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KANSAS BREEDING BIRD SURVEY FOR 1967

By John L. Zimmerman

Even though breeding bird censuses have been published for over a quarter century by the National Audubon Society, the data provide little information on temporal changes in the distribution and abundance of bird populations because very few of these censuses have been consistently conducted in the same locality (see Brewer, R., 1963, Occas. Papers Adams Ctr. Ecol. Studies, No. 7:1–12). Having recognized the need for such information in order to assess the effects of such environmental changes as pollution and shifts in land use, Chandler S. Robbins and W. T. Van Velzen of the Migratory Bird Populations Station, Fish and Wildlife Service, developed a roadside breeding bird count that could be used to sample a broad geographic area in the same way from year to year.

This technique was first used in June, 1965, in Maryland and Delaware. In 1966 these June counts were expanded to include the eastern Provinces and all States east of the Mississippi River. Then in 1967 the area of coverage was extended westward to the longitude of Kansas. Coverage in 1968 will reach the Pacific coast, Hawaii and Alaska.

Methods

As in other States and Provinces, the routes in Kansas (Fig. 1) were designated by a randomly selected starting point of a given latitude and longitude. East of the 100th meridian two routes were chosen in each degree-block; west of this longitude only one route for every two degree-blocks was taken. This procedure reflects the density of birdwatchers rather than the density of birds. Furthermore, the direction of the route along the road nearest this point and away from the selected starting point was chosen at random. A route was composed of 25 stops at one-half mile intervals. Routes were begun one-half hour before sunrise and at each stop the observer recorded all numbers and species of birds seen or heard during a 3-minute period. A full discussion of methods and sources of bias as well as an analysis of the 1966 results are given by Robbins and Van Velzen (1967, Special Sci. Report—Wildlife No. 102, Bureau of Sport Fisheries and Wildlife, Washington, 43 pp.).

Of the 35 routes predetermined for Kansas, 28 were completed (Fig. 1). Some routes were not run because weather conditions exceeded the limits, particularly those of wind speed and amount of rainfall, stipulated in the sampling rules. Other routes lacked observers.

Results

Table 1 summarizes the species data for Kansas in 1967, giving average number of birds per route ($n = 28$) and the percentage of these 28 routes on which the species was seen. Since the conspicuousness of birds varies with species, caution must be used in comparisons between species. The greatest value will accrue from comparisons of given species' values over a series of years. In no case are these records documented instances of breeding.

