

# Kansas Ornithological Society

## BULLETIN

PUBLISHED QUARTERLY

Vol. 32

December, 1981

No. 4

### BIRD SPECIES COMPOSITION IN A MISSOURI PARK, 1916 VS 1973

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Bird species composition in an area correlates with the vertical plant profile (MacArthur and MacArthur 1961). If the profile changes, bird composition will change predictability (Bennett and Hendrickson 1939, Shugart and Douglas 1973). Thus land modification or succession may destroy habitat for one species and create it for another. Other factors, including influence of surrounding areas, climatic changes, nationwide bird population shifts, presence of competing species, and species adaptability may contribute to the increase or decline of a species.

The nesting birds in Swope Park, Kansas City, Jackson Co., Missouri, were inventoried June, 1916 (Shirling 1920). That inventory was repeated in June, 1973 to detect any changes in bird species composition area over the approximately 60 intervening years.

#### Methods

Shirling (1920) inventoried nesting birds in Swope Park within 17 sections which he established. He traveled a different portion each morning, starting at dawn, listing adult males by section and species, determined chiefly by their songs. June was selected because by that month migrating birds had passed and only summer residents remained. In cases where some young had left the nest, birds were listed in groups. For instance, a family unit in a single clump of bushes was listed as one nesting male (Shirling 1920).

The 1973 census utilized Shirling's geographic sections and inventory methods, but also listed the habitat type in which individual birds were observed. Habitats were outlined on early and recent park maps, then cut out and weighed to determine areas. These areas may be interpreted within  $\pm 10\%$  for 1916 and  $\pm 15\%$  for 1973.

#### Description of the Study Area

In 1916 Swope Park covered 539 ha in the southeastern corner of Kansas City. By 1973, Kansas City had expanded and the Park was near the center of a 15-city urban area. Over the years, park, lawn, zoo, and paved areas within Swope Park gradually increased in area, but upland forest, meadow, and prairie declined. Only the floodplain escaped significant conversion to other habitat types. Remaining pland forest became more dense due to lack of fire and grazing.

Floodplain forest, a rich climax community, composed 89 ha in 1916 and was dominated by American elm (*Ulmus americana*). Since that time Dutch elm disease (*Ceratocystis ulmi*) has greatly reduced the number of living American elms, although many trunks, with diameters breast high  $>1$  m, still remain.

Prairie once covered many upland areas of Swope Park, but by 1916 had become open canopy and understory forest, interspersed with 6 ha of prairie remnant. By 1973 suppression of fire and grazing and establishment of a golf course had eliminated all but 0.5 ha of prairie.

Upland forest, with an open canopy and understory, covered 260 ha in 1916. By

1973 much had been converted to park or lawn and only 115 ha remained as upland forest. This remaining area was generally too steep or inaccessible for mowing and developed a dense understory and canopy profile.

Lawn consists of closely mowed grass generally with less than 1 tree/ha, and has increased from 90 ha to 144 ha between 1916 and 1973. Much of this habitat is golf course.

Park is frequently mowed former upland forest, lacking shrubs and young trees. It has >10/trees ha but the canopy is rarely closed, thus sufficient light reaches the ground to maintain grass. Park covered 25 ha in 1916 and 129 ha in 1973.

Old field is infrequently mowed and consisted of young oaks (*Quercus* sp.), maples (*Acer* sp.), and hickories (*Carya* sp.) of various ages, densely interspersed with asters (*Aster* sp.), wild lettuce (*Lactuca* sp.), goldenrods (*Solidago* sp.), common elderberry (*Sambucus canadensis*), and thistle (*Cirsium* sp.). Many of the trees are in nursery rows for replanting elsewhere. This habitat increased from 15 ha to 26.8 ha between studies.

Zoo, a variable habitat of sidewalks, barren ground, mowed grass, spilled feed, and food scraps from concessions, increased from 5 ha to 11.3 ha between studies. Meadow covered 30 ha in 1916 but was totally converted to lawn by 1973. Paved areas increased from 5 to 11.2 ha between studies.

Two lakes covered 14 ha in 1916. Eutrophication reduced their combined area to 13.2 ha by 1973. One had formed from an oxbow and contained a 1 ha island of old field habitat which was utilized to nesting Canada Geese (*Branta canadensis*) in 1973.

