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## NON-GAME BIRD POPULATIONS ON AREAS MANAGED FOR WILDLIFE AND AGRICULTURAL CROPS<sup>1</sup>

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**ABSTRACT.** Non-game bird diversity and abundance on Resthaven Wildlife Area, Erie County, Ohio, managed by the Ohio Division of Wildlife, were compared with those on a nearby agricultural area (Erlin), Sandusky County, Ohio, during June 1974. Of non-game birds, 67 species were recorded at Resthaven and 53 species at Erlin. Mean number of species per census route was 52 at Resthaven and 41 at Erlin. Twenty-two species were significantly more abundant at Resthaven and 8 were significantly more abundant at Erlin. Plant diversity indices for Resthaven and Erlin were 18.32 and 8.65, respectively. Habitat quality was responsible for greater diversity and abundance of birds at Resthaven, which contained nearly twice as much edge between dissimilar habitats as Erlin.

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### INTRODUCTION

Strong public demand has surfaced in the past decade for intensive management programs directed at non-game species (Crawford 1976, Scheffer 1976). Non-game birds, in particular, are an increasingly important recreational resource, with bird watching rivaling hunting in economic importance and numbers of participants (DeGraaf and Payne 1975). Responsibility for managing non-game populations has been recognized by wildlife professionals, and most state wildlife departments have at least one person working in this area (Crawford 1976, Grieb and

Graul 1975). Despite this interest in non-game management, most effort by wildlife agencies is still directed toward game species, primarily because funds for non-game management have been difficult or impossible to generate. Hence, the wildlife manager faces a realized responsibility with minimal means of resolution. A common assertion by managers has been that management for game species also benefits non-game species (Wildlife Management Institute 1975). Data supporting this assertion, however, are lacking in the scientific literature. The objectives of this study were to compare non-game bird diversity and abundance on the Resthaven Wildlife Area and on a nearby agricultural area (Erlin), and to correlate bird population data with land use and habitat parameters.

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### STUDY SITES

Resthaven Wildlife Area is in the lake plains region of Erie County near Castalia, Ohio, and is managed by the Ohio Division of Wildlife. Topography is flat and soils consist uniformly of black, poorly drained organic materials and marl (Hurst 1971). Cover is diverse consisting of cropland interspersed among areas of permanent grasses, low shrubs, woodlots, and ponds (fig. 1).

The area is managed for cottontail rabbit (*Sylvilagus floridanus*), bobwhite quail (*Colinus virginianus*) and American woodcock (*Philohela minor*). Controlled burning and mowing are used to regulate plant succession and to maintain a high degree of interspersion.

The agricultural study area (Erlin) is in the lake plains region of Sandusky County near Erlin, Ohio, and was randomly chosen from farmland considered typical of north-central Ohio. A comparison of the Erlin area with all of Sandusky County for percentage of area in each major cover type indicated the Erlin area did represent typical northcentral Ohio farmland ( $X^2$ ,  $P > 0.05$ ). Topography of the Erlin area is flat with a general slope toward Lake Erie. Soils consist of calcareous lacustrine materials, and vary from 12 m to 17 m in depth (Hough 1963). The Erlin area is intensively used for growing corn and soybeans (fig. 1). In recent years, fencerows, woodlots, and odd areas have been removed, with an increase in field size and more uniform field shape (U. S. Dept. Agri. 1971).

### METHODS

Both study areas were sampled between 11 June and 29 June 1974, using a roadside census (Robbins and VanVelzen 1966). Starting points for routes in both areas were randomly chosen, and routes consisted of 20 stops, 0.64 km apart. Routes were started at sunrise and run alternately for each study area on consecutive days until both routes had been covered 6 times. Routes were not run on days with rain, fog, or wind speeds over 19 km/h. Each stop lasted 5 min. Species and numbers of all birds seen within 0.32 km and all birds heard, regardless of distance, were recorded. Type of habitat used was identified

for all non-flying birds seen within 0.32 km of a stop.

Most of the roads in the Resthaven route were on gravel-surfaced wildlife area roads, whereas the Erlin route was on township roads surfaced with asphalt. The Resthaven route started south on a wildlife area road about 0.7 km west of the intersection of U. S. 6 and S. R. 269. Stops 1, 2 and 3 were on this road. The route turned east, and this section contained stops 4, 5 and 6. The route then occupied S. R. 269 for stop 7, wherein it turned west on Heywood Road (T-24) for stops 8, 9 and 10. Using an internal wildlife area road before Northwest 314 Road the route went south for point 11. Oxbo Road (T-34) was taken east for stops 12, 13, 14 and 15 to S. R. 269. The route went south on S. R. 269 to the edge of Castalia just beyond the N&W Railroad tracks, where it turned west onto a wildlife area road running west and parallel to the railroad. Stops 16, 17 and 18 were on the railroad track road. Stop 19 was on a wildlife area road heading south toward S. R. 101. The route continued on Vickery Road (T-33) and then north on Northwest 314 Road; the latter held stop 20.

