



**Grassland Bird Surveys in Missouri's Priority Geographies  
2015 - 2020**





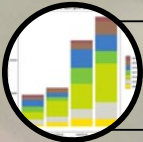
P.O. Box 16  
Arrow Rock, MO 65320  
660.837.3888  
<https://mrbo.org>

## Our Mission



### Conservation

To contribute to the conservation of Missouri's migratory and resident birds through scientific research, community outreach, and education.



### Science

To gather information about avian communities and habitat use that will assist state, federal, and private natural resource managers in their efforts to implement conservation programs.



### Education & Outreach

To provide opportunities for Missourians of all ages to learn about species and their habitats.



### Advocacy

To advocate for sound, science-based conservation policy that benefit birds, other wildlife and environmental quality.



Henslow's Sparrow by Andrew Reago and Chrissy McClaren

The MRBO Grassland Bird Survey Program is conducted in cooperation with



This report is submitted in partial fulfillment of MDC Cooperative Agreement #311A

## Background

The Missouri River Bird Observatory (MRBO) has been conducting breeding season surveys of grassland birds in Missouri since 2012. In 2013, MRBO and the Missouri Department of Conservation (MDC) formed a partnership to pursue long-term population monitoring on Missouri's most important publicly-managed grasslands and cooperating private lands. The overarching goals are to track the populations of our imperiled grassland bird species over time and to assess the effects of management activities. To address the latter, MRBO conducts a sub-study focused on bird response to patch-burn grazing which is presented in a separate document (please see [https://mrbo.org/mrbo-reports/2020\\_mrbo\\_pbg\\_report/](https://mrbo.org/mrbo-reports/2020_mrbo_pbg_report/)).

The standardized breeding season surveys are conducted using line-transect Distance sampling. Public and private properties are sampled on a yearly or every-other-year basis depending on their status as restoration sites, private cooperators, or sites undergoing concurrent MDC research. Thus, the number of sites surveyed is variable by year but represents an adequate sample of available quality bird habitat within Priority Geographies (PG) or Conservation Opportunity Areas (COA). A small number of sites are surveyed outside of PGs and COAs, typically upon request of private cooperators and other NGO partners. (Note: in 2020, surveys were somewhat curtailed by the coronavirus pandemic; the MRBO field crew was limited geographically to sites within a short distance of established lodging).

The density estimates resulting from grassland bird surveys provide both a year-to-year assessment of grassland bird population trends as well as a means by which to compare various geographies across the state. MRBO also evaluates the quality of bird habitat provided by each surveyed property by calculating a "bird-friendliness score". This score is a measure of a property's avian diversity and density coupled with an assessment of the conservation concern level of the bird species present. Data for all years (2012-present) are available in previous years' reports (<https://mrbo.org/mrbo-reports/>) and within an ArcGIS Online database accessible by partners. Due to space constraints, the following report displays the results from just the last six years (2015-2020) of breeding season surveys in Missouri's most important grassland landscapes. A basic summary of the sites surveyed each year since 2012 and the number of grassland obligate birds detected at each site is provided in the Appendix on pages 16-19.