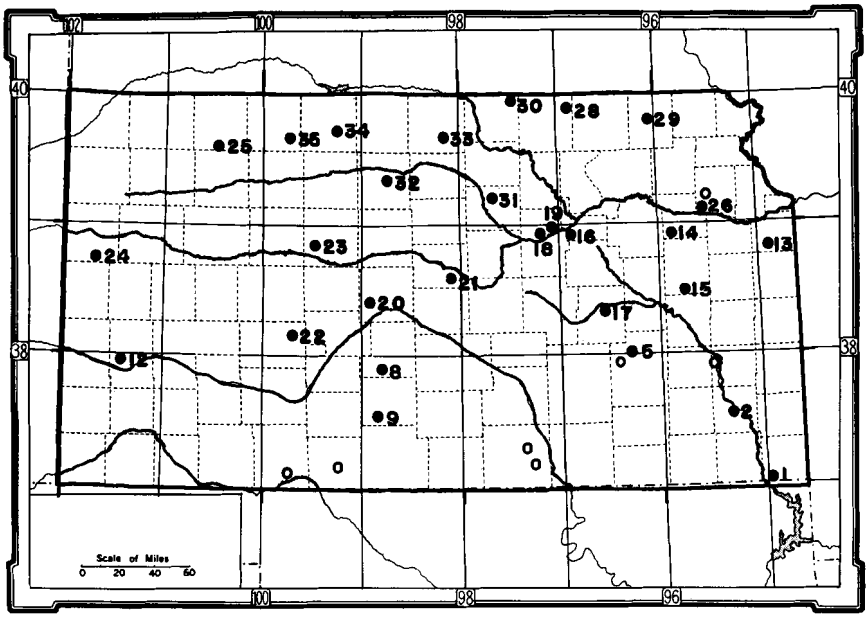

Figure 1. Starting points of routes in Kansas, 1967. Solid circles, routes completed; open circles, routes not completed. Observers and route numbers: A. R. Challans—22; D. C. Coleman—9; E. V. Fisher—26; W. I. Harrison—5, 15, 17; M. G. Hesket—33; D. H. Hunt—28, 30; J. C. Johnson—2; E. R. Lewis—14; W. A. Meier—25; T. R. Mollhagen—23, 32, 34, 35; J. L. O'Keefe—12, 24; J. C. Sanders—13; M. Schwilling—8, 20; T. G. Shane—16, 18, 19, 31; T. M. Sperry—1; P. A. Volkland—21; I. M. Willis—29.

Some notion of the abundance of a species can be determined by comparing the frequency of observation (percentage of routes recorded, Table 1). Some species (Mourning Dove, Eastern Kingbird, Barn Swallow, Common Crow, House Sparrow, Red-winged Blackbird, Common Grackle, and Dickcissel) were seen on all routes. Other species were infrequently observed, either due to their daily period of activity (Barred Owl), the seasonal period of their greatest conspicuousness (Greater Prairie Chicken), the distribution of their preferred habitat (Ruddy Duck), the distribution of their entire species population in relationship to Kansas (Carolina Chickadee) or their low level density across the state (Black-billed Cuckoo).

The distribution and relative abundance of a species can be depicted by plotting total numbers seen according to route location. Figure 2 illustrates this information for four species of different distributional patterns within the state. Since the number of routes is low, these data cannot accurately denote population densities in the state, but they do reflect the ranges of variation in densities, at least for common species. When these data are joined together with similar data in adjacent states and across the whole continent, however, a much better picture of a species' relative abundance and distribution can be drawn (see Robbins and Van Velzen, 1967, *op. cit.*). Plotting of totals for 58 of the species recorded in Kansas shows no great discrepancies from Johnston's account (1964, Univ. Kansas Publ. Mus. Nat. Hist., 12:575–655). Persons interested in a given species can request breeding survey data on that species for all states sampled by writing the Migratory Bird Populations Station, Laurel, Maryland.

Conclusion

The exciting aspects of this study lie in the quantification of long term environmental change and its effects on bird populations. Heretofore we have had qualitative

