

WORM-EATING WARBLER — Eight at NBSF, May 28 (JB, PB).

SWANSON'S WARBLER — Two on opposite sides of Kentucky 444, Calloway County (MMI, CP); heard two and saw one, same location, May 24 (MMI); and one again at same location May 28 (several observers); one at Red River Gorge, Powell County, May 28 (JB, PB).

CONNECTICUT WARBLER — One (female) at LCWMA, May 8 (JEI).

YELLOW-BREASTED CHAT — First observation in Hopkins County, April 20 (JH); at least nine in Cumberland County, May 30 (SS).

SUMMER Tanager — A pair at BPS, April 10-May 31 (KC); five in Cumberland County, May 30 (SS); and several sightings at Mad during May (JH).

SCARLET Tanager — One to two birds reported in six counties: Breckinridge, Daviess, Edmonson, Hopkins, Jefferson, and Trigg, while five were seen in Cumberland County.

ROSE-BREASTED GROSEBEAK — Maximum counts at the following locations included: 10 at BCNP, eight at NBSF, and five at BPS, while one was at Mad.

BLUE GROSEBEAK — Two at HWMA, May 12 (KC, HC); and a few in the Danville area (FL, WK).

INDIGO BUNTING — First arrival was at Mad, April 12 (JH); highest count was 37 or more in Cumberland County, May 30 (SS).

DISCUSSE — Frederick Loetscher reported a "good year" for this species in the Danville area (Boyle and southern Mercer counties); five in east Jefferson County, May 8 (JB, PB); give in Hopkins County (two locations), May 5 (JH); one near Pet, May 7 (LMC); and 10-12 in Ohio County, May 12 (KC, HC).

LARK SPARROW — One or a pair at two pastures (about a mile apart) in western Mercer County, April 16 and on a few subsequent dates (FL, WK).

HENSLOW SPARROW — Two along Cemetery Road, Ohio County, May 12 (HC, KC).

WHITE-THROATED SPARROW — Highest count was 40 at Mad, April 21 (JH); one still present at LCWMA, May 28 (JEI).

BOBOLINK — A count of 100+ in northern Gallatin County, May 6 was noteworthy (LMC); 26 in eastern Jefferson County, May 8 (JB, PB); 17 near Dewey Lake, Warren County, May 10 (WM); and found at six or eight meadows in Boyle County (FL, WK).

ORCHARD/NORTHERN ORIOLES — Arrival date for both species was April 20 (AP, MP); numbers low for both.

PURPLE FINCH — Fifteen at MCNP, April 16 (JB, PB); five to six still at BPS, April 30 (KC *et al.*).

PINE SISKIN — Eight at BUMSIDE, Pulaski County, April 20 (Linda McClendon *vide JEL*); three at BPS, April 23 (KC); 15 at feeder on Garland Road, Pulaski County, April 25 (JEI); and one at Mad, May 3 (JH).

EVENING GROSEBEAK — Two (male and female) at BPS, April 22-23 (KC, HC); two at Garland Road, Pulaski County, April 25 (JEI); flock of 12 to 18 at Green Valley Acres, Rowan County, March 1-30 and last observed (one female) there, April 9 (FB).

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DENSITY AND HABITAT USE OF HAWKS WINTERING AT THE BLUEGRASS REGION OF KENTUCKY

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Introduction — The fields and pastures of Kentucky's Bluegrass region potentially provide substantial habitat for hawks that winter in open landscapes. However, few studies have focused on the wintering ecology of hawks in central Kentucky. Sferra (1984a) estimated hawk densities along roadsides in 4 physiographic regions of Madison County and investigated patterns of habitat use in American Kestrels and Red-tailed Hawks (Sferra 1984b). Both species used pasturelands and old fields to a greater extent than was represented in the landscape. Because Sferra (1984b) surveyed across broad habitat gradients, I undertook a study to determine the specific use of field habitats by hawks wintering in a single physiographic region, the Bluegrass.

Study Area and Methods — To measure the abundance and habitat use of wintering hawks, I established a 17.9 km (11.1 mile) roadside survey route in western Clark County, Kentucky. The starting point of the route was located 10.5 km (6.5 miles) west of Winchester adjacent to the border with Fayette County. Agricultural fields

and pastures, common to the Bluegrass, dominated the landscape along the route. After an initial reconnaissance, I delineated 7 habitat types that were indicative of habitats along the route: 1) residential — buildings and mown yards, 2) Long stems — grazed, grass stems ≥ 15 cm (6 inches), 3) short stems — grazed, grass stems <15 cm, 4) overgrown — perennials, stems >50 cm (19.7 inches), 5) bare soil, 6) cropped — stubble in rows, and 7) woodlots. To determine the distribution of habitat types along the survey route, I quantified the habitat on each side of the survey route at 0.32 km (0.2 mile) intervals ($n = 110$ points).

