadside censuses conducted in September through April from 1974-1977. Data from 10 years of Jonesboro Christmas Bird Counts were also analyzed.

During the roadside survey 20,174 miles were driven and 1819 raptors were counted. Ten species were observed with the Red-tailed Hawk being most abundant followed by the Marsh Hawk and the American Kestrel. Eight species were recorded from the 10 years of Christmas Bird Counts. Annual breeding bird surveys and spot records turned up three additional species making a total of 14 species in 15 years of study.

Although hawk populations fluctuate from year to year, the data do not reveal any downward trend in numbers in northeastern Arkansas. Large concentrations of hawks do not appear in this region of the state until after mid-September. Populations reach a peak in December after which they decline in January. A second peak is reached in February followed by a gradual decline such that in April the American Kestrel is the only species consistently seen from the roadside. After April only a few hawks remain to nest.

Both Krider's and melanistic Red-tails occur here but from a total of 864 Red-tailed Hawks observed only 26 Krider's and 31 melanistic or *Buteo jamaicensis harlanii* were recorded.

INTRODUCTION

In this paper we investigate the seasonal and long term species composition and relative abundance of hawks in the northeastern section of Arkansas. Data from roadside censuses and Christmas bird counts were analyzed in this study. The roadside census, which is a method of determining relative abundance, not absolute abundance, was used by Nice and Nice (1921) to study Oklahoma bird populations as early as 1920. Since then many workers have employed this technique. Howell (1951) made detailed studies using relative conspicuousness in determining bird numbers along roadsides in Tennessee while Peterle and Eberhardt (1959) reported on the variability of this method in studying the Cottontail Rabbit. Also, many wildlife personnel have used the roadside census to study population trends for mammals and game birds (Fisher et al., 1947; Hendrickson, 1939; Lord, 1959 and 1961; Newman, 1959; Wight, 1959; and Wortham and Hanebrink, 1970). Kendeigh (1944) evaluated the roadside census in relation to other types of censuses used to study birds, and Dice (1930 and 1952) thoroughly discussed and compared numerous census methods.

METHODS

A total of all falconiform species was completed for September through April from 1974 through 1977. There are few summer resident hawk species in northeastern Arkansas. Breeding bird censuses taken in June for ten northeastern Arkansas counties for 1971 and eleven years of breeding bird censuses in three counties revealed only three species, the Turkey Vulture *(Cathartes aura)*, the Mississippi Kite *(Ictinia mississippiensis)* and the Red-shouldered Hawk *(Buteo lineatus)*. A few Red-tailed Hawks *(Buteo jamaicensis)*, Cooper's Hawks *(Accipiter cooperii)* and possibly American Kestrels *(Falco sparverius)* and Sharp-shinned Hawks *(Accipiter striatus)* nest in this region of the state but numbers have not been high enough to appear on annual breeding surveys.

Relative conspicuousness as reported by Howell (1951) is not a great factor in determining winter hawk populatins since most winter species perch in open places such as telephone wires and poles and trees without leaves. These species can be easily identified from an automobile and are all equally conspicuous. The exception is the Marsh Hawk *(Circus cyaneus)* which flies low over stubble and open fields and generally perches on the ground.

In northeastern Arkansas, migratory hawks are seldom numerous before the middle of September and roadside censuses before this time give very low counts. Thus, fewer miles were driven during the earlier part of this month.

All types of roads and highways were traveled including Interstate 40 between Memphis and Little Rock. Normal speeds were driven during early morning and late afternoon.

Long term population trends were based on the Jonesboro Christmas Bird Count data for 1967 through 1976. Since the interpretation of quantitative data from Christmas bird counts is difficult because of the many variables involved, such as time spent in the field, locality, weather, habitat, period of day spent in the field, number and competence of observers and methods of travel (Graber and Golden, 1960), Stewart (1954: 192) has suggested that such data be used to show general trends only. It is impossible to eliminate all or even some of the major sources of variation and most of the variables were present throughout the census period, but hopefully were not operating in any one direction to produce undue bias. The Jonesboro Christmas Counts (Hanebrink, 1968-1977) were somewhat standardized as each covered an eight-hour period with four parties observing. The number of individuals in each party often varied, but there was at least one competent observer in each party.

All species names used in this paper are based on the A.O.U. Check-list of North American Birds, Fifth Edition (1957) and the 32nd Supplement to the A.O.U. Check-list of North American Birds (1973).