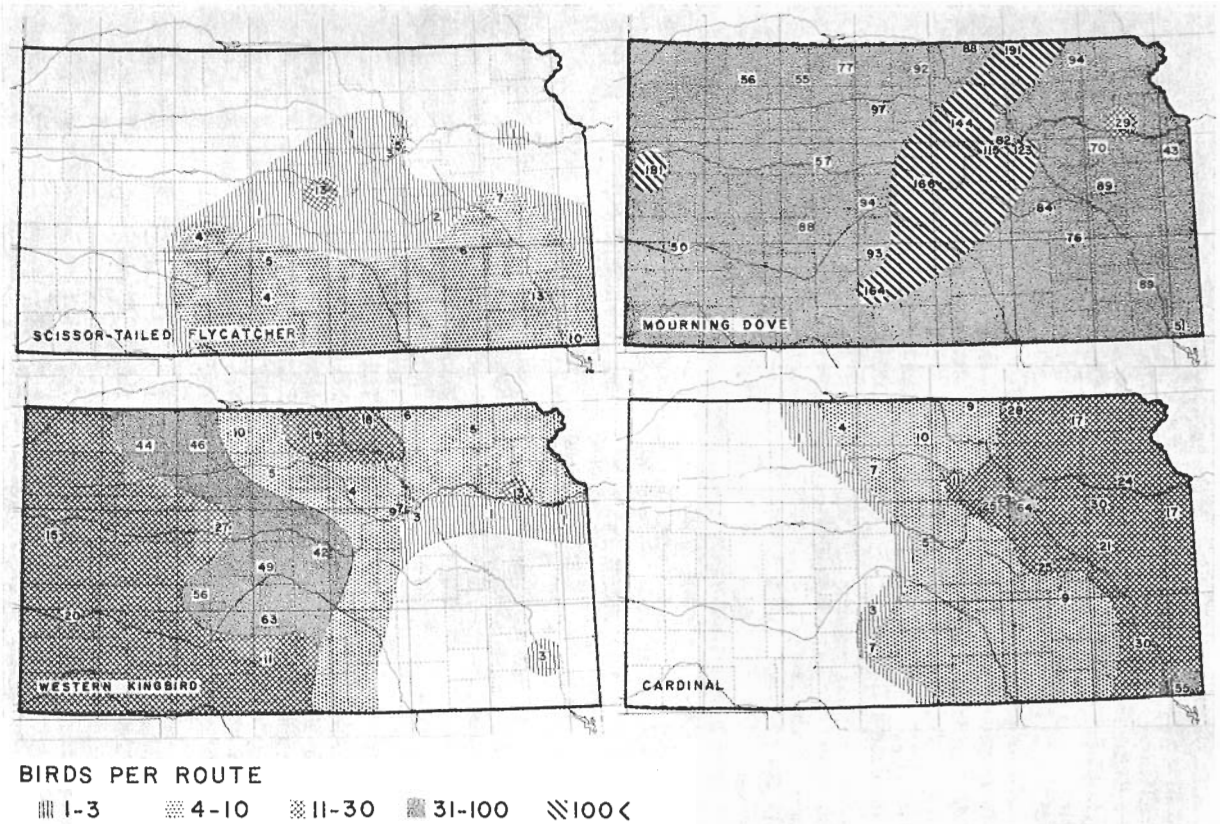

Figure 2. Distribution and relative abundance in 1967 of the Scissor-tailed Flycatcher, Mourning Dove, Western Kingbird, and Cardinal in Kansas.