I conducted hawk surveys at weekly intervals from 5 November 1985 to 21 March 1986. A single, constant observer, travelling 16-24 km/hour (10-15mph), counted all hawks observed within 0.40 km (0.25 miles) of either side of the road. Surveys began 1.5 hours prior to sunset and were completed by sunset. Surveys were only conducted when visibility was good and wind speed was <24 km/hour. I recorded the species, sex (Kestrels, Harriers), age (*Accipiters*, Red-tails, Harriers), color morph (Rough-legs), and behavior (perched or flying) of each individual encountered. The perch sites of perching birds were recorded as woodlot edge, fence-row, single tree, telephone wire or pole, fence-post, ground, or hay bale. The immediate habitat where each hawk occurred was also noted; the hunting behavior of hawks was sometimes used to assign habitat types. For example, the habitat assigned to a hawk perched on a woodlot edge but scanning the adjacent field was the field type.

Composition of the wintering hawk assemblage was determined by calculating the percentage of total observations for each species and calculating the average density (based on a width of 0.8 km) across the season. The percentage of observations, for each species, occurring in each habitat type was calculated for each weekly survey. Percentages were averaged across the entire season to determine a mean relative use of the habitat type. I used normal variance estimates to compare the use of habitats, within common species, to their availability (one-sample *Z*-test with Bonferroni adjustment for multiple tests). Analytical treatment was restricted to the most abundant species and habitats that had $>1\%$ of the observations. Perch site selection by common species was examined by calculating the percentage of observations in each perch site category. Lastly, phenology was determined by plotting the average number of hawks, by 2 week periods, across the period of study.

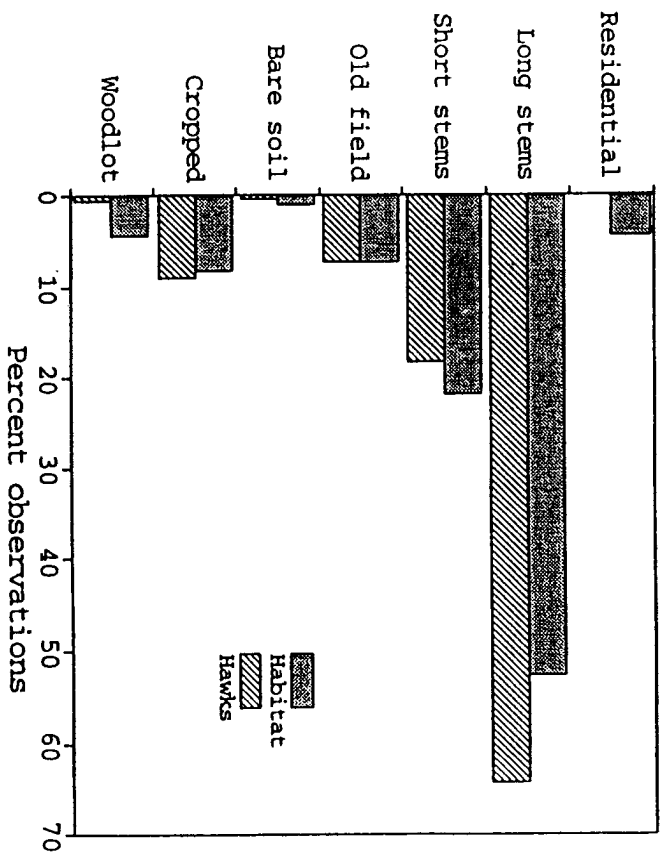
Results and Discussion — From 5 November 1985 to 21 March 1986, I conducted 19 weekly surveys on which I recorded 369 hawks of 5 species or species groups: 3 species (Red-tailed Hawk, American Kestrel, and Rough-legged Hawk) constituted 97% of the observations (Table 1). Mean density of all species along the roadside route was 1.35 ± 0.09 (± 1 SE) hawks/km² (3.50 hawks/mile²). The age ratio of Red-tailed Hawks was skewed toward adults (2.5 adults: 1 sub-adult). Male and female American Kestrels were present in equal proportions (1.1 males: 1 female). The majority of Rough-legged Hawks were light morphs (2.8 light: 1 dark).