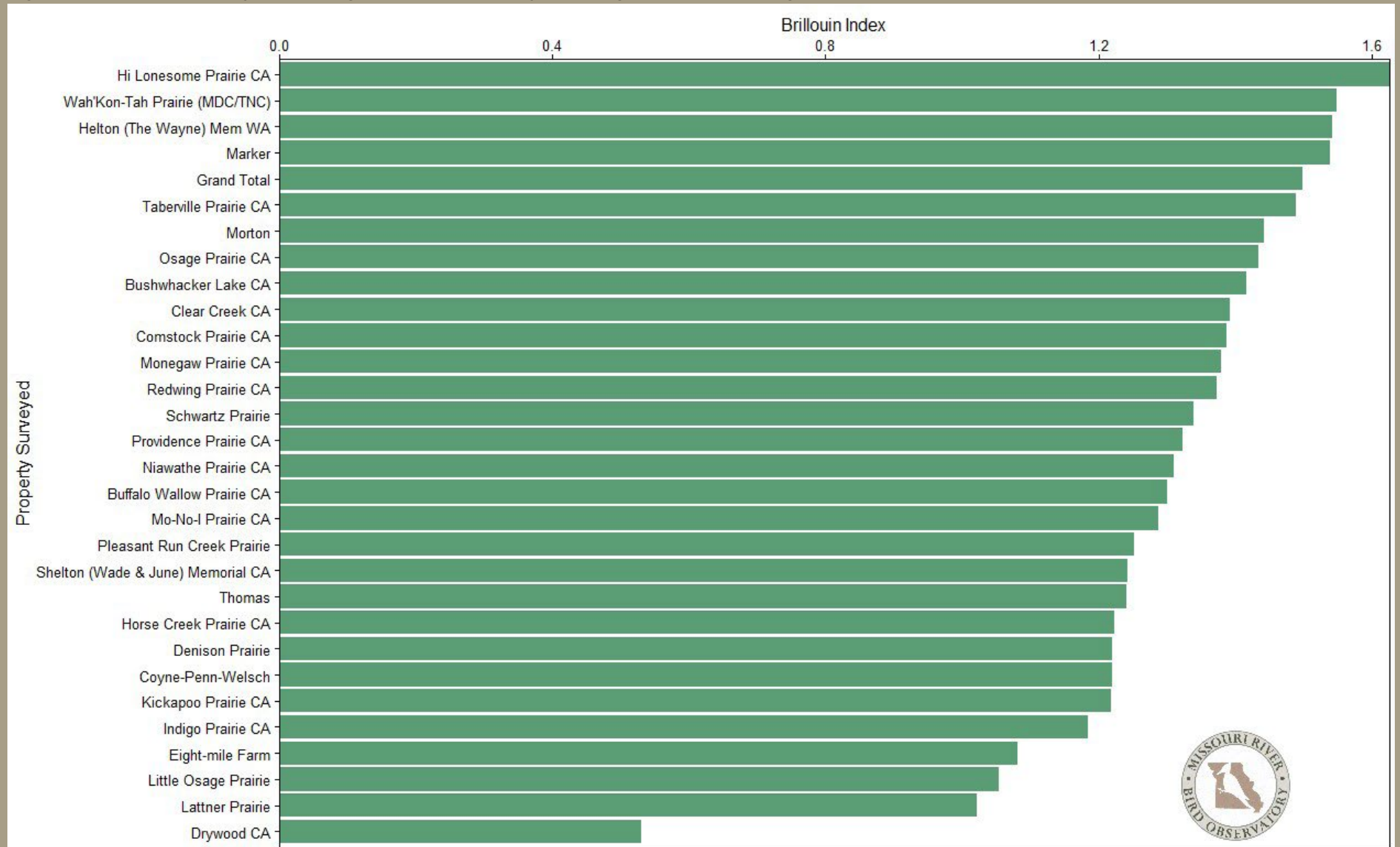
## 2020 Survey Results

Data for twelve target species of conservation concern were analyzed from 400m transect survey areas across a selection of publicly- and privately-owned grassland properties. Species densities were calculated for the broad Conservation Opportunity Areas (COAs) and Priority Geographies (PGs) using the program Distance. Species densities represented in the tables on pages 7-15 represent an estimate for the number of birds per 100 acre of grassland habitat occurring within the PG or COA. The number of birds detected (N) is presented for all birds, but densities were only calculated for sample sizes exceeding 20 birds per PG or COA. In addition to densities for each species, a total density of the 12 target species was calculated and is presented as the number and density of Grassland Obligates (GOs).

Densities were then calculated for each property where the sample size of a given species was >10. A Brillouin diversity index (Figure 1) was calculated for each property to capture differences in diversity. Maximum Brillouin Diversity was 1.62495 at Hi Lonesome Prairie. The average diversity score was 1.3079. Other than Drywood Conservation Area, there was little difference in diversity between sites.



Figure 1. Brillouin Diversity Index for grassland sites surveyed during the 2020 breeding season.

