

1984

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Recommended Citation

Lowther, Peter E. (1984) "Repeat of a 1916 Bird Census in Northwestern Iowa," *Proceedings of the Iowa Academy of Science*: Vol. 91: No. 3, Article 4.
Available at: <http://scholarworks.uni.edu/pias/vol91/iss3/4>

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Repeat of a 1916 Bird Census in Northwestern Iowa

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On 17 June 1982, a census of birds was taken on a section of farmland in Woodbury County, Iowa, to repeat earlier censuses in 1916 and 1926. A total of 41 species and 359 individuals were counted; 19 species were common to all three censuses. In general, between-year comparisons show great similarity in the bird life for the three censuses. Farmsteads, riparian and pastures (in this order) were the habitat classes with highest bird densities. The three most abundant species (House Sparrows, Barn Swallows and European Starlings) were found on farmsteads; the next two most common species (Western Meadowlark and Grasshopper Sparrow) were prairie species found in pastures.

INDEX DESCRIPTORS: bird census, bird populations, habitat change, habitat preferences, population change, Woodbury County

On 25 and 26 July 1916, Arthur R. Abel tried to count all the birds on section 11 (640 acres) of Woodbury township (T88N, R47W) of Woodbury County, Iowa. His results showed the presence and abundance of 31 species among 12 land use categories (Abel 1920). Abel expressed his hope that his census might provide a base for future comparisons. Ten years later, on 10 June 1926, Charles J. Spiker repeated this census (Spiker 1927). Spiker noted 35 species among 7 land use categories and commented on the differences between his census and Abel's results. I visited section 11 on 17 June 1982, and made another bird census.

METHODS

Both Abel and Spiker censused all birds in a single pass over section 11. I was able to completely census the area in a single day. I made no preliminary survey of the area other than casual observations while I visited land owners on 16 June. Beginning at 0600 CDT on 17 June, I slowly walked the whole section, starting in the southeast corner and making a circuit around the eastern half section, and then travelling to the western half to complete coverage. I followed the procedures outlined in the census instructions given in W. W. Cooke (1915). The method could be described as a zig-zagging strip census with spot mapping used to minimize repeated counting of individual birds. The census was completed by 1300 CDT. Sky conditions were overcast. Temperature ranged from 15 to 26° C and 1.0 cm precipitation was recorded for the day (but not during the time of the census). My censusing route was planned so that the low bird density areas (e.g., crop fields) would be covered later in the day when bird activity had diminished. In general, I spent more time per unit area at farmsteads and in pastures and along Little Whiskey Creek, areas I expected (and which actually had) more birds, and less time in areas with few birds. The intensity of my coverage also varied. All areas within farmsteads and along the stream were approached to within 10-20 m, all areas in pastures within 100-150 m, and areas within crop fields within 200-250 m. Visibility was not hindered in crop fields. Corn was not more than 20 cm tall, soybeans were emerging, the clover field had been recently mowed, and the oats were about 60 cm tall. Undoubtedly, some birds present in section 11 were missed, but I feel the census detected all breeding species and closely approximated numbers of each species present.

Identity and location of all birds were mapped on habitat maps showing field boundaries. Birds in high direct flight were not included. Thus excluded were about 100 European Starlings in several small flocks, 1 Great Blue Heron (*Ardea herodias* Linnaeus), and 1 Canada Goose (*Branta canadensis* Linnaeus). I used 8 x 30 binoculars and (for the eastern half section) a 20 x 60 telescope.

RESULTS

On the 17 June 1982 census, 41 species and 359 individual birds were seen (Table 1). Of this total, 19 species had been recorded on both of the earlier censuses and 12 species were additions to the lists of Abel and Spiker. Six species that were seen in both 1916 and 1926 were not seen. The census results of 1916 and 1926 are included in Table 1 for comparison. The birds seen in 1982 are partitioned among 7 land use categories (see Figure 1).

