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THE ROADSIDE CENSUS

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Our discovery of the Roadside Census as an aid in bird study came by accident. On May 30, 1920, we started to play with our small daughter a new kind of "Roadside Euchre" by counting the Dickcissels that were lustily singing "jig-jig-jig" along each side of a five mile stretch of road. After a second Dickcissel game that same day — we found they averaged from six to eight a mile — the little girl suggested we count *all* the birds we saw on the rest of the trip, a distance of fifty miles. At first thought this seemed an impossible task for one hurrying along in an automobile, but, nevertheless, we tried it, and found it so worthwhile that by the middle of July we had taken 780 miles of Roadside Censuses.

A Roadside Census is a record of the number of birds of each kind seen along a particular road, on a particular date, between particular hours; that is, to be complete, it should tell the time, location and distance covered besides the temperature and state of the weather. Such a census has a definite, though limited, value: first, it has a distinct use in recording the abundance and distribution of certain birds; and second, it is valuable for comparative purposes, for revealing effects of different conditions of time, place and weather. Two things, however, it does not do: it does not give by any means a complete list of the birds of any region, and it does not enable one to say positively that such and such birds do not live in a certain district,

although under favorable conditions one could be practically sure in the case of some birds.

Our method of taking a Roadside Census is as follows: we have a small notebook with a pencil attached by a string, in this at the top of a page we write the date, hour, number of miles, county, place of starting and destination, and also a note as to weather. The temperature we have obtained later by writing to the local stations of the Weather Bureau. We always began a new census with a new county although sometimes it was difficult to know the county boundaries; often it was necessary to calculate from the map the number of miles from a certain town to the border of the county and turn over a page when the speedometer showed that we had reached that spot. As to the birds, we jot them down as they appear, using approximately the order of the A. O. U. Checklist, so as to know where to expect the name of each bird, an important matter when one sees several different species at a time. The numbers seen are put down after each bird's name and of course changed when occasion arises. There are usually a number of birds that have to go down under the caption "unknown"; with us the difficulty generally lay in being sure whether a few individuals were English Sparrows, Dickcissels or Grasshopper Sparrows. (In making up the totals for this paper we divided these "unknowns" between the three species in the same proportion as the "known" birds; other "unknowns" were left as such.) Naturally the person who drives the car cannot take a Roadside Census although he can often see birds on his side that the census taker misses. We find it important to copy our censuses in a permanent notebook each evening when the experience of taking them is fresh in our minds, for they are naturally difficult to read. That is one reason why it is better not to take too long a census at one time, but to start again after twenty or thirty miles because it is often hard to be sure of figures when so many have been written one after another when jolting along.

On our censuses we probably seldom saw more than a third of the breeding birds of a region; occasionally the

proportion was higher, but usually it was lower. There are certain birds that one can be sure of seeing if they are in the vicinity; they are conspicuous, fearless and nest near the roadside. For the prairies of Oklahoma, these dependable birds are Dickcissels, Mockingbirds, Mourning Doves, Meadowlarks, Lark Sparrows, Bluebirds, Kingbirds and Purple Martins. Other birds that are uncommon, shy, or prefer a different environment are only occasionally seen; such as Hawks, Crows, Cardinals, Painted Buntings, Yellow-breasted Chats, etc.

The following table gives the numbers of birds that were alike and different on three trips that were repeated a week later at different times of the day.

TABLE I.

Numbers of Species Alike when Trip was Repeated

Date	Distance	Time	Number Alike	Number Different	Per cent Alike
June 9	35 miles	11 - 2 P. M.	13	9	60
June 16	35 miles	4 - 6 P. M.	13	4	76.5
June 9	38 miles	2 - 5 P. M.	14	4	77.7
June 16	38 miles	12 - 4 P. M.	14	8	63.3
June 9	14 miles	5 - 6 P. M.	10	3	78
June 16	14 miles	10-11 A. M.	10	2	83.3

It will be seen that from 60 to 83 per cent of the species were alike when the same ground was covered a second time. The highest proportion was on the shortest trip where there was least chance for variety.