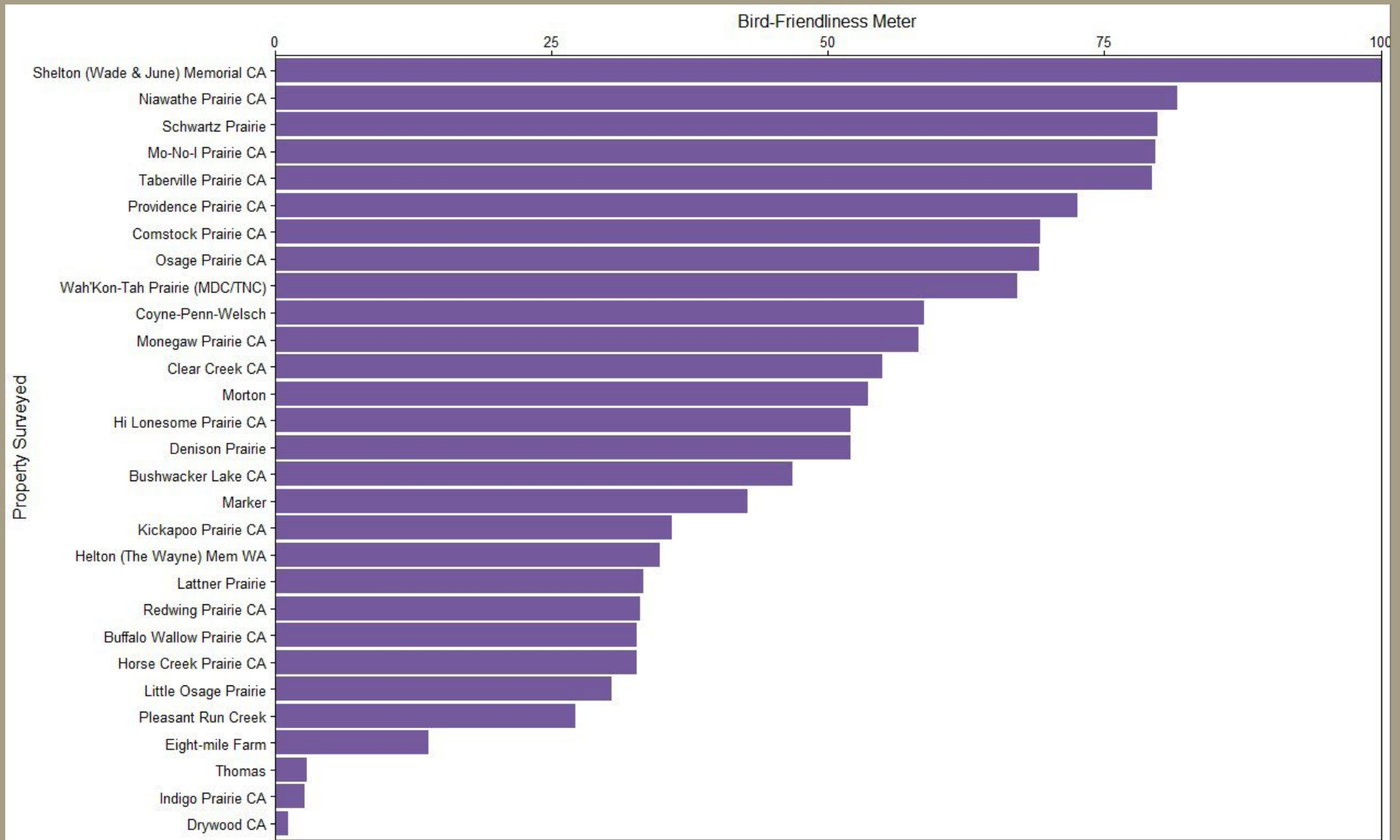


An additional measure for each property was a composite conservation score. The composite score is calculated from the density of our target grassland birds (above) times the conservation rank. Conservation rank for each bird species used were developed by the MDC (please see: <https://mdc.mo.gov/sites/default/files/downloads/MOBirdConservationPlanTech.pdf>) for birds that maintain at least 5% of their breeding population in the state of Missouri. Other grassland-obligate birds were ranked according to their Partners in Flight (PIF) ranking. Maximum composite score was found at Shelton Memorial CA, with a score of 34.63. The mean score was 15.44. Thomas, Indigo Prairie, and Drywood CA did not have large enough populations of any individual species to calculate a density or earn a composite conservation score.

The preceding scores were combined to calculate an overall 'Bird Friendliness' ranking for each property. Bird friendliness scores were calculated as the composite score times the Brillouin diversity for each property. If a property did not have a composite score (due to populations of each target species being below the 10-bird threshold), then the Brillouin diversity was used to represent their score. Bird-friendliness scores closely mirrored the conservation composite scores, largely due to the minimal difference in the diversity scores between each property. Shelton again achieved the highest bird-friendliness score at 43.02. The mean score was approximately half of Shelton's score, at 20.75.

The bird-friendliness score was used to develop a bird-friendliness meter (Figure 2), wherein each property is expressed as a percentage of the highest score.

Figure 2. Bird-Friendliness Meter for grassland sites surveyed during the 2020 breeding season.



As a whole, density of grassland obligate birds per acre was slightly higher than previous years. As will be elaborated on below, much of this trend is buoyed by Dickcissel numbers; this species comprises the largest proportion of grassland obligates detected.