#### Results and Discussion

Shirling (1920) noted 1,986 males in Swope Park in June, 1916, representing 68 species in 30 families while the 1973 inventory, covering the same 539 ha area, revealed 1,878 males representing 63 species. All comparisons exclude House Sparrow (*Passer domesticus*) and Rock Dove (*Columba livia*) as these were not counted in 1916. Forty-six species were common to both years, giving a species similarity index,

$$S = \frac{2C}{A+B},$$

of 70%, where A = number of species in 1916, B = number of species in 1973, and C = number of species common to both years. Ten of the 20 species most abundant in 1916 were within the top 20 in 1973 (Table 1). Species diversity ( $\bar{H}$ , Shannon and Weaver 1949) decreased from 3.64 to 3.27 between 1916 and 1973, and this change is significant ( $P < .01$ , Hutcheson 1970). This decrease in diversity resulted from both a decrease in the number of species (richness) and a decrease in species evenness ( $J'$ , Tramer 1969), which changed from 0.862 in 1916 to 0.790 in 1973. Thus not only were there fewer species in 1973, but there were less species with few individuals and more species with many individuals.

Ducks and geese were in low numbers continent wide in 1916, and none were noted in Swope Park. However, waterfowl numbers have increased nationwide (Bellrose 1976), and this increase was reflected by 3 Mallards (*Anas platyrhynchos*), 1 Wood Duck (*Aix sponsa*), and 3 Canada Geese in 1973.

Common Crows (*Corvus brachyrhynchos*) decreased from 42 to 23 males between studies, probably reflecting conversion of surrounding lands from agricultural to residential and industrial thus reducing food available to them. Black-capped chickadee (*Parus atricapillus*) and Tufted Titmouse (*Parus bicolor*) prefer forest habitat. In 1973 their combined density in forest was 60 males/100 ha, where it was only 10 males/100 ha in park, lawn, old field, and zoo combined. Their 47% decrease between studies probably reflects reduction of forest habitat.

White-breasted Nuthatches (*Sitta carolinensis*) increased from 2 to 19 males. Individuals nest at heights from 3 to 12 m and are considered inhabitants of mature forest. Their increase probably resulted from succession of forest habitat from open to dense including an increase in nest cavities, in spite of reduction of overall forest area.

TABLE 1.

**Males, 1916 and 1973  
and  
Density of Males by Habitat, 1973**

Common Name	Total Males		Males/100 ha in 1973					
	1916	1973	FPF <sup>1</sup>	ULF <sup>1</sup>	Lawn	Park	O.F. <sup>1</sup>	Zoo
Green Heron	3	1	2					
Canada Goose	0	3					2	
Mallard	0	3	2			.7		
Wood Duck	0	1	1					
Turkey Vulture	17	6	2	.4	1.1		3	
Cooper's Hawk	3	0						
Red-tailed Hawk	0	2	1	1.2				
Broad-winged Hawk	0	1	1					
American Kestrel	2	1			.5			
Bobwhite	4	8		3.6		6		
Rock Dove	NC	47 <sup>2</sup>	1		.5	4.3	105	53
Mourning Dove	17	56	2	5	5.4	14	60	27
Yellow-billed Cuckoo	65	13	9	.4		1.3	3	
Screech Owl	3	0						
Great-horned Owl	1	1		.4				
Barred Owl	0	2	1	.4				
Chuck-will's-widow	0	4		2				
Whip-poor-will	6	2		1.6				
Common Nighthawk	1	0						
Chimney Swift	4	17	4	.8	.5	4.3	9	35
Ruby-throated Hummingbird	3	2	1	.4				
Belted Kingfisher	2	0						
Common Flicker	15	44	13	11	2.7	5.3	12	9
Red-bellied Woodpecker	30	52	25	13	.5	6		9
Red-headed Woodpecker	17	30	16	2.7	1.1	5.3	6	9
Hairy Woodpecker	20	5	3	2.7		.7		
Downy Woodpecker	75	87	37	20	2.1	16	9	18
Eastern Kingbird	11	14	2		4.9	4		
Great Crested Flycatcher	71	56	24	18	1.1	5.3	6	
Eastern Phoebe	5	1	2					
Acadian Flycatcher	27	0						
Least Flycatcher	0	1		.04				
Eastern Wood Pewee	40	50	14	5	4.3	12	3	
Bank Swallow	0	1				.7		
Rough-winged Swallow	0	9	2		.5	4	6	9
Barn Swallow	0	26	2		2.7	10	3	80
Purple Martin	8	0						
Blue Jay	73	199	43	45	15	46	18	80
Common Crow	42	23	17	4.5		4	3	
Black-capped Chickadee	153	87	52	21	2.7	10	9	18
Tufted Titmouse	158	79	29	31	1.6	8	3	9
White-breasted Nuthatch	2	19	9	4		2.7		
House Wren	1	0						
Carolina Wren	18	38	21	13		1.3	9	
Mockingbird	0	1			.5			
Gray Catbird	25	11	2	1.6	1.1	2	3	
Brown Thrasher	58	13		3.2	2.2	3.3		18
American Robin	31	197	26	8.2	38	59	18	80
Wood Thrush	55	17	4	12		1.3		
Eastern Bluebird	17	10	1	.8	4.3	2		

