1970 HABITAT RELATIONS STUDY OF THE NESTING BIRDS OF WILLIAM B. UMSTEAD STATE PARK

HARRY E. LeGRAND JR.

The purpose of this research was to study the habitat relations of the nesting birds in an extensive woodland environment. Breeding bird censuses were made on seven carefully selected plots representative of the major habitat types at William B. Umstead State Park. Each census was conducted by visiting the plot at least five times during the summer and directly counting the number of pairs or, more correctly, the number of singing males present.

DESCRIPTION OF STUDY AREA AND CENSUS PLOTS

William B. Umstead State Park is located about 8 miles NW of Raleigh, N. C. Most of the 5,200-acre park is either pinewoods or mixed pine-hardwoods. This is especially true in the drier and higher sections. Along the creeks there are essentially pure hardwoods, but away from the creeks there are few pure hardwood forests. Climax forests (oak-hickory) are rare. Below the dams of the three lakes are bushy areas, and there are a few bushy clearings scattered over the park. Also, a power line bisecting the park offers some nesting habitat for a few open-country birds. Along the park boundaries are a few residential and farming areas. However, Umstead State Park is mainly a solid block of second-growth woodland.

The seven plots I censused were of different-aged forests, except for two lowland hardwood censuses. The youngest stage plot was located just outside the park at the Raleigh-Durham Airport. This plot was a mixed sapling brushland, but a grassy field adjacent to the saplings was censused in connection with them. Since this sapling habitat was restricted to only a few places in the park, I chose this one because of its adequate size. There was a gap in the regular succession stages at the park. There were almost no young pine forests (10 to 30 years) in the park, since the area had been out of cultivation for about 30 to 40 years. The next census was a middle-aged pine forest with an understory of hardwoods. This type of forest was common at Umstead, but usually there were a few large hardwoods present in the canopy. The next census, a predominantly pine forest (some hardwoods in the canopy), was the most typical habitat in the park. Following this plot was one that was approximately evenly-mixed pine-hardwood. The last of the upland forest types, the oak-hickory climax, was so limited in the park that I was unable to census this type. Instead, I censused a mature hardwood ridge overlooking a creek. This forest was similar to the oak-hickory except there was less understory and fewer hickory trees present. The two lowland hardwood forests were located along Crabtree Creek. One census was of a fairly narrow hardwood forest along the creek, but the other was richer and more extensively deciduous away from the creek. Many special habitats, such as a fresh-water marsh and a wet thicket, were not censused because their distribution was very limited at the park, and they were not representative of the area.

RESULTS

The values for each species in Table 1 are the numbers of pairs per 100 acres of habitat (converted from the number of pairs per acres of plot). These values are important because they can be used as a comparison of a species' abundance in the habitats in which it nests. Values of 10 or under on the table are not very significant, since they represent only one or two pairs of birds on a particular plot. A plus sign on the table indicates that a species was recorded in a plot only on one visit. The most

TABLE I. *Distribution of the birds recorded on the breeding bird censuses, expressed in number of pairs per 100 acres of habitat.*

	Brushy Saplings	Pine Forest	Predominantly Pine Forest	Mixed Forest	Upland Hardwood Forest	Creekbank Hardwoods	Lowland Hardwoods
Eastern Meadowlark	46*/0						
Grasshopper Sparrow	46*/11						
Prairie Warbler	52						
Yellow-breasted Chat	37						
Field Sparrow	30						
Bobwhite	15	4.6	6.5			10	
Yellowthroat	15						
Indigo Bunting	15						
Rufous-sided Towhee	15	9	13				
Ruby-throated Hummingbird	7.4	2.3	6.5				20
Brown Thrasher	7.4						
Cardinal	7.4	18	19	14	13	60	40
Bachman's Sparrow	7.4						
Mourning Dove	3.7		6.5				
Eastern Kingbird	3.7						
Carolina Chickadee	3.7	14	19	18		30	10
Carolina Wren	3.7	9	13	9	13	30	20
White-eyed Vireo	3.7						
Blue Grosbeak	3.7						
Red-eyed Vireo		23	33	37	65	60	70
Pine Warbler		23	13	32			
Wood Thrush		18	39	32	39	70	60
Summer Tanager		14	13	23	13	20	20
Solitary Vireo		9					
Ovenbird		9	6.5	14			10
Yellow-shafted Flicker		4.6	6.5	4.6	13	10	10
Red-bellied Woodpecker		4.6		9	13	20	20
Hairy Woodpecker		4.6		4.6	6.5	10	10
Blue Jay		4.6	13	9	6.5		
Brown-headed Nuthatch		4.6	6.5	9			
Hooded Warbler		4.6	13		13	20	30
Scarlet Tanager		4.6	6.5	18	+	20	10
Yellow-billed Cuckoo		+	6.5			20	30
Tufted Titmouse			13	32	6.5	30	20
Common Crow			6.5				
Yellow-throated Warbler			6.5			20	10
Brown-headed Cowbird			6.5	4.6		10	30
Eastern Wood Pewee				14			
Downy Woodpecker				9	6.5	10	10
Great Crested Flycatcher				9	+	10	
Acadian Flycatcher					19	60	50
Blue-gray Gnatcatcher					6.5	30	30
Parula Warbler					6.5	10	20
Kentucky Warbler					6.5	10	20
Screech Owl						10	10
Eastern Phoebe						10	10
Yellow-throated Vireo						10	10
Louisiana Waterthrush						10	10
American Redstart						+	40
Whip-poor-will							10
Acres of plot	26.5	22.0	15.5	22	15.5	10	10
Pairs	65.0	40.5	42.0	66	38.0	61	64
Pairs/100 acres	240.5	184.0	271.0	300	245.0	610	640

*Grassy field sector only.

important values on the table are the total numbers of pairs per 100 acres of each habitat. These numbers indicate the density of nesting birds in each habitat and tell which habitats are more attractive to breeding birds than others.

DISCUSSION

Because Umstead State Park is mostly a pine forest with a heavy growth of deciduous understory, the most common birds in the park are naturally those that live either in the pine forests or in the deciduous understory. The Pine Warbler is the abundant bird of the pines, and the Wood Thrush and Red-eyed Vireo are the dominant birds of the understory, though the vireos are also abundant in mature hardwoods. Other common birds are those nesting in pines or mixed woods or nesting in deciduous understory. Because most of the large deciduous trees are located along creeks, woodpeckers and other birds of the deciduous forest are most common there. Also, a few species nest only in lowland hardwoods, and, therefore, these woods have by far the highest concentration of birdlife in the park.

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