The Erlin route started south on T-244, which is located east of Erlin off S. R. 412, about 0.2 km east of Raccoon Creek but before S. R. 510. T-244 contained stops 1 and 2. The route then followed T-233 west for stops 3 and 4; T-232 south for stops 5 and 6; T-231 east for stops 7 and 8; T-244 south for stops 9 and 10; T-229 west for stops 11, 12 and 13; T-232 south for stops 14 and 15; T-223 east for stops 16, 17, 18 and 19; and T-246 south for the last stop.

Data were analyzed using area as treatment and individual trips of a census route as replications. A nested one-way analysis of variance was employed to examine bird abundance, with number within species summed by trip and nested in area. Diversity was evaluated using mean number of species per census route in each area; means were compared via

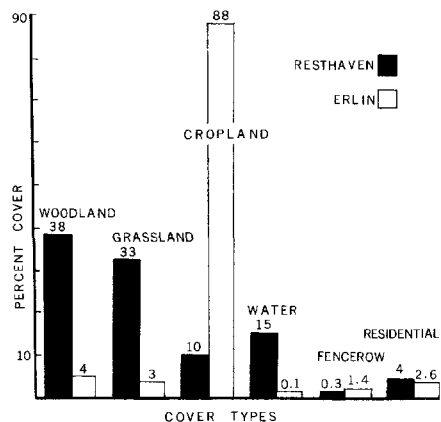


FIGURE 1. Percentages of cover types within Resthaven (968 ha) and Erlin (1229 ha).

Student's t-test. An alpha level of  $P \leq 0.05$  was considered significant for all statistical tests.

Study areas were cover mapped (Cannon et al. 1969) using aerial photographs and field observations. Cover types at Resthaven were bottomland woods, grassland, cropland, water, fencerows and residential (fig. 1). Cover types within the Erlin study area were upland woods, water, cropland, pasture, fencerow, and residential. Area of each cover type, amount of edge, and diversity indices (Patton 1975) were determined from the cover maps. The diversity index is reported in the form  $18.32 (7) 968$  ha: 18.32 shows the increase of periphery over a similar area in circular configuration; 7 indicates number of distinct habitat types; and 968 ha shows total area measured. The diversity index was conceived to measure edge, the peripheral contact of different habitats.

## RESULTS

**BIRD DIVERSITY AND ABUNDANCE.** Sixty-seven species of non-game birds were recorded at Resthaven, and 53 species were recorded at Erlin. Mean number of species

per census route was 52 at Resthaven and 41 at Erlin; this difference was significant.

Significant differences in numbers between study areas were found for 30 species. Twenty-two species were significantly more abundant at Resthaven (table 1), and 8 were significantly more abundant at Erlin (table 2). Of those species significantly more abundant at Resthaven, 17 were seen most often in woodlands, and 5 were seen most often in grasslands. All species significantly more abundant at Erlin, except the house sparrow (*Passer domesticus*), were seen most frequently in croplands. The house sparrow was seen most frequently around barns, houses, and other buildings in residential areas.

**VEGETATIVE STRUCTURE AND DISTRIBUTION.** Composition of woodlands on the 2 areas was decidedly different. Woodlands at Resthaven consisted mainly of bottom-

TABLE 1  
Birds significantly ( $P \leq 0.05$ ) more abundant at Resthaven than at Erlin.

Species	Mean no. per route		Species	Mean no. per route	
	Resthaven	Erlin		Resthaven	Erlin
<i>Woodland:</i>					
Great blue heron ( <i>Ardea herodias</i> )	1.5	0.3	Yellow-throated vireo ( <i>Vireo flavifrons</i> )	1.1	0.0
Green heron ( <i>Butorides virescens</i> )	2.3	0.0	Red-eyed vireo ( <i>Vireo olivaceus</i> )	5.1	0.5
Yellow-billed cuckoo ( <i>Coccyzus americanus</i> )	6.0	0.2	Warbling vireo ( <i>Vireo gilvus</i> )	8.8	0.0
Common flicker ( <i>Colaptes auratus</i> )	8.3	1.5	Common yellowthroat ( <i>Geothlypis trichas</i> )	13.0	3.6
Downy woodpecker ( <i>Dendrocopos pubescens</i> )	6.0	0.2	Northern oriole ( <i>Icterus galbula</i> )	20.0	1.6
Eastern kingbird ( <i>Tyrannus tyrannus</i> )	1.6	0.5	Rufous-sided towhee ( <i>Pipilo erythrophthalmus</i> )	8.0	0.2
<i>Grassland:</i>					
Eastern pewee ( <i>Contopus virens</i> )	9.3	0.2	Yellow warbler ( <i>Dendroica petechia</i> )	15.6	0.8
Tree swallow ( <i>Iridoprocne bicolor</i> )	26.3	12.3	Yellow-breasted chat ( <i>Icteria virens</i> )	7.0	0.0
House wren ( <i>Troglodytes aedon</i> )	16.3	1.5	Indigo bunting ( <i>Passerina cyanea</i> )	44.3	7.1
Gray catbird ( <i>Dumetella carolinensis</i> )	4.0	1.5	Field sparrow ( <i>Spizella pusilla</i> )	11.6	5.0
Cedar waxwing ( <i>Bombycilla cedrorum</i> )	17.0	0.0	American goldfinch ( <i>Spinus tristis</i> )	46.6	21.8

TABLE 2  
Birds significantly ( $P \leq 0.05$ ) more abundant  
at Erlin than at Resthaven.