Common Name	Total Males		Males/100 ha in 1973					
	1916	1973	FPF	ULF	Lawn	Park	O.F.	Zoo
	Blue-gray Gnatcatcher	31	1				.7	
Loggerhead Shrike	1	0						
Starling	0	170	25	8.2	19	58	24	256
White-eyed Vireo	12	0						
Yellow-throated Vireo	3	1						
Red-eyed Vireo	86	34	14	9.5	.5	1.3		9
Warbling Vireo	0	8	2		1.6	2		
Black-and-White Warbler	5	0						
Prothonotary Warbler	1	0						
Worm-eating Warbler	21	0						
Blue-winged Warbler	17	0						
Northern Parula	32	11	6	1.6		2		
Cerulean Warbler	34	1			.5			
Common Yellowthroat	11	1					6	
Ovenbird	7	0						
Louisiana Waterthrush	7	0						
Kentucky Warbler	74	1		.8				
Yellow-breasted Chat	18	0						
House Sparrow	NC	124 <sup>2</sup>	4	7.2	8.7	28	57	416
Eastern Meadowlark	32	16			6.5	5.3	3	
Western Meadowlark	0	1				.7		
Red-winged Blackbird	0	27	7	.8	1.1	11	6	9
Orchard Oriole	1	0						
Northern Oriole	14	20	5	1.2	1.6	6		
Common Grackle	9	149	34	12	14	46	30	124
Brown-headed Cowbird	51	36	12	3.6	4.3	2	39	27
Scarlet Tanager	22	0						
Summer Tanager	8	12	2	4		.4		
Cardinal	70	110	49	29	2.7	18	24	27
Rose-breasted Grosbeak	2	0						
Indigo Bunting	164	77	44	19	1.6	6	51	9
Dickcissel	58	0						
American Goldfinch	36	6		.8			15	
Rufous-sided Towhee	34	0						
Chipping Sparrow	12	2			.5		3	
Field Sparrow	25	1					3	
TOTAL MALES	1986	1878 <sup>2</sup>						
Total males/100 ha in 1973			576	348	158	422	551	1330
Area per habitat	1916		89	260	90	25	15	5
	1973		88	115	144	129	26.8	11.3

<sup>1</sup> FPF = floodplain forest; ULF = upland forest; O.F. = old field.

<sup>2</sup> Rock Doves and House Sparrows were not counted in 1916. The 1973 total males, if Rock Doves and House Sparrows are counted, is 2,049.

Warblers were prominent in 1916 with 333 males of which 121 represent species that generally nest within 1 m of the ground (Chapman 1921). Twelve of the 14 males listed in 1973 are species that nest above 7 m. Warbler declines reflected conversion of forest to park (loss of groundstory and understory), an increase in the understory density of remaining forest areas, forest fragmentation, and nationwide population declines (Robbins 1979).

Eastern Meadowlarks (*Sturnella magna*) declined 50% between studies, probably in response to current management of frequent and close cutting of ground vegetation within the Park. Red-winged Blackbirds (*Agelaius phoeniceus*) and Common Grackles (*Quiscalus quiscula*) often utilize spilled grain and food scraps and probably increased in response to greater human use of Swope Park and an enlarged Zoo.