Overall, hawk species (combined) used available habitats in proportion to their distribution in the landscape (Figure 1). However, individual species differed in their habitat use patterns. Whereas Red-tailed Hawks were distributed evenly among habitat types, American Kestrels and Rough-legged Hawks used grazed fields with long

Table 1. Relative abundance and mean density (± 1 standard error [SE] of the mean) of hawks wintering in Clark County, Kentucky, 1985-1986.

| Species | Percent of all observations | Density (birds/mile ²) | |
|-----------------------|-----------------------------|------------------------------------|------|
| | | X | SE |
| Red-tailed Hawk | 46.1 | 1.61 | 0.10 |
| American Kestrel | 33.6 | 1.17 | 0.11 |
| Rough-legged Hawk | 17.3 | 0.61 | 0.11 |
| <i>Accipiter</i> spp. | 1.6 | 0.06 | 0.02 |
| Northern Harrier | 1.4 | 0.05 | 0.02 |
| All species | $\bar{n} = 369$ | 3.50 | 0.23 |

Figure 1. Percent habitat and percent observations of all hawk species in habitats made along a roadside route in Clark County, Kentucky, winter 1985-1996.



grass stems to a greater proportion than their availability (Table 2). American Kestrels were adverse to using cropped fields and Rough-legged Hawks to using overgrown fields. Although hawk species overlapped in their use of field habitats, their choice of perches varied (Table 3). Most American Kestrels perched on telephone wires or poles (73%), whereas Rough-legged Hawks favored single trees (81%). Red-tailed Hawks perched along fence rows and in single trees in equal proportions ($\approx 43\%$).

Although relatively stable numbers of hawks were present in the study area from mid-December to late-February, patterns of temporal abundance varied among species (Figure 2). American Kestrels were present in relatively constant numbers throughout the period. One-half of the resident Red-tailed Hawks departed by early-March. However, a pulse of migrants appeared in late-March (Figure 2). Rough-legged Hawks were not present until mid-November and departed by mid-February; no Rough-legs were found on 21 March (Figure 2). Seasonal changes in hawk abundance follow patterns reported in Monroe *et al.* (1988) and Sferra (1984a).

Roadside hawk densities for all species in this study exceed those found by Sferra (1984a) in Madison County, Kentucky. Densities were also higher than those on Bluegrass Christmas Bird Counts in 1984 (means/mile², red-tail = 0.2, rough-leg = 0.01, kestrel = 0.2). Because Sferra (1984a), and Christmas Bird Counts, surveyed across physiographic boundaries and included a broad array of habitat types, densities from this study should be interpreted as densities attainable in prime habitat for open-country hawks in the Bluegrass region of Kentucky. But why these high densities in Clark County? Qualitatively, I suspect that the habitat along the survey route differed from that in surrounding areas. Although Sferra (1984b) found similar high use of grazed pastures, mown hayfields, and old fields by American Kestrels and Red-tailed Hawks, densities were much lower than those in Clark County. Pastures, most likely, differed in their structural composition. The abundance of pastures comprised of grass stems that were > 15 cm probably attracted wintering hawks into western Clark County. Bart (1977) found that high grass cover was positively correlated with meadow vole (*Microtus pennsylvanicus*) density. Moderately grazed fields could provide good habitat for voles that, in turn, provide good wintering habitat for hawks. Variability among hawk species in their selection of perch sites might minimize negative interactions and allow species to partition available resources. Partitioning of shared hunting habitat by differential perch site selection has been reported in several other studies. Hawks and eagles wintering on the short-grass prairie of Colorado selected different perch sites (Marion and Ryder 1975) as did red-tails and rough-legs in Illinois (Schnell 1968). Unlike other species, American Kestrels favored utility wire perches in Utah (Fischer *et al.* 1984). Ample perch sites of various types and high quality habitat appears to have lead to a high density of hawks wintering in the Bluegrass region of Clark County.

Table 2. Mean percent hawk use [P(T)] and percent area [P(A)] of field habitats in Clark County, Kentucky, 1985-1986.