Much similarity between the census results is evident. Pearson product moment correlations show similar abundance patterns between years: for the 1916-1926 comparison of the 25 species in common, $r = 0.74$ ($t = 5.32$, $P < 0.001$); for the 1926-1982 comparison of the 27 species in common, $r = 0.71$ ($t = 5.08$, $P < 0.001$); and for the 1916-1982 comparison of the 21 species in common, $r = 0.58$ ($t = 3.07$, $P < 0.01$).

DISCUSSION

There are few early efforts to census birds in North America. The start of bird census work began shortly after 1900 (Hickey 1981). The U.S. Biological Survey began a volunteer program of bird censuses in 1914 (M. T. Cooke 1923, W. W. Cooke 1915, 1916) and Abel's effort was likely inspired by this program. The Biological Survey recommended choosing a 40-80 acre (16.2-32.4 ha) area which included croplands, fields and woods, along with farm buildings, in approximate proportions to the region as a whole (W. W. Cooke 1915). This early work of the Biological Survey found bird densities to be about 2 pairs/ha (1 pair/acre) on farms in northeastern U.S. (W. W. Cooke 1915:6). Abel's 1916 census seems very compatible with these early results.

Abel described section 11 as an area which had been "typical of the upland prairie" (Abel 1916:385). Woodbury County no longer has extensive tallgrass prairie vegetation and did not in 1916. Woodbury County was settled in 1848 and quickly changed from prairies to the mosaic of vegetation types associated with modern agriculture. Iowa, by 1900, had only remnants of its original vegetation. Since 1900, farming has become increasingly mechanized, and the mixture of pasture, prairies and croplands has changed to become extensive croplands (Dinsmore 1981).

By 1916, much of section 11 had been farmed (Figure 1). The similar results among the three census years (1916, 1926, and 1982) suggest that changes in bird populations from pre-settlement prairie bird communities had already taken place prior to 1916.

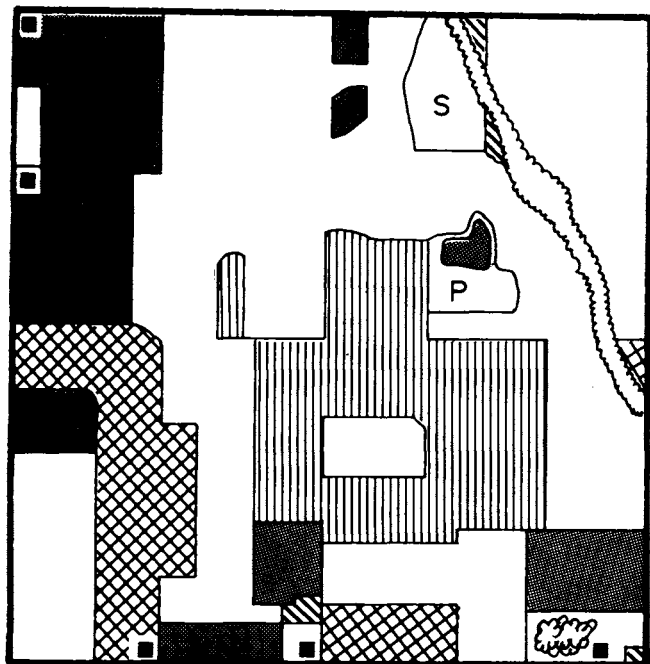
Prairie bird communities have few species of birds present; typically from 1 to 9 non-game species at densities of 1.8 to 3.3 individuals/ha are censused in grassland habitats (Wiens and Dyer 1975). Two

Table 1. List of birds seen during censuses of section 11 of Woodbury Township (T88N, R47W) of Woodbury County, Iowa.