DESCRIPTION OF AREA

All of northeastern Arkansas is extensive delta with the exception of Crowley's Ridge. The flat land reaches the base of the Ouachita hills at the edge of North Little Rock. It then continues north into southeastern Missouri and south into Louisiana without any natural

Journal of the Arkansas Academy of Science, Vol. 32 [1978], Art. 19

break. Crowley's Ridge runs for a distance of 200 miles from southeastern Missouri down to the Mississippi River at Helena, Arkansas. Accounts of the geology of Crowley's Ridge are given by Call (1891), and Magill (1958) summarizes the various theories concerning the origin of the ridge. Another important topographical feature in northeastern Arkansas is the "sunken lands" of the St. Francis River area, Big Lake and Wapanocca. These areas had their origin with the New Madrid Earthquake of 1811-1812 (Magill, 1958). The area censused by automobile included all counties of the delta and Crowley's Ridge to the foothills of the Ozarks and as far south and west as West Memphis, Brinkley and Little Rock (Fig. 1).

RESULTS AND DISCUSSION

Lowland deciduous woods in northeastern Arkansas have been destroyed at a rapid rate by slash clearance. These once swampy areas are now planted in cotton, soybeans, wheat and rice. Destruction of swampy woods has decreased wildlife habitat over vast areas of northeastern Arkansas delta so that many species of raptors are forced into poor cover along roadsides. However, much of their food comes from dead animals that have been killed by automobiles.

Seasonal Trends in Hawk Populations:

During the roadside survey 20,174 miles were driven, and a total of 1819 raptors were observed (Table 1). During these surveys the number of miles driven differed each month so the total number of hawks seen per month is a meaningless figure. All numbers given in tables and figures are expressed as numbers of hawks per 100 miles of travel.

Ten species were recorded with the Red-tailed Hawk being most abundant followed by the American Kestrel and the Marsh Hawk. Turkey Vultures were rare in the delta area and were recorded mainly from Crowley's Ridge and areas near the edge of the Ozarks near Batesville and Pocohontas. Because of the small acreage of wooded area, Red-shouldered Hawks, Cooper's Hawks and Sharp-shinned Hawks were rarely recorded. Broad-winged Hawks *(Buteo platypterus)* do not winter here but do migrate through during the spring and fall; however, they usually fly high and are seldom observed during roadside censuses. Rough-legged Hawks *(Buteo lagopus)* are extremely rare in northeastern Arkansas and have only been recorded during the past few years.

Red-tailed Hawks of northeastern Arkansas belong to three subspecies and show much variation in color pattern. The sub-species are *Buteo jamaicensis borealis, B. j. kriderii* and *B. j. harlani* with *B. j. borealis* by far the most abundant form (Fig. 2). Only *B. j. borealis* spends the entire fall and winter season from September until April in this area. Krider's Red-tailed Hawk *(B. j. kriderii)* does not arrive until October and leaves in March while *B. j. harlani* and melanistic *B. j. borealis* have not been recorded before November, and they too leave in March (Fig. 2).

The Bald Eagle *(Haliaeetus leucocephalus)*, the Golden Eagle *(Aquila chrysaetos)* and the Osprey *(Pandion halioetus)* have all been observed in northeastern Arkansas although the Golden Eagle occurs only rarely. However, the Bald Eagle and the Osprey often frequent Big Lake, Wapanocca and Claypool's Reservoir near Weiner and other large bodies of water and rivers during late fall, winter and spring. The Bald Eagle was observed once during a spring roadside survey near Corning, Arkansas (Table 1).

The Red-shouldered Hawk is an uncommon permanent resident which nests on Crowley's Ridge and also in wooded areas near Corning in Randolph and Clay Counties. Cooper's Hawks probably nest at Wapanocca and other sufficiently wooded areas of the delta as well as in the Ozarks. Only five records exist for the Sharp-shinned Hawk from the northeastern delta region and Crowley's Ridge. Four of these were in the fall or winter and one was in the spring from Greene County on Crowley's Ridge. The Merlin *(Falco columbarius)* is also

Table 1. Seasonal hawk populations in northeastern Arkansas (1974-1977).

Month	Miles traveled	Total hawks per 100 mi.	Turkey Vulture	Cooper's Hawk	Red-tailed Hawk	Red-shouldered Hawk	Broad-winged Hawk	Rough-legged Hawk	Marsh Hawk	American Kestrel	Bald Eagle	Merlin
			Hawks per 100 miles									
Sept.	1913	1.20	-	-	0.57	-	0.05	-	-	0.57	-	0.10
Oct.	1509	5.43	-	0.07	3.24	-	-	-	0.07	2.05	-	0.15
Nov.	1963	15.91	0.10	0.15	10.53	-	-	-	1.19	3.87	-	-
Dec.	2142	20.68	-	-	6.30	-	-	0.42	2.19	11.76	-	-
Jan.	3877	7.69	-	0.05	3.56	0.05	-	0.02	0.85	3.02	-	-
Feb.	2519	17.31	0.20	-	8.65	0.03	-	0.15	1.59	6.47	-	-
Mar.	3027	5.72	0.17	-	3.20	-	-	0.03	0.39	1.92	-	-
Apr.	3224	1.99	0.34	-	0.37	0.03	0.03	-	-	1.18	0.03	-
Total	20,174	1819*	22	6	864	4	2	15	156	745	1	4

*Values in this line represent total hawks seen during study period. not total hawks per 100 miles of highway travel.