Species	Mean no. per route	
	Resthaven	Erlin
<i>Cropland:</i>		
Killdeer ( <i>Charadrius vociferus</i> )	2.1	13.5
Horned lark ( <i>Eremophila alpestris</i> )	0.0	23.5
Eastern meadowlark ( <i>Sturnella magna</i> )	0.8	16.1
Red-winged blackbird ( <i>Agelaius phoeniceus</i> )	19.8	95.1
Common grackle ( <i>Quiscalus quiscula</i> )	61.8	166.5
Savannah sparrow ( <i>Passerculus sandwichensis</i> )	0.2	4.3
Vesper sparrow ( <i>Poocetes gramineus</i> )	0.0	10.5
<i>Residential:</i>		
House sparrow ( <i>Passer domesticus</i> )	39.0	189.9

land hardwoods dominated by cottonwood (*Populus deltoides*). Woodlots on the Erlin area consisted mainly of upland hardwoods dominated by oaks (*Quercus* spp.) and shag-bark hickory (*Carya ovata*).

Grassland on the Erlin area was rare and was represented by pastures. Resthaven contained about 9 times greater percentages of both woodland and grassland, and more than 100 times greater percentages of water than Erlin (fig. 1). Erlin had 9 times more cropland than Resthaven. Amount of fencerow and residential land was similar in the 2 study areas.

Resthaven contained nearly twice as much edge as Erlin (table 3). At Resthaven, 75% of edge was composed of woodland/water and woodland/grassland. At Erlin, 55% of edge was composed of cropland/cropland and cropland/road.

Diversity indices (Patton 1975) for Resthaven and Erlin were 18.32 (7) 968 ha and 8.65 (7) 1229 ha, respectively. Community diversity was not measured accurately due to our methods of cover mapping.

## DISCUSSION

More species of birds were attracted to Resthaven; 22 species were more abundant there than at Erlin. Reasons for these findings include the variety, amount, and quality of edge and habitat.

TABLE 3  
Edge within Resthaven and Erlin (in meters).

Habitats Forming Edge	Road	Woodland	Grassland	Cropland
Woodland	12,558*			
	762**			
Grassland	17,922	21,153		
	0	1,219		
Cropland	1,768	4,816	3,658	0
	31,821	10,973	3,200	27,036
Water	2,073	120,274	7,620	0
	0	0	305	122
Fencerow	1,219		1,524	762
	18		2,743	17,496
Residential	3,780	610	1,829	457
	3,901	305	1,219	6,401
Totals =	202,023			
	107,521			

\*Resthaven

\*\*Erlin

A variety of habitat types exhibiting a high degree of interspersions would be expected to provide habitats for many species with diverse requirements. Resthaven had a diversity index more than twice that of Erlin and was even more varied than the index showed. Our methods of cover mapping were not designed to detail small but important interspersions, such as the numerous openings in woodlands and clumps of shrubs in grasslands. Thus, true diversity was higher than calculated for Resthaven, but was accurate for the uniform vegetation on Erlin. No attempt was made to measure vertical diversity of vegetation, but we believe that it too was much greater at Resthaven.

Amount of edge was qualitatively and quantitatively different on the 2 study areas. Resthaven contained nearly twice as much edge as Erlin, and the woodland/grass or woodland/water edges were much more attractive to songbirds than the corn/soybeans or corn/sugarbeets edges. Of the 22 species more abundant at Resthaven, 11 can be considered woodland edge species (Kendeigh 1944, Johnston 1947, Johnston and Odum 1956). Thus, the large amount and kind of woodland edge accounts for greater numbers of these species at Resthaven. Five of the species more abundant at Resthaven prefer grass/shrub habitat (Johnston and Odum 1956, Gates 1976), and grassland at Resthaven had small shrubs and trees scattered throughout. The tremendous amount of cropland and cropland edge at Erlin accounted for most of the species more abundant at Erlin.

Much of the edge at Resthaven was created by mining of marl in the late 1800s. This mining left most of the area in a series of ditches and spoil banks, which reverted to woody vegetation and ditches filled with water. These ditches opened the woods to light and thereby created a shrub edge. Much of the bird abundance and diversity related directly to edge associated with spoil banks. Johnston (1970) also found increased numbers of birds in partial clearings of hardwood forest.

Resthaven may be unique among state wildlife areas because it was mined for marl; however, the tremendous diversity of vegetation found there is typical of most well-managed wildlife areas. Much of this diversity is the direct result of varied and purposeful manipulation of vegetation. Such a variety of ecotypes is unlikely to exist on areas intensively farmed by man.

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