TABLE 1

SPECIES RECORDED ON THE 1967 BREEDING BIRD SURVEY IN KANSAS

Species	Average no. per route	Percent routes recorded	Species	Average no. per route	Percent routes recorded
Great Blue Heron	0.8	32.1	Tree Swallow	+	3.6
Green Heron	0.4	17.9	Bank Swallow	1.6	21.4
Bl.-cr. Night Heron	0.1	3.6	Rough-wing. Swallow	0.8	25.0
Canada Goose	0.6	3.6	Barn Swallow	15.8	100.0
Mallard	2.2	10.7	Cliff Swallow	6.1	17.9
Pintail	0.3	7.1	Purple Martin	0.7	21.4
Blue-winged Teal	4.8	3.6	Blue Jay	6.8	82.1
Ruddy Duck	0.4	3.6	Black-billed Magpie	1.3	17.9
Turkey Vulture	1.5	21.4	Common Crow	16.3	100.0
Mississippi Kite	0.1	3.6	Black-cap Chickadee	2.8	60.7
Red-tailed Hawk	2.0	71.4	Carolina Chickadee	0.2	3.6
Red-shouldered Hawk	+*	3.6	Tufted Titmouse	2.7	46.4
Swainson Hawk	1.5	53.6	Wh-breast. Nuthatch	0.1	10.7
Marsh Hawk	0.6	35.7	House Wren	5.0	64.3
Sparrow Hawk	1.5	53.6	Bewick's Wren	0.1	7.1
Gr. Prairie Chicken	0.1	10.7	Carolina Wren	0.2	14.3
Bobwhite	42.8	96.4	Mockingbird	13.7	85.7
Ring-necked Pheasant	25.0	71.4	Catbird	0.7	17.9
Killdeer	5.1	92.9	Brown Thrasher	10.6	96.4
Upland Plover	4.1	42.9	Robin	8.5	92.9
American Avocet	0.6	3.6	Eastern Bluebird	2.4	46.4
Forester Tern	0.1	3.6	Blue-gray Gnatchr.	0.4	14.3
Least Tern	0.1	3.6	Loggerhead Shrike	8.4	89.3
Black Tern	0.7	3.6	Starling	11.3	78.6
Rock Dove	2.5	42.9	Bell Vireo	0.8	28.6
Mourning Dove	94.2	100.0	Red-eyed Vireo	0.1	7.1
Yell-bill. Cuckoo	7.8	78.6	Warbling Vireo	1.3	35.7
Bl-bill. Cuckoo	0.3	10.7	Black and Wh. Warb.	+	3.6
Gr. Horned Owl	0.3	21.4	Parula Warbler	+	3.6
Burrowing Owl	0.5	21.4	Yellow Warbler	0.5	25.0
Barred Owl	+	3.6	Yellow throat	0.6	25.0
Common Nighthawk	2.8	67.9	Yel-breast. Chat	+	3.6
Chimney Swift	7.2	78.6	House Sparrow	117.5	100.0
Ruby-thr. Hummingbird	+	3.6	E. Meadowlark	37.4	60.7
Belted Kingfisher	0.2	17.9	W. Meadowlark	112.5	78.6
Yell-shafted Flicker	5.2	75.0	Yel-head. Blackbd.	1.4	10.7
Red-bell. Woodpecker	2.9	50.0	Red-wing. Blackbird	70.9	100.0
Red-head. Woodpecker	6.7	92.9	Orchard Oriole	6.6	85.7
Hairy Woodpecker	2.1	14.3	Baltimore Oriole	8.8	85.7
Downy Woodpecker	0.9	50.0	Bullock Oriole	0.7	14.3
Eastern Kingbird	14.1	100.0	Common Grackle	35.5	100.0
Western Kingbird	17.0	85.7	Brown-headed Cowbird	40.5	96.4
Scis.-tail Flyctch.	2.7	50.0	Cardinal	15.3	78.6
Gr-crested Flyctch.	2.0	50.0	Rose-br. Grosbeak	0.3	7.1
Eastern Phoebe	1.5	46.4	Blue Grosbeak	1.4	50.0
Say Phoebe	+	3.6	Indigo Bunting	3.5	53.6
E. Wood Pewee	1.5	39.3	Dickcissel	74.0	100.0
Horned Lark	26.6	71.4	American Goldfinch	2.5	53.6

TABLE 1 (Continued)

Species	Average no. per route	Percent routes recorded	Species	Average no. per route	Percent routes recorded
Rufous-sided Towhee	0.1	7.1	Chipping Sparrow	0.4	3.6
Lark Bunting	13.7	35.7	Clay-colored Sparrow	0.2	3.6
Grasshopper Sparrow	10.0	71.4	Field Sparrow	4.9	50.0
Henslow Sparrow	0.1	3.6			
Lark Sparrow	5.5	75.0			
Cassin Sparrow	0.9	7.1			

Probable transients also recorded: Rough-legged Hawk, Herring Gull, Franklin Gull, and Least Flycatcher.
• Average number per route less than 0.1.

accounts as to what bird populations were before the forests were cut, the prairie plowed and the wetlands drained. Man's effect on the environment will not lessen. But we will now be able to ascertain in a quantitative manner what happens to bird populations as rural areas become urban, croplands replace pasture, or the high prairie is irrigated. And, more importantly, knowing the changes that have occurred, we will be able to predict what changes will take place through further manipulation of the environment and, hopefully, to manage our environmental resources with full awareness of the consequences to bird species.

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Evolutionary Dynamics of House Sparrows: Re-analysis of Data on Tarsus Length.—In an earlier paper on evolution of House Sparrows, *Passer domesticus*, from the Great Plains and montane Colorado (Packard, *Syst. Zool.*, 16, 1967:73–89), I reported that not all interpopulational variation in tarsus length of male birds could be ascribed to rectilinear regression of tarsus length on isophane (Packard, *op. cit.*:76). Subsequently, I have been able to subject all of the data to a more rigorous analysis, involving stepwise multiple regression. Lines for first, second, and third degree polynomial equations were fitted to the data by the method of least squares, and the regression coefficients were tested for significance with the "F" test. Data for birds from Stringtown, Colorado, were omitted from this re-analysis; specimens from this locality are in juvenal plumage and erroneously were treated in my earlier study as subadult birds. A summary of data is given in Table 1.