### Species-specific Trends

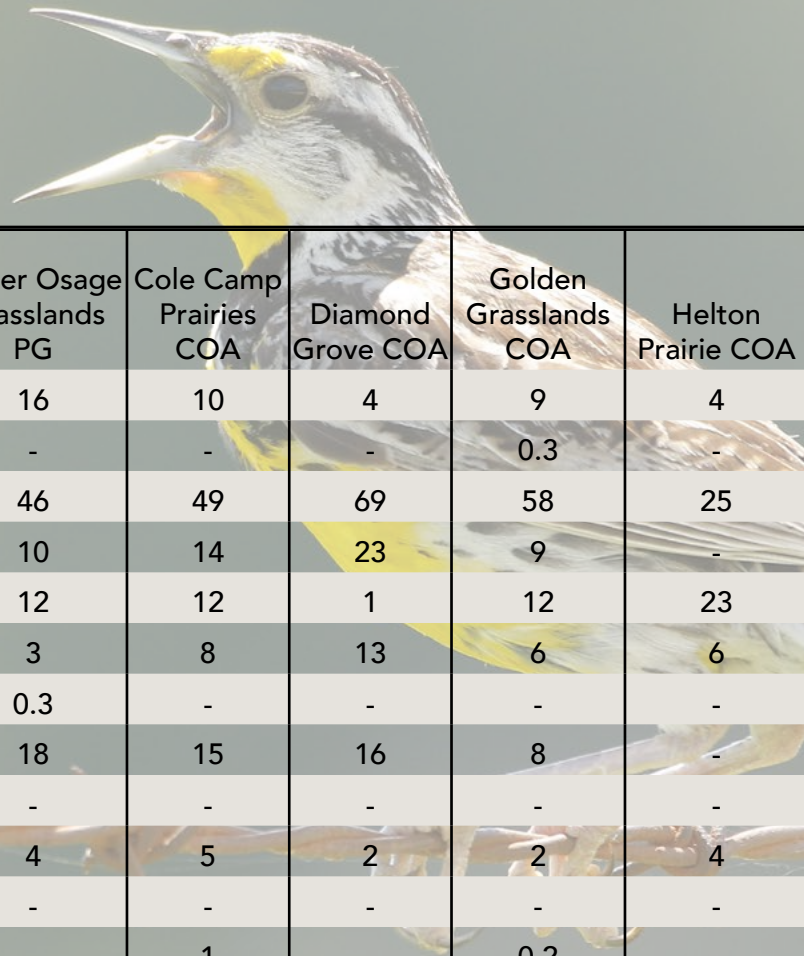
- » Bell's Vireo: The density of Bell's Vireo detections per acre was significantly greater than last year, though as most properties are surveyed on a two-year rotation, the properties surveyed in 2020 are not the same ones that were surveyed in 2019. Comparison of density at the same sites showed a mixture of increases and decreases (only one density was significantly different - a significant increase at Wah'Kon-Tah). Overall data suggest the population is relatively stable.
- » Bobolink: properties surveyed in 2020 did not (and typically do not) contain enough Bobolink to draw any conclusions on population trends.
- » Dickcissel: The density of Dickcissels per acre was significantly greater than last year, though, as most properties are surveyed on a two year rotation, the properties surveyed in 2020 are not the same ones that were surveyed in 2019. When comparing Dickcissel density at the same sites in previous years (2018 & 2016) the results differed. Densities were lower for most sites than in 2018, but similar or slightly higher than the same sites in 2016. This also suggests the population is relatively stable in Missouri.
- » Eastern Meadowlark: Densities of Eastern Meadowlark continue to decline year-over-year at the same sites, leading to a significant decline since 2016, though the difference is slight (not significant) in a direct comparison (e.g., 2018 was lower than 2016, though not significantly, and 2020 was lower than 2018, though not significantly, leading to 2020 being significantly lower than 2016). It is also worth noting that many sites did not contain enough detections to calculate a density of birds, including some sites that used to contain an adequate sample size.
- » Field Sparrow: When comparing Field Sparrow densities at the sites surveyed in 2018, results are mixed. Field Sparrow numbers fluctuated in both directions, with no differences being significant. It is worth noting that some sites had larger numbers of Field Sparrow that allowed for estimating density which had not been possible in past years.
- » Grasshopper Sparrow: The density of Grasshopper Sparrows per acre was slightly lower than last year, and density in 2019 was significantly lower than densities observed in 2018. It is difficult to compare densities at the same sites, because few sites have a substantial enough population to estimate. In general, it would appear the population of Grasshopper Sparrows in Missouri is in decline.
- » Henslow's Sparrow: Henslow's Sparrow populations appear to be improving across the state. The density of Henslow's Sparrows per acre was significantly higher than last year; also, when comparing densities at the same sites surveyed in 2018, the increasing trend is still detected. Most sites have slight increases year-over-year. It is worth noting that more sites had large enough sample sizes in 2020 that we were able to calculate densities in whereas we had been unable to do so in previous years.
- » Northern Bobwhite: The density of Northern Bobwhite per acre was slightly greater than last year, however, when comparing densities at the same sites results are mixed. Bobwhite numbers fluctuated in both directions, with no differences being significant. It is worth noting that, while most densities were slightly lower, some 2020 sites had sufficient sample sizes for estimating density that had not in the past.
- » Common Nighthawk, Greater Prairie Chicken, Loggerhead Shrike, Sedge Wren, and Upland Sandpiper: While these are all important grassland obligate birds and are a treat to find when detected, properties surveyed in 2020 did not (and typically do not) contain enough of any of these species to draw any conclusions on population trends. Detections of these species do get incorporated in to the grassland obligate overall numbers.