The forty-one censuses which form the basis of this study were all taken in Oklahoma in the summer of 1920. The country covered was of two very diferent types; most of it was level prairie, but some, especially in the eastern part of the State, was wooded and mountainous. The first two censuses were taken on a trip from Oklahoma City, which is in the center of the State, to Kingfisher county, fifty miles northwest. All the others occurred on two camping trips with Norman, twenty miles south of Oklahoma City, as a starting point. The first trip was to the Wichita Mountains, about 120 miles to the southwest. On the second trip we went directly south 60 miles to the Arbuckle Mountains, then east to the Ouachita Mountains;

northeast to Fort Smith, Arkansas; northwest to Cherokee county and from there back to Norman.

The first two censuses occurred May 30th, the others were taken from June 9th to 16th and from June 26th to July 15th. We saw, therefore, only summer birds, and, for the most part, breeding birds. In the beginning the males were much in evidence singing; a little later there was less singing but females as well as males were seen with food for the young; and by July many young were with the parents, especially Horned Larks and Mourning Doves. A few birds had begun to gather in flocks by the middle of July, as Cowbirds, Red-winged Blackbirds and Cliff Swallows; but none of these flocks were large, forty-two birds being the greatest number seen together.

Our primary object was to obtain data on the distribution and comparative abundance of birds in the State, but upon tabulating our results we found other relationships that were of interest, especially the effects of weather and of the character of the country.

The total number of native birds seen during 780 miles of Roadside Censuses was 3755, which gives an average of 4.8 birds to a mile. (In all the tables and calculations, English Sparrows are omitted entirely; they will be treated separately.)

The effects of weather, time of day, and to a small extent, the time of year, are shown in Table II.

TABLE II.

Numbers of Native Birds Seen
Showing Effect of Weather, Time of Day and Time of Year

Number of Censuses	Total Miles	Weather	Time	Average Number of Birds Seen per Mile
41	780	Mostly Pleasant	All Times	4.8
39	696	Pleasant	All Times	5.2
2	84	Rainy	All Day	1.4
26	395	Pleasant	Early Morning or Late Afternoon	6.2
13	301	Pleasant	At or Near Noon	3.9
2	50	Pleasant	May 30	10.2
11	228	Pleasant	June 9 - 16	3.5
11	196	Pleasant	July 12 - 15	6.7

Two aspects of the weather affected the numbers of birds to be seen: first, the noon heat, and second, rain. All the censuses but two were taken on days whose maximum temperature ranged from 90° F to 95° F. The exceptions were one cooler day — May 30th, when the maximum was 88° F. and one hotter day — July 3rd, when the thermometer reached 99° F. All but two of the censuses were taken on sunny days. Thus there were remarkably uniform weather conditions on thirteen of the sixteen days on which censuses were taken. The thirteen counts at or near noon occurred when the weather was undeniably hot and the inactivity of the birds is marked, for only an average of 3.9 birds per mile was seen in contrast to the 6.2 birds per mile noted in the cooler parts of the day. The effect of an all day rain, even though the temperature rose to 91° F., is even more striking in driving the birds to cover than the noon heat on sunny days, for only 1.4 birds were seen per mile instead of the 5.2 observed in pleasant weather.

We have very little data on the difference in the number of birds to be seen at different times of the year, as there are only 47 days between our first and last census. Our results stand as follows: 50 miles of censuses on May 30th gave us an average of 10.2 birds a mile; 228 miles from June 9th to 16th gave 3.5 birds a mile and 196 miles from July 12th to 15th gave 6.7 birds a mile. The distance travelled in May is so short that it is hardly comparable to the other two sets of figures. As for the June and July results, they represent the same number of censuses— eleven —, much the same number of miles, equally pleasant weather with practically the same distance travelled near noon — 73 and 76 miles, respectively, — and both were taken entirely in prairie country. Therefore they would seem as comparable as one could wish with one exception; they were taken in different parts of the State, the June censuses in the southwest, in Cleveland, Grady and Comanche counties; while the July censuses taken in the east, in Leflore, Sequoyah, Muskogee, Wagoner, Creek, Okmul-