TABLE 1

TARSUS LENGTH (MM) OF HOUSE SPARROWS (MEAN PLUS STANDARD ERROR)

Locality	Isophane	Adult Male	Subadult Male	Adult Female	Subadult Female
Roodhouse, Illinois	43.1	18.92 + 0.217 (6)[1]	18.94 + 0.159 (21)	19.05 + 0.245 (3)	18.80 + 0.185 (9)
Kansas City, Kansas	42.0	18.80 + 0.148 (22)	18.43 + 0.121 (37)	18.73 + 0.194 (16)	18.66 + 0.170 (21)
Lawrence, Kansas	42.0	18.52 + 0.157 (19)	18.43 + 0.114 (43)	18.16 + 0.275 (7)	18.30 + 0.142 (33)
Hays, Kansas	44.0	19.08 + 0.169 (16)	18.92 + 0.159 (20)	18.49 + 0.226 (11)	18.78 + 0.217 (12)
St. Francis, Kansas	47.7	18.85 + 0.157 (19)	18.63 + 0.176 (16)	18.43 + 0.185 (18)	18.50 + 0.236 (10)
Elkhart, Kansas	45.4	18.59 + 0.151 (21)	18.07 + 0.167 (18)	18.11 + 0.246 (9)	17.74 + 0.364 (4)
Kit Carson, Colorado	48.9	18.61 + 0.219 (9)	18.41 + 0.149 (23)	18.46 + 0.218 (12)	18.60 + 0.164 (23)
Pueblo, Colorado	49.1	17.55 + 0.289 (5)	18.03 + 0.121 (37)	18.05 + 0.494 (2)	17.99 + 0.138 (35)
Colo. Sprgs., Colorado	52.9	18.27 + 0.192 (12)	18.43 + 0.134 (29)	18.25 + 0.259 (8)	18.29 + 0.191 (16)
Alamosa, Colorado	55.3	18.40 + 0.157 (19)	18.35 + 0.167 (18)	18.67 + 0.172 (22)	18.04 + 0.224 (11)
Gunnison, Colorado	57.0	18.45 + 0.192 (12)	18.25 + 0.136 (28)	18.33 + 0.275 (7)	18.18 + 0.186 (17)

[1] Sample size

TABLE 2

REGRESSION EQUATIONS FOR TARSUS LENGTH (MM) ON ISOPHANE

Subadult Males	$Y = 19.36 - 0.0194\ X$	$F_{1,\ 288} = 4.801$ $.05 > P$
Adult Males	$Y = 19.96 - 0.0298\ X$	$F_{1,\ 158} = 7.207$ $.01 > P$
Subadult Females	$Y = 19.55 - 0.0250\ X$	$F_{1,\ 189} = 4.555$ $.05 > P$

Of the several lines fitted to the data, a binomial expression is in every instance the best line describing interpopulational variation in tarsus length as a function of isophane (Table 2). Interpopulational variation in tarsus length of adult and subadult male sparrows, as well as of subadult female birds, can be described as a negative rectilinear regression of tarsus length (in millimeters) on isophane (a single function of longitude, latitude, and altitude that is considered to be indicative of ambient temperature conditions; see Hopkins, *U. S. Dept. Agr. Misc. Publ.* 280, 1938:188 pp.). The regression equation describing variation in adult male sparrows is identical to that equation reported previously (Packard, *op. cit.*:76). Inexplicably, adult female sparrows exhibit no interpopulational variation whatsoever in this character.

It is important to emphasize that the equations presented herein for male sparrows do not represent the best mathematical fits of all possible lines that might be generated. However, I do believe that these lines are biologically the most meaningful of all possible lines, in that with them we can detect a general pattern of geographic variation. Deviations from linearity demonstrate that the form taken by an animal, or by any of its parts, is the result of complex, interacting selective agents.