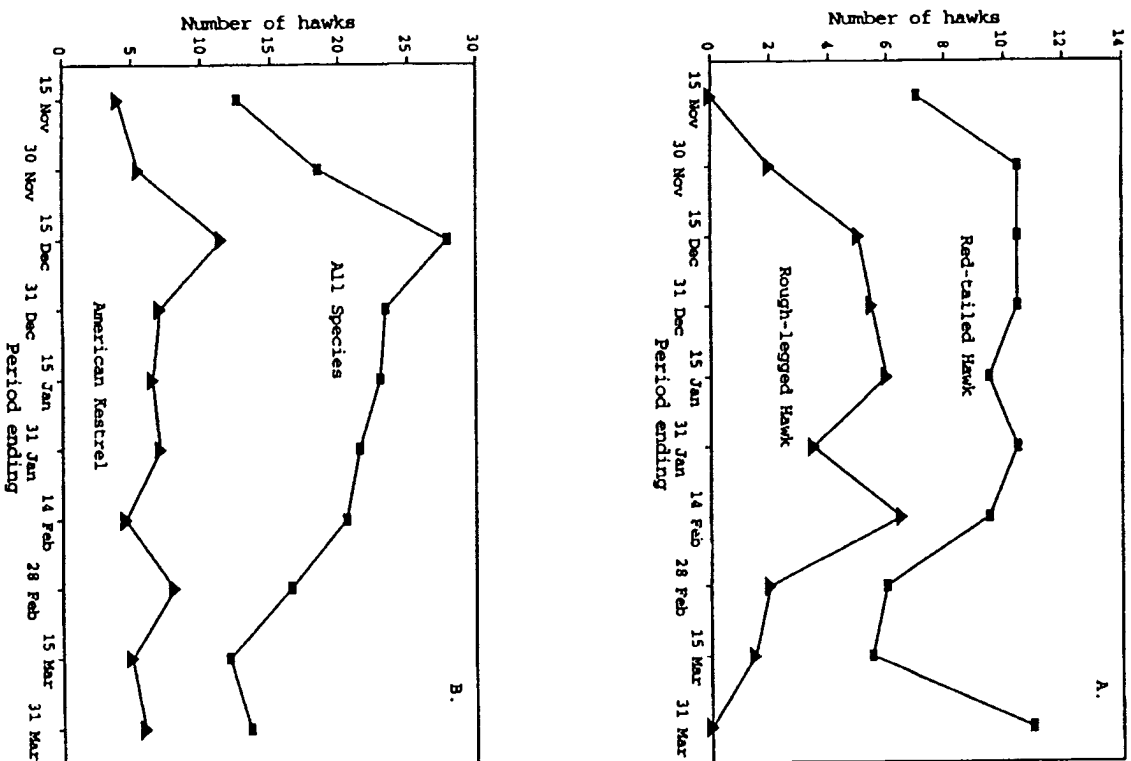
| Field habitats | Red-tailed Hawk | | | American Kestrel | | | Rough-legged Hawk | | | |
|-----------------------|-----------------|------|-----------|------------------|------|-----------|-------------------|------|-----------|-----------|
| | P(A) | P(T) | P(T)-P(A) | <u>P*</u> | P(T) | P(T)-P(A) | <u>P*</u> | P(T) | P(T)-P(A) | <u>P*</u> |
| Cropped | 9.1 | 9.9 | 0.8 | >>0.1 | 3.0 | -6.1 | ≤0.001 | 6.7 | -2.4 | >>0.1 |
| Overgrown, perennials | 8.1 | 10.5 | 2.4 | >>0.1 | 8.9 | 0.8 | >>0.1 | 1.0 | -7.1 | ≤0.001 |
| Grazed, short stems | 24.2 | 21.0 | -3.2 | >>0.1 | 15.0 | -9.2 | ≤0.05 | 13.7 | -10.5 | ≤0.05 |
| Grazed, long stems | 58.6 | 58.5 | -0.1 | >>0.1 | 73.1 | 14.5 | ≤0.001 | 79.6 | 21.0 | ≤0.005 |

*P — values computed by large sample approximation of the binomial test. Differences within species were significant if $P \leq 0.01$.

Table 3. Selection of perch sites by hawks wintering in Clark County, Kentucky, 1985-1986.

| Species | Percent observations in or on: | | | | |
|--------------------------------------|--------------------------------|------------|--------------|-----------------------|-------------|
| | woodlot edges | fence-rows | single trees | telephone wires/poles | other types |
| Red-tailed Hawk ($\bar{n} = 114$) | 7.9 | 42.1 | 43.0 | 2.6 | 4.4 |
| American Kestrel ($\bar{n} = 81$) | 0.0 | 11.1 | 12.3 | 72.8 | 3.7 |
| Rough-legged Hawk ($\bar{n} = 47$) | 0.0 | 14.9 | 80.9 | 2.1 | 2.1 |

Figure 2. Abundance of Red-tailed and Rough-legged Hawks (A) and American Kestrels and all species combined (B) by 2-week periods in Clark County, Kentucky, 1985-1986.



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