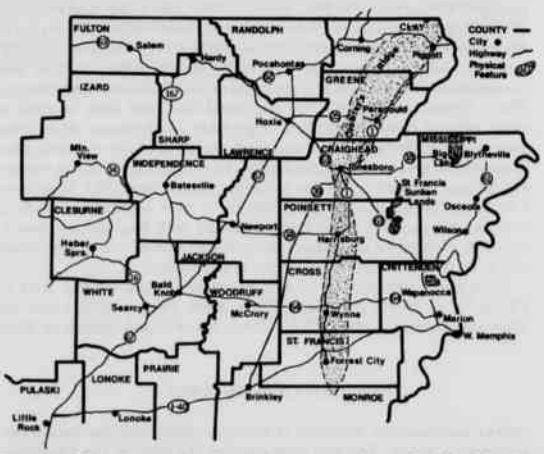


Figure 1. Map of counties of northeastern Arkansas included in the census area. Only the major highways are illustrated.

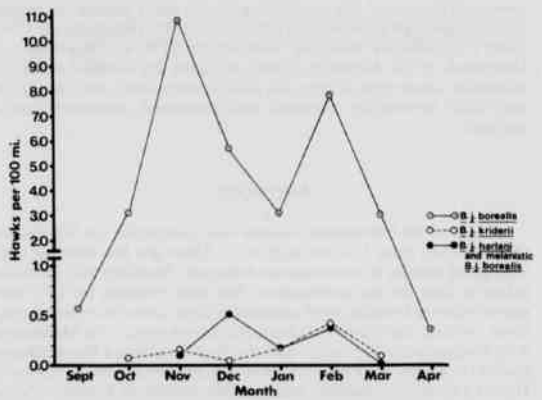


Figure 2. Seasonal occurrence of *Buteo jamaicensis borealis, B. j. harlani* and *B. j. kriderii* in northeastern Arkansas. The data on *B. j. harlani* probably also includes data on immature *B. j. borealis* which are indistinguishable from the *harlani* morph in the field.

extremely rare in northeastern Arkansas. Few have been observed during the past 15 years although two were seen during Christmas bird counts (Table 2), and nine were recorded during the roadside surveys.

The Mississippi Kite, a summer resident along the Mississippi River in northeastern Arkansas, has been found nesting in the tall cottonwoods *(Populus deltoides)* along the highway in Wilson, Arkansas, during recent breeding bird censuses. This species is also common near Luxora, Arkansas, and has been observed in May for the past two years at Wapanocca where it probably nests.

Hawks begin to appear in mid-September and reach their highest numbers in December (Fig. 3). The numbers then drop in January apparently because the hawks migrate further south in response to the colder weather around the first of the year. Populations reach a second peak in February and then decline through April (Fig. 3). Red-tailed Hawks, American Kestrels and Marsh Hawks comprise the bulk of the raptors during the winter season (Fig. 4). The Red-tailed Hawk peaks in November and declines through January, while the American Kestrel and the Marsh Hawk peak in December and also drop in January. All three species reach a second peak in February. The Marsh Hawk migrates out of the region in March, followed by the Red-tailed Hawk in April and the American Kestrel by 1 May, after which only a few permanent residents remain. The latest seasonal record of the Marsh Hawk in northeastern Arkansas that the senior author has is 16 April 1976 near Corning in Clay County. As previously stated though, most are gone by the end of March. Red-tailed Hawks do nest in this region but so sparingly that they are not usually seen from the roadside.

Long Term Trends in Hawk Populations:

Although environmentalists have been highly critical of habitat destruction and insecticide pollution, Christmas bird count records for 1967 through 1976 do not show any general decline in hawk populations (Table 2) as determined by a single sample runs test (Seigel, 1956). Population fluctuations of the three most abundant species, Red-tailed Hawk, American Kestrel and Marsh Hawk, however, do show significant yearly differences ($X^2=62.41$, $df=2$, $p<.001$) (Fig. 5). A review of the literature on relative abundance of hawk species in the late 1880's and early 1900's (Pindar, 1924, and Hollister, 1902) shows little or no change compared to today's listings. Although Pindar's surveys were made in 1888-1889 they were not published until 1924.