The clinal variation in tarsus length in relation to ambient temperature conditions is in accord with the ecogeographic rule of Allen, and presumably is adaptive in enabling birds from the various localities to respond appropriately to thermoregulatory demands (Packard, *op. cit.*:81). The observed pattern of geographic variation has become established since the species first arrived in Kansas and Colorado in 1880–1885 (Wing, *Auk*, 60, 1943:74–87).

I want to thank Dr. W. E. Johnston of the Department of Experimental Statistics, Clemson University, for invaluable assistance with the mathematical treatment of the data. Computations were performed in the Clemson University Computer Center.—GARY C. PACKARD, *Department of Entomology and Zoology, Clemson University, Clemson, South Carolina. Present address: Department of Zoology, Colorado State University, Fort Collins, Colorado, 80521.*

Records of the Curve-billed Thrasher (*Toxostoma curvirostre*) from Kansas. —A number of recent observations of the Curve-billed Thrasher (*Toxostoma curvirostre*) from Kansas suggest that the species is an irregular visitant to the state. Two specimens and an additional three sight records have come to our attention.

Charles A. Ely and Maurice Witten observed a single Curve-billed Thrasher at Castle Rock, Gove County, on 21 April 1962. The bird was first seen at very close range as it fed on the floor of a small canyon. It flew and was subsequently observed on two occasions at longer range before it left the area. On the same day, Donald K. Darnell reported a single Curve-billed Thrasher in a windbreak on the Fort Hays Kansas State College farm just west of Hays, Ellis County. This bird was observed briefly and could not be found the following day.

The first Kansas specimen (FHKSC 926) of the Curve-billed Thrasher was taken by John A. Davis on 25 July 1963. The thrasher was an adult male with fully ossified skull, contained moderate fat, and the left testis measured 14 mm. It was taken in tamarisk and heavy shrub growth interspersed with a few tall cottonwoods, 6½ miles west of Garden City, Finney County. Despite a thorough search no other Curve-billed Thrashers could be found at this locality.

Gordon Barnhardt saw a solitary Curve-billed Thrasher about 10 November 1967, in a multiflora hedge in grassland habitat, 1 mile east, ½ mile north of Winfield, Cowley County (Max C. Thompson, personal communication). Another solitary Curve-billed Thrasher was observed for about 10 minutes by Ely and Marvin E. Rolfs as it hopped about and flew from tree to tree around a small frozen pond on the Harold Kraus farm, approximately 2 miles west, 3 miles south of Antonino, Ellis County on 1 January 1968. This bird was fairly tame and was observed at close range. The next day Larry W. Anthony flushed the thrasher again from beneath an overhanging bank. It flew first into a crevice beneath tree roots and then into low elms where it was collected. The specimen (FHKSC 1525) was an adult male with completely ossified skull, had moderate fat, and the left testis measured 3 × 1½ mm. It was in generally fresh plumage but had several old secondaries and the right rectrices were not yet of full length. The stomach contained both plant and animal remains that were largely unidentifiable but included one sandbur and two geometrid larvae (one 34 mm long).—CHARLES E. ELY AND JOHN A. DAVIS, *Department of Zoology, Fort Hays Kansas State College, Hays, Kansas, 67601, and 2710 Atlanta, Pueblo, Colorado, 81003, 1 January 1968.*

A Hermit Warbler and Other Noteworthy Records of Birds from Finney County, Kansas.—Several interesting species of birds were observed or collected on the Arkansas River, ½ mile south of Holcomb, Finney County, Kansas, in early May, 1964. I visited the area first on 5 May, and returned on 7 May with Ross A. Lock, Tony R. Mollhagen, Elton K. Schroder, and Dennis L. Stadel. Weather conditions were dry and warm (90–97°F). On both dates, and for several days preceding, winds were from the south at 30–45 mph, and carried much dust. On both dates large concentrations of transient birds, chiefly warblers, were noted along a three-mile stretch of the river. Birds were restricted to the riparian vegetation, and greatest feeding activity was observed near the ground, especially in the salt cedar (*Tamarix*) along the river bottom. Of special interest was the large number of western species present. All specimens mentioned are deposited in the Fort Hays Kansas State College collection.