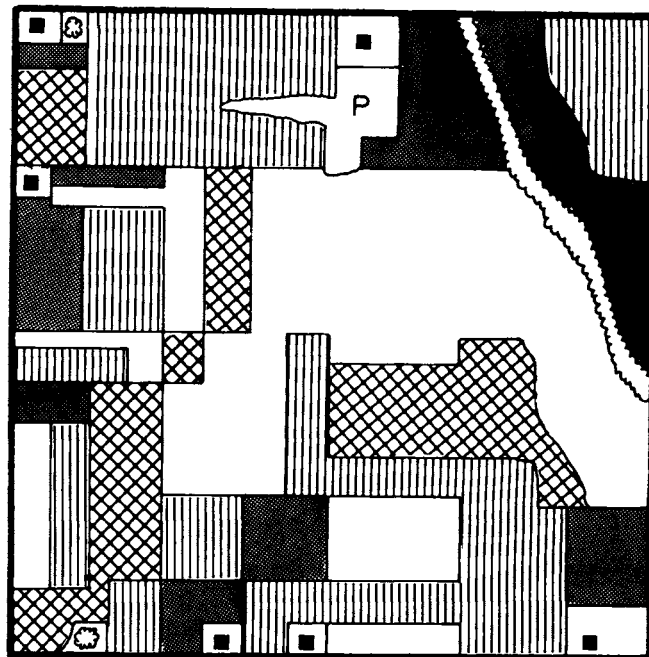
Species	25 July 1916	10 June 1926	17 June 1982
Northern Harrier, <i>Circus cyaneus</i> (Linnaeus)	5	-	-
American Kestrel, <i>Falco sparverius</i> Linnaeus	-	-	1
Ring-necked Pheasant, <i>Phasianus colchicus</i> Linnaeus	-	-	2
Killdeer, <i>Charadrius vociferus</i> Linnaeus	-	2	4
Rock Dove, <i>Columba livia</i> Gmelin	-	-	6
Mourning Dove, <i>Zenaidura macroura</i> (Linnaeus)	17	2	14
Yellow-billed Cuckoo, <i>Coccyzus americanus</i> (Linnaeus)	5	-	1
Eastern Screech-Owl, <i>Otus asio</i> (Linnaeus)	1	-	-
Burrowing Owl, <i>Athene cunicularia</i> (Molina)	5	3	-
Common Nighthawk, <i>Chordeiles minor</i> (Forster)	-	1	-
Chimney Swift, <i>Chaetura pelagica</i> (Linnaeus)	-	-	7
Red-headed Woodpecker, <i>Melanerpes erythrocephalus</i> (Linnaeus)	8	10	6
Downy Woodpecker, <i>Picoides pubescens</i> (Linnaeus)	-	-	3
Hairy Woodpecker, <i>Picoides villosus</i> (Linnaeus)	-	1	2
Northern Flicker, <i>Colaptes auratus</i> (Linnaeus)	5	6	-
Eastern Phoebe, <i>Sayornis phoebe</i> (Latham)	-	2	-
Western Kingbird, <i>Tyrannus verticalis</i> Say	-	-	5
Eastern Kingbird, <i>Tyrannus tyrannus</i> (Linnaeus)	29	13	12
Horned Lark, <i>Eremophila alpestris</i> (Linnaeus)	15	7	4
Northern Rough-winged Swallow, <i>Stelgidopteryx serripennis</i> (Audubon)	-	2	5
Bank Swallow, <i>Riparia riparia</i> (Linnaeus)	42	4	-
Barn Swallow, <i>Hirundo rustica</i> Linnaeus	43	5	28
Blue Jay, <i>Cyanocitta cristata</i> (Linnaeus)	3	1	1
American Crow, <i>Corvus brachyrhynchos</i> Brehm	-	6	1
Black-capped Chickadee, <i>Parus atricapillus</i> Linnaeus	5	2	2
House Wren, <i>Troglodytes aedon</i> Vieillot	-	4	6
American Robin, <i>Turdus migratorius</i> Linnaeus	9	5	11