gee and Tulsa counties. The main difference between these regions is one of humidity, the eastern counties having an annual rainfall of 35 to 40 inches and the southwestern about 30. Probably the bird life is more abundant at all times in the more luxuriant vegetation of the east than the west. So our July figures doubtless represent the effects of two causes of abundance — more favorable environment than the region visited in June as well as the actually greater number of birds to be seen in July. Although we cannot rely on the proportions as they stand, it is undoubtedly true that more birds are to be seen on a Roadside Census when the males are in full song and after the young are raised than while the young are in the nest.

The greatest number of birds seen per mile was 18 and the least 1.6 with the exception of the rainy day. The former record occurred on July 15th and was swelled by great numbers of young Mourning Doves and Horned Larks. The very small number of the other census must have been due to the unusual heat for it was taken at noon on the day when the temperature reached 99° F. The four largest and smallest censuses taken in pleasant weather are shown in Table III.

TABLE III.

The Largest and Smallest Censuses Taken in Pleasant Weather

Date	Time of Day	Distance	Place	Average Number of birds Seen per Mile
July 15	6 - 7 P. M.	11 miles	Prairie, Tulsa Co.	18
May 30	4 - 5 P. M.	10 miles	Prairie, Kingfisher Co.	13
June 9	11 - 2 P. M.	35 miles	Prairie, Grady Co.	2
July 3	12 - 2 P. M.	10 miles	Woods, Pushmataha Co.	1.6

We saw 72 different species in the 41 censuses. The average number of species seen in an average run of 20 miles was 17, while the shorter trips, averaging 7 miles, gave us 12. The effect of weather and character of country on the number of species seen is shown in Table IV.

TABLE IV.

Numbers of Different Species Seen

Showing Effects of Weather, Character of Country and Length of Trip

Number of Censuses	Character	Average Number of Miles	Average Number of Species Seen on Each Census
39	Pleasant Weather	17.8	16.6
2	Rainy Weather	42	14.5
33	Prairie	27	16
5	Woods	17	22
33	10–40 Miles	20	17
6	4–9 Miles	7	12

These figures are not directly comparable as in Tables II and III, for the average length of the different censuses varies so much. However, the depressing effect of the rain is almost as evident in the lessened numbers of species seen as in the total numbers. The greater variety of birds in a mixed environment over those on the prairie alone is evident from the 22 kinds observed on the average trip of 17 miles in woods, in comparison to the 16 seen on the average trip of 27 miles on the prairies; most of the "woods" censuses included some prairie. In this table the noon census of July 3rd is omitted because of its unusual heat; if it is included, the number of species seen in woods would be 19 on a trip of 16 miles.

The greatest number of different kinds of birds seen on any one trip was 31 and the least 4. Both of these were short trips, entirely through woods; the first was through more varied country than the second, but most of the blame for the minimum number can probably be laid to the excessive heat at that time.

TABLE V.

Largest and Smallest Number of Species

Seen on Trips of 10 Miles and Over

Date	Time of Day	Distance	Place	Average No. Species seen each Census
June 30	9 - 12 M.	12 Miles	Woods; Arbuckle Mts.	31
June 29	12 - 3 P. M.	12 Miles	Woods; Platt Nat. Park	25
June 26	11 - 12 M.	16 Miles	Prairie; Garvin Co.	9
July 3	12 - 2.P. M.	10 Miles	Woods; Pushmataha Co.	4

As to the main object of our study, the kinds of birds, their distribution and comparative abundance, Table VI gives some data in regard to the most common birds arranged in order of breadth of distribution.

TABLE VI.