Steller Jay (*Cyanocitta stelleri*): One seen on 5 May. Only one specimen is known from Kansas (Riley County) (R. Johnston, Misc. Publ. 41, Univ. Kansas Mus. Nat. Hist., 1965:37).

Piñon Jay (*Gymnorhinus cyanocephalus*). Piñon Jays were seen both 5 and 7 May. The species is irregular in western Kansas, and vagrant in eastern Kansas (Johnston, *op. cit.*, 38).

Clark Nutcracker (*Nucifraga columbiana*): One seen on 5 May. Previous Kansas records are from Marshall, Ellis, Lyon, Finney, Seward, and Johnson counties (Johnston, *op. cit.*, 38).

Golden-winged Warbler (*Vermivora chrysoptera*): A ♂ taken 5 May (FHKSC 921) had little fat. Only two previous specimens are known from Kansas (both from Douglas County); all previous sight records are from eastern counties (Johnston, *op. cit.*, 45).

Virginia Warbler (*Vermivora virginiae*): One ♀ (?) taken 7 May (FHKSC 927) had moderate fat. All previous Kansas specimens and sight records are from Morton County (Johnston, *op. cit.*, 46).

Black-throated Gray Warbler (*Dendroica nigrescens*): One ♂ (?) taken 7 May (FHKSC 939) had moderate fat. All previous Kansas specimens and sight records are from Morton County (Johnston, *op. cit.*, 47).

Hermit Warbler (*Dendroica occidentalis*): One ♂ taken 7 May (FHKSC 925) had moderate fat, and its testes measured 5mm. This is the first record from Kansas.

MacGillivray Warbler (*Oporornis tolmiei*): Seen on both 5 and 7 May. Kansas specimens are from Marshall, Morton, and Hamilton counties (Johnston, *op. cit.*, 49).

Western Tanager (*Piranga ludoviciana*): Seen on 7 May. The Western Tanager is a low-density transient through western Kansas.

Green-tailed Towhee (*Chlorura chlorura*): Seen on 7 May. The Green-tailed Towhee is probably a low-density transient through western Kansas.

The following vireo and warblers were also seen, on the dates indicated: Solitary Vireo (5 May); Black-and-white Warbler (5 May); Orange-crowned Warbler (5 and 7 May); Nashville Warbler (5 and 7 May); Yellow Warbler (5 and 7 May); Myrtle Warbler (5 and 7 May); Audubon Warbler (5 and 7 May); Chestnut-sided Warbler (7 May: ♂ collected, FHKSC 928); Wilson Warbler (5 and 7 May); American Redstart (5 May).—JOHN A. DAVIS, *2710 Atlanta, Pueblo, Colorado, 81003, 20 February 1968.*

REVIEW

Birds of Australia. Illustrations by John Gould, text by Abram Rutgers. 1967. London, Methuen and Co., Ltd. (distributed in U. S. by Barnes and Noble, Inc., New York). 321 pp., 160 color plates. Price, $15.00.—This book reproduces 160 of John Gould's color plates that originally appeared in *The Birds of Australia* (1840–1848). The original, as well as this volume, also includes plates of a number of birds from New Zealand and New Guinea. The format is identical to that of an earlier volume entitled *Birds of Europe*, which was reviewed in the Kansas Ornithological Society *Bulletin* (18:11, 1967), and the comments by the earlier reviewer, Dennis M. Power, apply equally to this book. Generally, the reproduction of the plates is good and the short text that accompanies each plate gives the reader a general description of the range, behavior, and nesting of the species portrayed. Much work has been done on the birds of the Australian Region since Gould's day, and it seems certain that the statement (p. 1) that the "text for each illustration incorporates *all* new findings that have come to light since Gould's day" (italics mine) is incorrect.—GARY D. SCHNELL.

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