Gray Catbird, <i>Dumetella carolinensis</i> (Linnaeus)	1	1	2
Brown Thrasher, <i>Toxostoma rufum</i> (Linnaeus)	3	5	6
Loggerhead Shrike, <i>Lanius ludovicianus</i> Linnaeus	1	-	-
European Starling, <i>Sturnus vulgaris</i> Linnaeus	-	-	36
Warbling Vireo, <i>Vireo gilvus</i> (Vieillot)	-	4	2
Yellow Warbler, <i>Dendroica petechia</i> (Linnaeus)	2	5	-
Common Yellowthroat, <i>Geothlypis trichas</i> (Linnaeus)	7	1	3
Rose-breasted Grosbeak, <i>Pheucticus ludovicianus</i> (Linnaeus)	-	-	1
Blue Grosbeak, <i>Guiraca caerulea</i> (Bonaparte)	-	-	1
Indigo Bunting, <i>Passerina cyanea</i> (Linnaeus)	1	-	3
Dickcissel, <i>Spiza americana</i> (Gmelin)	73	51	5
Chipping Sparrow, <i>Spizella passerina</i> (Bechstein)	-	-	1
Field Sparrow, <i>Spizella pusilla</i> (Wilson)	13	7	6
Vesper Sparrow, <i>Pooecetes gramineus</i> (Gmelin)	-	-	2
Lark Sparrow, <i>Chondestes grammacus</i> (Say)	1	3	-
Grasshopper Sparrow, <i>Ammodramus savannarum</i> (Gmelin)	13	16	15
Swamp Sparrow (?), <i>Melospiza georgiana</i> (Latham)	1	-	-
Bobolink, <i>Dolichonyx oryzivorus</i> (Linnaeus)	-	-	5
Red-winged Blackbird, <i>Agelaius phoeniceus</i> (Linnaeus)	21	7	-
Western Meadowlark, <i>Sturnella neglecta</i> Audubon	48	24	22
Common Grackle, <i>Quiscalus quiscula</i> (Linnaeus)	1	23	14
Brown-headed Cowbird, <i>Molothrus ater</i> (Boddaert)	6	7	9
Orchard Oriole, <i>Icterus spurius</i> (Linnaeus)	-	1	4
Northern Oriole, <i>Icterus galbula</i> (Linnaeus)	-	7	7
American Goldfinch, <i>Carduelis tristis</i> (Linnaeus)	23	6	2
House Sparrow, <i>Passer domesticus</i> (Linnaeus)	60	60	91
unidentified	13	7	-
Total species	31	35	41
Total individuals	474	311	359