The Fourteen Most Common Birds in 41 Roadside Censuses

	No. of Censuses in which each occurred	Total Number Seen	Av. No. Seen on each census where each occurred	No. Censuses in which each bird came 1st	No. Censuses in which each bird came 2nd
Western Mourning Dove	39	478	12.2	7	10
Mockingbird*	39	275	7	5	6
Dickcissel	33	687	20.8	17	4
Bluebird	31	202	6.5	6	3
Lark Sparrow *	29	166	5.4	2	2
Bob-white	29	71	2.4	0	1
Kingbird	27	102	3.8	0	0
Meadowlark*	24	213	9	0	2
Read-headed Woodpecker	23	90	4	0	2
Orchard Oriole	21	64	3	0	0
Horned Lark*	20	168	8.4	1	1
Scissor-tailed Flycatcher	20	124	6.2	0	1
Purple Martin	15	91	6	0	0
Cliff Swallow	5	99	20	2	0

It will be seen that the Mourning Dove and Mockingbird were found on practically every single census. The former were missing on two trips, the first at noon in McClain County where they were seen a week later on repeating the trip and the second on the noon census of July 3rd which has made so many exceptions. Mockingbirds were recorded on all but two censuses; one in the Wichita Mountains and the other in the Arbuckles. These two are the most adaptable of all our native birds here; Mockingbirds are found about farmhouses on the prairies and cabins in the woods, while the Mourning Dove is even more universal in its tastes for it will live in deep woods,

* In central and western Oklahoma the Mockingbirds and Lark Sparrows were the western forms but near the Arkansas border the birds were probably the eastern forms, according to information kindly given me by Dr. H. C. Oberholser. The Horned Larks were "Desert" in central Oklahoma but may have been "Prairie" in the east. The Meadowlarks were all eastern except those in Kingfisher County on the second census which were western.

in open country with few trees, or if there are no trees at all, nests upon the ground. The main variations in the distribution of the other birds depended on the distinction in environments — the prairie and the woods. The prairies are the homes of the Dickcissels, Lark Sparrows, Meadowlarks and Horned Larks; Scissor-tailed Flycatchers, Kingbirds and Orchard Orioles like the prairie with orchards, but Red-headed Woodpeckers and Bluebirds were most abundant in woods, especially where there are many girdled trees. Purple Martins depend, of course, on bird houses and as nearly every dwelling in southeastern Oklahoma has its Martin box, these birds were common there both in the woods and on the prairies. Cliff Swallows were seen on only five censuses; they were all in flocks in the northeastern prairie districts.

In order of total abundance on all 41 censuses, the birds range as follows: Dickcissels, 687; Mourning Doves, 478; Mockingbirds, 275; Meadowlarks, 213; Bluebirds, 202; Horned Larks, 168; Lark Sparrows, 166; Scissor-tailed Flycatchers, 124; Kingbirds, 102; Cliff Swallows, 99; Purple Martins, 91; Red-headed Woodpeckers, 90; Bob-whites, 71; and Orchard Orioles, 64.

Some birds had a wide distribution yet were nowhere abundant; the Bob-white was the best instance of this, as it was seen on 29 trips but only reached a total of 71. Others in this same class were Kingbirds, Red-headed Woodpeckers and Orchard Orioles. Another class were limited to a somewhat restricted range but were usually abundant where they did occur, as Horned Larks, Meadowlarks and especially Dickcissels. Only two species were almost universally distributed and at the same time abundant — the Mockingbird and Mourning Dove.

As to English Sparrows, they were, unfortunately, the most common bird of all, since we saw 1486 of them — two and a half times as many as the most abundant native bird, the Dickcissel. They constituted 28 per cent of all the birds seen. They were recorded on 33 censuses, some of the trips taken in woods and those on the Wichita Game Reserve being almost the only ones free from them. They

were the most abundant bird in 16 censuses and second most abundant in 4. They varied from none at all to 350 on one census. This great number was seen July 13th, in Muskogee County, where they apparently had repaired with all their broods to feast upon the wheat fields.