The reduction in all but one of the fringillids parallels the loss of prairie and meadow habitats. For example, in 1916 17 Indigo Buntings (*Passerina cyanea*), 50 Dickcissels (*Spiza americana*), and 5 American Goldfinches (*Carduelis tristis*) were found on a 24 ha meadow which was later converted to a golf course. On the same area in 1973 we found 5 Indigo Buntings and no Dickcissels or goldfinches. Likewise Chipping Sparrows (*Spizella passerina*) and Field Sparrows (*S. pusilla*), dependent on oldfield, were much less numerous in the Park in 1973 although frequently observed in outlying areas. Cardinals (*Cardinalis cardinalis*), on the other hand, increased from 70 to 110 males.

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#### BOOK REVIEWS

*Diets for Birds in Captivity*. Kenton C. Lint and Alice Marie Lint. Distributed by Sterling Publishing Co., Inc., New York; and Blandford Press (Publishers), Poole and Dorset, U.K. 1981. 222pp. \$50.00 (hard).

For the investment, this book is most useful to professional aviculturists and individual researchers and of less use to backyard feeder enthusiasts. It fills a literature gap in being a comprehensive guide to how much, when, and what to feed captive wild and domesticated birds (Did you know captive mockingbirds prefer papaya and sauerkraut over peanut butter and molasses?), though commercial sources for foods are unfortunately given only for the United Kingdom.

Food for all orders of birds is described in good quantitative and qualitative detail and each family of birds is introduced describing appearance of species, behavior, and general ecology. Appendix I details composition of commercial foods, food additives, and vitamin compounds and Appendix II describes propagation of suggested live foods.

One short section deals with feeding and attracting wild birds to backyard feeders but it isn't worth buying the book just for that since most avid bird feeders know what "their" birds like. Bird dusting areas and baths are mentioned for attracting birds all year as well as the responsibility associated with feeding birds in winter.

Some of the taxonomy is slightly dated but a "Virginia" cardinal (*Richmondena cardinalis*) is still recognizable as a plain old cardinal (now *Cardinalis cardinalis*).

Although the book is expensive, it has good information for the avian specialist but the general information can be found elsewhere.

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*Poisonous Plants of the Central United States*. H. A. Stephens. Regents Press of Kansas, Lawrence. 1980. xiii + 165 pp. \$16.00 cloth, \$9.95 paper.

*Poisonous Plants of the Central United States* is a handy, informative book that provides quick and easy access to toxicological information concerning some 300 vascular plant species. It is in effect, a distillation of facts from a variety of sources. The book is written in a style that is easy to read and understand, and should prove useful to a broad spectrum of readers.

As the title implies, emphasis is given to plants native or naturalized in the central United States; however, the utility of the book goes beyond the area covered and the species included. Many species in the book have ranges that extend into peripheral regions thus making the book potentially useful in surrounding areas. Additionally, a number of commonly cultivated house and garden plants are included (e.g. *Solanum tuberosum* L. and *Dieffenbachia seguine* Schott), although the list is far from exhaustive.

Species are arranged by families and each species is provided with a brief morphological description, habitat information, and a statement of the plant's range. In those cases where a genus has a number of species of note (e.g. *Euphorbia* and *Asclepias*) a brief discussion of generic characters precedes the listing and description of individual species. Each description is followed by a paragraph discussing poisonous agents and their sources in the plant. Symptoms in both humans and livestock, resulting from consumption of or contact with the plant is then provided. Abundant black-and-white photographs of various morphological aspects of most taxa follow. For the most part, the photographs are well-taken, nicely reproduced, and serve to point out diagnostic features. No key to species is included, but, the photographs in combination with the species descriptions would allow the layperson to put a name on a plant-in-hand for many of the taxa. Nevertheless, the author's introductory remarks warrant reiteration as there is no substitute for a competent taxonomist's experience in properly identifying a specimen.

A glossary of descriptive terms is found in the beginning of the book and a handy appendix of plants arranged by toxic principle has been compiled. The price may discourage some of the intended readers, but can be defended in light of the plenitude of photographs.

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