Note: On 16 June, 1983, 1 Wood Duck (*Aix sponsa* [Linnaeus]), 2 Great Horned Owls (*Bubo virginianus* [Gmelin]) and 1 Black-billed Cuckoo (*Coccyzus erythrophthalmus* [Wilson]) were seen along the east boundary of the section.

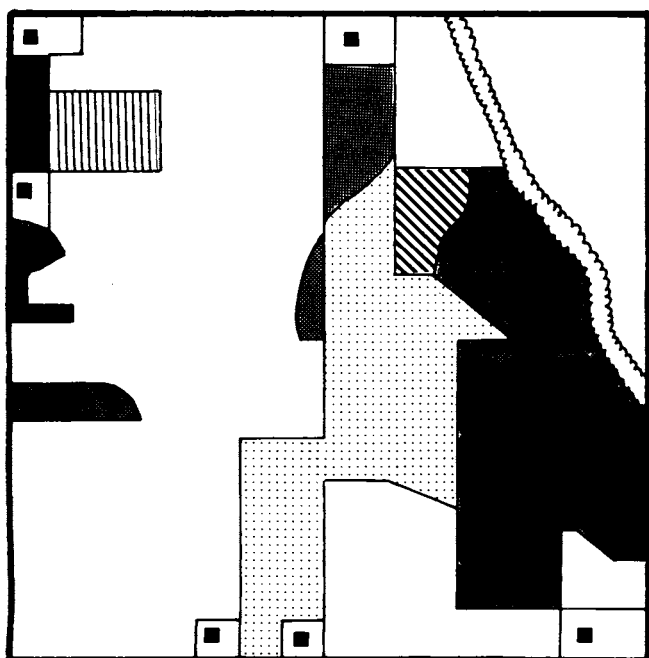
25-26 JULY 1916










10 JUNE 1926



17 JUNE 1982



-  CORN
-  PASTURE OR MEADOW
-  OATS
-  ALFALFA
-  SOYBEANS
-  OTHER CROPS
-  FARMSTEAD

S - SWAMP ; P - PLOWING

Fig. 1. Maps showing the distribution of land uses on section 11 of Woodbury Township (T88N, R47W) of Woodbury County, Iowa, at the times the 3 censuses were taken. Conditions in 1916 and 1926 were taken from Able (1920) and Spiker (1927), respectively. Little Whiskey Creek cuts across the northeast corner of the section.

Table 2. Bird densities within land use habitats for all three censuses. In 1916, the "creek" included a 7.3 ha "swamp" or "slough". Farmstead includes "grove" and "orchard" of 1916 and 1926 censuses since these areas were near farm buildings. In 1982, "roadside" and "flying" birds were included in the neighboring habitat classes. 1 section = 640 acres = 259.1 ha (rounding errors in totals).

	1916 Census			1926 Census			1982 Census		
	Area	Birds	Bird/ha	Area	Birds	Bird/ha	Area	Birds	Bird/ha
Corn	117.4	5	0.0	75.7	16	0.2	170.4	42	0.2
Oats	44.9	17	0.4	82.6	25	0.3	4.8	3	0.6
Alfalfa	28.3	129	4.6	35.2	23	0.6	---	---	---
Pasture	28.3	53	1.9	51.4	39	0.8	43.7	62	1.5
Meadow	18.2	45	2.5	---	---	---	---	---	---
Cane	4.9	0	0.	---	---	---	---	---	---
Creek/swamp	4.9	59	12.0	2.0	32	16.0	2.1	38	18.1
Plowed	2.8	1	0.4	5.7	15	2.6	---	---	---
Farmstead	8.1	85	10.5	6.5	68	10.5	8.2	199	24.3
Clover	0.8	0	0.	---	---	---	3.5	9	2.6
Potatoes	0.4	0	0.	---	---	---	---	---	---
Soybeans	---	---	---	---	---	---	26.6	3	0.1
Roadside	---	36	---	---	68	---	---	---	---
Flying	---	44	---	---	25	---	---	---	---
Total	259.0	474	1.8	259.1	311	1.2	259.3	359	1.4

years of censuses of three prairie remnant sites in northwest Iowa produced values of 1.6 to 3.2 pairs/ha (mean, 2.4 pairs/ha; Lowther 1983, 1984). Overall bird density in section 11 is lower (1.4 individuals/ha) but more species occur in the present mosaic of habitats. Crop fields totalled 79% of section 11 but only 16% of the birds were seen on these lands; pasture areas comprised 17% of the land area and 17% of total birds seen. Most birds were seen in the two habitat areas with trees — farmstead areas included 3% of land area but 55% of all birds seen and the streamside area included 1% of the section and 11% of the birds. As habitat complexity became greater — from crop fields to pasture to farmsteads — the diversity of birds, in terms of numbers of species and individuals, also increased (Tables 2; Tramer 1969).

Graber and Graber (1976) in their work showing species-area relationships in Illinois, give charts to estimate the number of species expected for different habitat categories. For crop fields of 100 to 200 ha in extent, they predict 10 to 15 species of birds. I recorded 16 species from the 205 ha of croplands in section 11. For small areas of forest, the Grabers expect 5 to 14 species in wooded areas about 5 ha in size. In the 2.1 ha riparian habitat along Little Whiskey Creek, I found 16 species. In terms of number of species seen, results of my census seem typical of Midwestern habitats.