Taking a Roadside Census is a fascinating occupation and lends fresh interest to an oft-repeated or otherwise monotonous journey. Yet to do it well requires considerable field experience and a fund of persistance, for it must be done thoroughly to be of any value. These studies were made at only one season and over part of one State. It would be interesting to try this method at other times of the year, when results would necessarily be much less uniform than in the summer, and especially in other parts of the country. Much information also as to the increase and decrease of roadside birds could be gathered by repeating such censuses in later years.

In conclusion let us give two sample censuses; one over prairie in central Oklahoma and the other through woods in southeastern Oklahoma.

PRAIRIE	WOODS
Kingfisher and Oklahoma Counties. Barrows to Oklahoma City. 40 miles.*	Atoka County. From Atoka to Darwin. 23 miles. Through Woods.
May 30, 1920. 5:00–7:00 p. m.	July 3, 1920. 8:30–12:00 M.
Day's Temp. 60° – 88°. Sunny	Day's Temp. 76° – 99°. Sunny.
1 Killdeer	2 Bob-whites
68 Western Mourning Doves	8 Western Mourning Doves
2 Yellow-billed Cuckoos	7 Turkey Vultures
11 Howell Nighthawks	1 Hawk (sp?)
28 Scissor-tailed Flycatchers	1 Hairy Woodpecker
13 Kingbirds	4 Pileated Woodpeckers
2 Arkansas Kingbirds	25 Red-headed Woodpeckers
1 Crow	3 Kingbirds
3 Cowbirds	1 Crested Flycatcher
30 Meadowlarks (neglecta & magna)	1 Wood Pewee
16 Orchard Orioles	1 Orchard Oriole
1 Baltimore Oriole	5 English Sparrows
5 Bronzed Grackles	3 Western Lark Sparrows
40 English Sparrows	1 Chipping Sparrow
	1 Field Sparrow

* On May 20, 1921, from 5:00-7:30 p. m. (temperature 67-88) we repeated this trip, seeing 20 species (4 of them different from the year before) and 453 birds in all.

PRAIRIE	
3	Western Grasshopper Sparrows
26	Western Lark Sparrows
2	Western Blue Grosbeaks
137	Dickcissels
6	Western Mockingbirds
1	Brown Thrasher
20	Unknown

20 species; 416 in all.

WOODS	
3	Cardinals
2	Summer Tanagers
10	Purple Martins
1	Red-eyed Vireo
28	Western Mockingbirds
1	Carolina Wren
1	Tufted Titmouse
1	Plumbeous Chicadee
24	Bluebirds

24 species; 135 in all.

AN ANNOTATED LIST OF THE LAND BIRDS OF SAC COUNTY, IOWA

BY J. A. SPURRELL, OF WALL LAKE, IOWA

PART II

This paper concludes a local list of the land birds of Sac county, the first part of which appeared in the Wilson Bulletin, Vol. XXXI, No. 4 (December, 1919).

Harris Sparrow (*Zonotrichia querula*).

The Harris sparrow is a regular and abundant migrant both spring and fall. Since its migration range is so restricted, I give all the migration data I have obtained, in the table below:

SPRING MIGRATION

Year	When first seen	About No. 1st seen	Next seen	Became Common	Last seen	Remarks
1909	3-29	1	4-4	5-8	5-17	
1910	5-1	4	5-6	5-12	5-24	
1911	4-2	1	4-6	5 8	5-13	They were common at an earlier date, which I failed to record.
1912	5-3	3	5-4		5-20	I failed to record the missing date.
1913	5-1	3	5-2	5-8	5-22	
1914	3-29	3			5-24	I failed to record the missing dates.
1915	5-2	4	5-7			I failed to record the missing dates.

FALL MIGRATION

1908	9-23	5	9-27	10-4	11-8	Last one seen could not fly, as it had a broken wing.
1909	9-25	10	9-29	10-4	10 31	
1910	10-1	20	10-2	10-8	11-4	
1911	10-1	20	10-3	10-7		Field to record last date.
1912	9-16	10		10-12	11-10	First seen by Mrs. E. B. Hayden.
1913	10-2					Failed to secure other dates.