Dickcissel fledgling by Erik Ost

# Overall Grassland Bird Densities by Geography 2015-2020

Birds per 100 acres in Missouri's Priority Geographies and Conservation Opportunity Areas



	Grand River Grasslands PG	Upper Osage Grasslands PG	Cole Camp Prairies COA	Diamond Grove COA	Golden Grasslands COA	Helton Prairie COA	Liberal Prairie COA	Prairie Forks COA	Outside of PG or COA
Bell's Vireo	1	16	10	4	9	4	14	-	2
Bobolink	43	-	-	-	0.3	-	2	-	8
Dickcissel	39	46	49	69	58	25	67	16	36
Eastern Meadowlark	11	10	14	23	9	-	7	-	10
Field Sparrow	4	12	12	1	12	23	6	20	9
Grasshopper Sparrow	20	3	8	13	6	6	2	-	9
Greater Prairie-Chicken	0.3	0.3	-	-	-	-	-	-	-
Henslow's Sparrow	12	18	15	16	8	-	8	8	4
Loggerhead Shrike	-	-	-	-	-	-	-	-	-
Northern Bobwhite	3	4	5	2	2	4	3	3	2
Sedge Wren	6	-	-	-	-	-	-	-	-
Upland Sandpiper	2	-	1	-	0.2	-	-	-	-
Grassland Obligate Guild	126	102	109	123	97	62	98	48	75

The following tables display grassland bird data from 2015 to 2020. Density estimates and associated coefficients of variance are only displayed when sample size exceeded 20 detections; if estimates were not possible, N is still reported while D and CV are denoted by a "-". Individual species are not included in tables if the species was never detected in a geography in any year.

N = number of individual birds detected; D = density estimate in birds per 100 acres; CV = coefficient of variance.

Please note that the following results are based on a spatially-explicit dataset of over 100,000 grassland bird detections. The full dataset is available to all project partners in ArcGIS Online. Please contact ethan.duke@mrbo.org for access.

## Grand River Grasslands Priority Geography

	2015			2016			2017			2018			2019			2020		
	6 properties sampled			5 properties sampled			2 properties sampled			3 properties sampled			2 properties sampled			0 properties sampled		
Species	N	D	CV	N	D	CV	N	D	CV	N	D	CV	N	D	CV	N	D	CV
Bell's Vireo	18	-	-	17	-	-	15	-	-	11	-	-	9	-	-	-	-	-
Bobolink	474	49	0.12	214	32	0.19	484	54	0.12	144	16	0.17	239	82	0.19	-	-	-
Dickcissel	476	36	0.08	260	23	0.1	380	35	0.09	349	42	0.09	220	36	0.1	-	-	-
Eastern Meadowlark	273	16	0.09	181	13	0.1	148	11	0.1	99	9	0.13	104	14	0.11	-	-	-
Field Sparrow	68	6	0.17	36	4	0.24	40	5	0.24	28	3	0.25	38	6	0.24	-	-	-
Grasshopper Sparrow	254	0.18	0.11	214	17	0.12	53	5	0.22	215	27	0.13	45	6	0.21	-	-	-
Greater Prairie-Chicken	16	-	-	1	-	-	17	-	-	1	-	-	0	-	-	-	-	-
Henslow's Sparrow	256	21	0.11	141	11	0.17	109	11	0.16	55	7	0.35	98	17	0.12	-	-	-
Loggerhead Shrike	5	-	-	2	-	-	8	-	-	5	-	-	0	-	-	-	-	-
Northern Bobwhite	80	3	0.15	66	4	0.18	120	6	0.11	39	2	0.2	17	-	-	-	-	-
Sedge Wren	57	5	0.26	81	7	0.24	161	15	0.14	0	-	-	82	21	0.21	-	-	-
Upland Sandpiper	24	2	0.3	3	-	-	26	2	0.34	6	-	-	13	-	-	-	-	-
Grassland Obligate Guild	2013	145	0.05	1204	106	0.07	1563	144	0.05	940	108	0.06	853	137	0.08	-	-	-

**The Grand River Grasslands PG was not surveyed in 2020 due to travel limitations caused by the coronavirus pandemic. The following notes are from 2019:** Populations of most grassland bird species, and the grassland obligate guild as a whole, have fluctuated mildly across years but remained relatively steady in this PG. For Grasshopper Sparrow, which prefer a sparser vegetation structure that is seldom available on public land, numbers fluctuate based primarily on whether or not the Frank Ranch is included in the sample; the Ranch was not surveyed in 2017 and 2019, causing a much lower sample size of this species. Northern Bobwhite and Upland Sandpiper numbers have declined since 2014. Sedge Wren numbers fluctuate based upon the breeding system of this species, which engages in a second nesting attempt in Missouri after first breeding further north; though MRBO surveys occur in the same late-June timeframe each year, Sedge Wren may or may not be present in significant numbers based on the species' breeding timing.