These censuses of section 11 provide snapshots of bird populations taken at infrequent and long intervals. Their value in detecting trends in population changes are only of limited value. For most species, between-census differences are likely well within the range of normal fluctuations in population size. Also, these three censuses were taken during different times of the breeding season: Abel's count in late July likely included many young birds; Spiker's and my visits in mid-June are more directly comparable. Certain changes can be commented upon and are likely results of regional, long-term trends.

Two introduced species, the European Starling and Ring-necked Pheasant, have established themselves in Woodbury County since 1916. Pheasants had been introduced in the area in 1900 and finally became established by 1928 (Farris et al. 1977). Starlings were first recorded in Woodbury County in 1933 (DuMont 1945). Breeding Bird Survey data have shown starling populations to have increased in numbers between 1966 and 1976 (Dolbeer and Stehn 1979). Rock Doves were not recorded in either the 1916 or 1926 census, but were likely already present in northwest Iowa. (It may be that Rock Doves were not considered "wild" birds; none of the Biological Survey's census reports mention this species — e.g., M. T. Cooke 1923.)

Hawk, owl and shrike populations have shown general and long-term declines in Iowa (Brown 1971, Dinsmore 1981). The lack of these predatory species is evident in the 1982 census.

Graber and Graber (1963) compared Illinois bird populations censused around 1906 and 1956. This 50 year interval spans much the same time period for which section 11 has been censused. The Grabers noted an increase in numbers of Horned Larks but counts listed in Table 1 suggest, instead, a decline. Horned Larks are considered tolerant of habitat shifts from grassland to row crops (Hurley and Franks 1976). Horned Larks are tolerant also of heavy grazing (Kantrud 1981). Killdeer populations were also favored by increased areas of row crops in Graber and Graber's (1963) assessment of Illinois bird life. Zimmerman (1979) recently noted increases in Killdeer populations from Breeding Bird Survey data from Kansas. Table 1 suggests similar increases for section 11.

Red-winged Blackbirds were not seen in 1982. Dolbeer and Stehn (1979) analyzed Breeding Bird Survey data and found recent increases in redwing populations. Graber and Graber (1963) also found that this species increased in Illinois between 1906 and 1956. The absence of Red-winged Blackbirds was quite unexpected and not really noticed until final tabulations were made.

Other blackbird species — Common Grackle and Brown-headed Cowbird — have been found to be increasing in numbers in northwest Iowa (Dolbeer and Stehn 1979), but it is hard to view this trend from census data in Table 1.

In 1982, Dickcissel numbers were much lower than earlier censuses. Recent observations have indicated a regional decline of Dickcissels that is of concern to ornithologists (Tate and Tate 1982).

Future farming activity will have greatest influence on the bird life in section 11. The farmsteads and streamside areas provide habitat diversity and attract most of the birds. Grassland species will maintain their populations if pastures remain. Kantrud (1981) noted that Grasshopper Sparrow numbers declined in response to heavy grazing but other grassland species (Bobolink and Western Meadowlark) did not. Blankespoor (1980) found Grasshopper Sparrows to tolerate grazing (95 cattle/65 ha for 45 days) and drought conditions in a restored prairie area.

If the present habitat diversity is maintained, bird diversity will remain much the same as in the past. Minor fluctuations in numbers of most species and occasional additions or losses from the list are to be expected.

ACKNOWLEDGEMENTS

I am grateful to landowners in section 11 for permission to visit their property: Vanner Stoneburg, Carl H. Braun, Ray and Wilbur Grohs, Harold Grohs, Orville Davis, and Maurice Uhl. Although the results discussed here are my own census efforts, this report represents part of a larger group activity. Peter J. Taft, Wade J. Olson, and Dean L. Cox accompanied me to the site; Taft mapped land uses, and Olson and Cox together independently undertook a replicate census. Both of our results were highly compatible ($r = 0.91$) and their efforts, though not discussed directly, helped my understanding and gave me confidence in my results. Iowa Lakeside Laboratory assisted in logistic support of our trip to Sioux City.

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