A comparison of Figures 4 and 5 reveals an apparent discrepancy in the values for Marsh Hawk and American Kestrel. Roadside surveys show the American Kestrel to be the second most abundant hawk species while the Christmas bird count data show the Marsh Hawk to be second in abundance. The Christmas bird count values probably more closely represent the true values for the Marsh Hawk. During a Christmas bird count there are usually at least two people in the party, one to drive and at least one to observe, so the more elusive Marsh Hawk is likely to be seen flying low over the fields. Also, many are probably flushed by observers on foot whereas a single person driving down the highway is likely to miss this low flying species particularly since Marsh Hawks do not usually perch on elevated objects.

Red-tailed Hawks are not evenly distributed in northeastern Arkansas but seem to follow rice production. The highest numbers are

Table 2. Ten year summary of annual Christmas Bird Counts for Jonesboro, Arkansas.

Hawk species	Year '67	'68	'69	'70	'71	'72	'73	'74	'75	'76	Total per species
Cooper's Hawk	0	0	0	0	3	1	0	0	0	0	4
Sharp-shinned Hawk	0	0	0	0	0	0	0	0	1	0	1
Red-tailed Hawk	64	20	24	16	32	26	19	47	31	38	317
Red-shouldered Hawk	1	2	1	0	0	0	0	0	1	2	7
Rough-legged Hawk	0	0	0	0	0	0	0	0	1	0	1
Marsh Hawk	67	18	31	13	15	23	18	12	24	13	324
Merlin	1	0	0	0	1	0	0	0	0	0	2
American Kestrel	11	13	12	20	18	17	9	20	16	22	158
Total per year	144	53	68	49	69	67	46	79	72	75	724

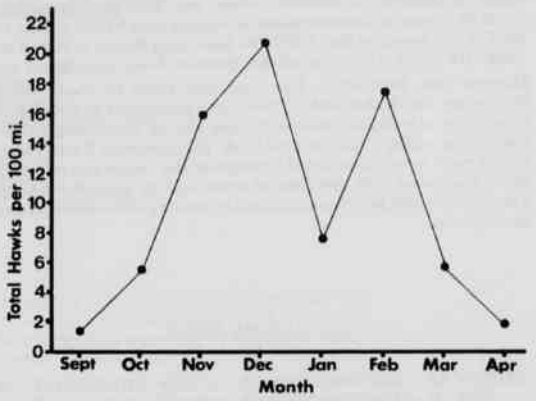


Figure 3. Total seasonal raptor population numbers for the winter season (September through April). Values indicated are number of hawks per 100 miles of highway travel.)

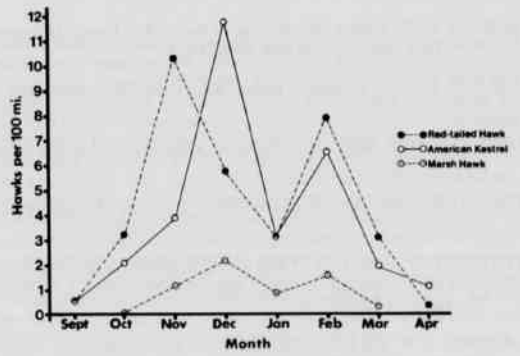


Figure 4. Seasonal population trends for the Red-tailed Hawk, American Kestrel and Marsh Hawk. (Values indicated are numbers of hawks per 100 miles of highway travel.)

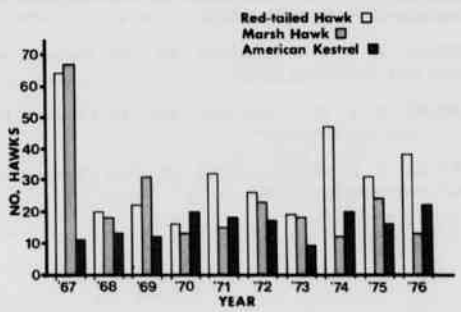


Figure 5. Winter hawk population trends based on Jonesboro Christmas Bird Count records for 1967 through 1976. Only the three most abundant species, the Red-tailed Hawk, Marsh Hawk and American Kestrel, are shown.

found on Highway 39 between Gibson and Brinkley. This pattern could be related to concentrations of rodents used by the species for food as was found by Bart (1977) for Red-tailed Hawks in New York State. He found a high correlation between hawk populations and *Microtus* spp. abundance. The same may apply to Marsh Hawk distribution which also tends to follow rice production in this region. In addition to rodents, this species may also be responding to bird populations which it also uses for food. The American Kestrel however is more evenly distributed throughout this region and is usually found associated with any type of open field or agricultural crop. These distribution patterns are indeed interesting and deserve further investigation.

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