# Upper Osage Grasslands Priority Geography

	2015			2016			2017			2018			2019			2020		
	7 properties sampled			7 properties sampled			5 properties sampled			4 properties sampled			4 properties sampled			4 properties sampled		
	N	D	CV	N	D	CV	N	D	CV	N	D	CV	N	D	CV	N	D	CV
Bell's Vireo	345	16	0.1	247	12	0.09	337	18	0.08	337	25	0.08	305	16	0.08	323	28	0.08
Common Nighthawk	0	-	-	0	-	-	6	-	-	0	-	-	0	-	-	1	-	-
Dickcissel	873	0.37	0.08	887	39	0.1	949	46	0.09	870	59	0.06	768	39	0.08	99	49	0.07
Eastern Meadowlark	369	12	0.08	333	12	0.11	247	10	0.11	169	9	0.09	147	59	0.12	131	7	0.12
Field Sparrow	223	11	0.12	172	10	0.13	384	23	0.11	137	9	0.12	326	15	0.08	233	14	0.11
Grasshopper Sparrow	101	4	0.2	36	1	0.24	20	10	0.32	27	2	0.27	27	1	0.25	6	-	-
Greater Prairie-Chicken	8	-	-	12	-	-	2	-	-	8	-	-	10	-	-	-	-	-
Henslow's Sparrow	426	19	0.08	382	16	0.12	469	24	0.1	410	29	0.1	220	12	0.13	344	27	0.1
Loggerhead Shrike	6	-	-	0	-	-	2	-	-	0	-	-	0	-	-	-	-	-
Northern Bobwhite	130	3	0.12	88	3	0.14	212	6	0.1	117	4	0.13	166	4	0.11	174	4	0.08
Sedge Wren	0	-	-	0	-	-	5	-	-	1	-	-	0	-	-	15	-	-
Upland Sandpiper	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Grassland Obligate Guild	2470	100	0.05	2138	94	0.07	2566	123	0.05	2027	132	0.04	1904	93	0.06	1875	128	0.05

Densities were similar in 2020 to previous years for grassland obligates as a whole in the Upper Osage PG, with some non-significant oscillations. Dickcissel, Field Sparrow, and Henslow's Sparrow mirrored the overall oscillation. Bell's Vireo increased in density, while Eastern Meadowlarks declined. Northern Bobwhite populations appear to have remained steady.

# Cole Camp Prairies Conservation Opportunity Area

	2015			2016			2017			2018			2019			2020		
	13 properties sampled			1 property sampled			10 properties sampled			7 properties sampled			7 properties sampled			1 property sampled		
	N	D	CV	N	D	CV	N	D	CV	N	D	CV	N	D	CV	N	D	CV
Bell's Vireo	105	10	0.13	33	14	0.12	73	8	0.17	62	0.11	0.12	70	10	0.15	22	9.8	0.26
Common Nighthawk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dickcissel	542	46	0.08	89	32	0.15	303	31	0.12	286	48	0.09	326	41	0.08	79	26	0.17
Eastern Meadowlark	301	19	0.09	77	24	0.11	160	13	0.15	105	14	0.14	103	11	0.14	40	11	0.2
Field Sparrow	131	13	0.15	27	13	0.26	84	11	0.16	77	12	0.14	82	10	0.13	24	7	0.29
Grasshopper Sparrow	43	4	0.25	11	-	-	22	2	0.36	7	-	-	14	-	-	31	13	0.35
Henslow's Sparrow	191	17	0.17	85	29	0.2	191	21	0.15	69	12	0.25	32	4	0.35	46	18	0.25
Loggerhead Shrike	4	-	-	0	-	-	0	-	-	0	-	-	6	-	-	-	-	-
Northern Bobwhite	126	6	0.15	55	15	0.18	83	5	0.16	68	5	0.18	61	4	0.14	23	3	0.32
Sedge Wren	0	-	-	4	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Upland Sandpiper	23	2	0.36	17	-	-	3	-	-	6	-	-	13	-	-	10	-	-
Grassland Obligate Guild	1455	119	0.05	395	145	0.1	872	88	0.07	650	105	0.06	684	89	0.06	263	91	0.1

**Only Hi-Lonesome Prairie was sampled during the 2020 breeding season, so it is difficult to draw conclusions about the Cole Camp COA as a whole. However, extrapolated results suggest that grassland obligate densities were similar to previous years, and specifically for Northern Bobwhite, Henslow's Sparrow, and Bell's Vireo. Field Sparrow and Eastern Meadowlark showed a continued declining trend, while Dickcissel appeared to have a sharper decline than in previous years. Grasshopper Sparrow showed a promising increase.**

# Diamond Grove Conservation Opportunity Area

	2015			2016			2017			2018			2019			2020		
	2 properties sampled			3 properties sampled			2 properties sampled			2 properties sampled			3 properties sampled			0 properties sampled		
	N	D	CV	N	D	CV	N	D	CV	N	D	CV	N	D	CV	N	D	CV
Bell's Vireo	9	-	-	13	-	-	10	-	-	16	-	-	30	7	0.27	-	-	-
Common Nighthawk	0	-	-	0	-	-	0	-	-	1	-	-	4	-	-	-	-	-
Dickcissel	238	66	0.09	278	47	0.09	257	71	0.1	306	86	0.08	246	56	0.09	-	-	-
Eastern Meadowlark	151	32	0.13	166	24	0.1	93	21	0.11	129	28	0.13	125	20	0.1	-	-	-
Field Sparrow	2	-	-	3	-	-	2	-	-	1	-	-	14	-	-	-	-	-
Grasshopper Sparrow	107	29	0.15	32	5	0.21	34	10	0.29	23	7	0.31	32	6	0.26	-	-	-
Greater Prairie-Chicken	0	-	-	0	-	-	1	-	-	0	-	-	0	-	-	-	-	-
Henslow's Sparrow	73	22	0.22	52	8	0.23	90	27	0.15	54	16	0.24	60	15	0.2	-	-	-
Loggerhead Shrike	2	-	-	0	-	-	2	-	-	2	-	-	1	-	-	-	-	-
Northern Bobwhite	12	-	-	8	-	-	18	-	-	9	-	-	6	-	-	-	-	-
Upland Sandpiper	0	-	-	0	-	-	1	-	-	0	-	-	0	-	-	-	-	-
Grassland Obligate Guild	583	154	0.08	552	95	0.08	493	136	0.07	529	143	0.07	496	111	0.08	-	-	-

**The Diamond Grove COA was not surveyed in 2020 due to travel limitations caused by the coronavirus pandemic. The following notes are from 2019: Beneficial management coupled with the overall openness of the landscape in the Diamond Grove COA have contributed to its relatively steady grassland bird populations. MRBO documented a slight decrease in densities of most species in 2019; future years' surveys will elucidate whether this is a trend or a temporary phenomenon. Results from 2016 show a similar dip in densities followed by an increase. Though the results from each surveyed site are not presented here, we note that the patch-burn grazing unit of Diamond Grove Prairie Conservation Area had higher densities of most grassland obligate species than the main western unit.**

# Golden Grasslands Conservation Opportunity Area

	2015			2016			2017			2018			2019			2020		
	12 properties sampled			7 properties sampled			10 properties sampled			9 properties sampled			16 properties sampled			9 properties sampled		
	N	D	CV	N	D	CV	N	D	CV	N	D	CV	N	D	CV	N	D	CV
Bell's Vireo	157	10	0.13	109	9	0.14	147	8	0.14	175	12	0.11	217	9	0.1	64	14	0.18
Common Nighthawk	0	-	-	3	-	-	4	-	-	2	-	-	2	-	-	0	-	-
Dickcissel	648	39	0.1	628	48	0.14	1347	69	0.09	1171	72	0.07	1183	47	0.07	552	92	0.08
Eastern Meadowlark	216	10	0.12	103	7	0.15	286	12	0.1	163	8	0.11	227	7	0.1	65	8	0.19
Field Sparrow	210	14	0.11	144	14	0.14	228	15	0.12	205	12	0.09	307	11	0.09	30	0.5	0.25
Grasshopper Sparrow	160	9	0.15	28	2	0.29	103	5	0.18	52	0.3	0.24	67	2	0.2	5	-	-
Greater Prairie-Chicken	0	-	-	0	-	-	2	-	-	0	-	-	0	-	-			
Henslow's Sparrow	101	7	0.18	39	3	0.27	158	9	0.16	174	11	0.16	162	7	0.17	134	27	0.16
Loggerhead Shrike	2	-	-	0	-	-	2	-	-	0	-	-	2	-	-			
Northern Bobwhite	77	3	0.16	43	2	0.18	102	3	0.13	56	2	0.18	94	2	0.12	40	2	0.16
Sedge Wren	0	-	-	1	-	-	17	-	-	0	-	-	0	-	-	1	-	-
Upland Sandpiper	14	-	-	0	-	-	7	-	-	0	-	-	3	-	-	3	-	-
Grassland Obligate Guild	1578	91	0.07	1098	84	0.09	2389	121	0.06	1985	118	0.06	2221	86	0.06	858	150	0.11

**Densities were higher for grassland obligates as a whole in the Golden Grasslands COA in 2020. Northern Bobwhite and Eastern Meadowlark densities were steady, while Henslow's Sparrow and Dickcissel increased significantly. However, Field Sparrow density decreased sharply, and Grasshopper Sparrow counts decreased to a number below the threshold to calculate a density.**

## Helton Prairie Conservation Opportunity Area

	2015			2016			2018			2020		
	1 property sampled			1 property sampled			1 property sampled			1 property sampled		
	N	D	CV	N	D	CV	N	D	CV	N	D	CV
Bell's Vireo	2	-	-	7	-	-	14	-	-	13	-	-
Bobolink	0	-	-	0	-	-	0	-	-			
Common Nighthawk	-	-	-	-	-	-	-	-	-	-	-	-
Dickcissel	27	19	0.25	32	18	0.32	54	33	0.39	12	-	-
Eastern Meadowlark	4	-	-	2	-	-	8	-	-	20	9	0.38
Field Sparrow	28	23	0.26	45	34	0.2	45	26	0.29	50	4	0.16
Grasshopper Sparrow	8	-	-	12	-	-	15	-	-	13	-	-
Henslow's Sparrow	0	-	-	0	-	-	0	-	-	14	-	-
Northern Bobwhite	13	-	-	22	9	0.24	9	-	-	8	-	-
Sedge Wren	-	-	-	-	-	-	-	-	-	0	-	-
Upland Sandpiper	-	-	-	-	-	-	-	-	-	0	-	-
Grassland Obligate Guild	82	56	0.12	118	68	0.21	140	83	0.22	141	78	0.2

Since the Helton COA consists of just one study site (The Wayne Helton Memorial Wildlife Area), few species were detected in high enough numbers to estimate density. Grassland obligates as a whole showed a similar density to previous years, with a significant increase as compared to 2015. Helton COA had a decrease in Field Sparrow and increase in Eastern Meadowlark densities. The data suggest a positive response to significant woody control and ongoing management at the site.

# Liberal Prairie Conservation Opportunity Area

	2016			2018			2020		
	10 properties sampled			13 properties sampled			12 properties sampled		
	N	D	CV	N	D	CV	N	D	CV
Bell's Vireo	367	16	0.1	406	17	0.08	324	21	0.08
Bobolink	141	9	0.49	1	-	-	1	-	-
Common Nighthawk	1	-	-	3	-	-	0	-	-
Dickcissel	1715	66	0.07	2147	81	0.05	131	54	0.06
Eastern Meadowlark	277	9	0.09	230	7	0.1	100	4	0.17
Field Sparrow	177	9	0.14	204	7	0.1	190	8	0.13
Grasshopper Sparrow	19	0.7	0.42	2	-	-	1	-	-
Henslow's Sparrow	186	7	0.18	321	13	0.12	290	17	0.12
Northern Bobwhite	166	5	0.1	178	3	0.13	140	2	0.1
Sedge Wren	2	-	-	10	-	-	1	-	-
Upland Sandpiper	0	-	-	0	-	-	0	-	-
Grassland Obligate Guild	3050	118	0.06	3409	124	0.04	2039	104	0.05

Densities were slightly lower for the grassland obligate guild at Liberal COA, with Northern Bobwhite, Dickcissel, and Eastern Meadowlark showing declines. Henslow's Sparrow and Bell's Vireo showed increases in this area. Field Sparrow numbers were consistent.

# Sites Outside of Priority Geographies and Conservation Opportunity Areas

	2015			2016			2017			2018			2019			2020		
	1 property sampled			1 property sampled			3 properties sampled			6 properties sampled			10 properties sampled			1 property sampled		
	N	D	CV	N	D	CV	N	D	CV	N	D	CV	N	D	CV	N	D	CV
Bell's Vireo	0	-	-	0	-	-	5	-	-	13	-	-	21	2	0.29	12	-	-
Bobolink	0	-	-	72	64	0.31	0	-	-	35	5	0.44	0	-	-	0	-	-
Common Nighthawk	0	-	-	0	-	-	0	-	-	0	-	-	1	-	-	0	-	-
Dickcissel	49	52	0.29	19	10	0.3	99	47	0.15	214	30	0.11	342	34	0.1	4	-	-
Eastern Meadowlark	23	18	0.23	35	16	0.27	26	10	0.27	95	10	0.17	121	10	0.18	1	-	-
Field Sparrow	5	-	-	10	-	-	15	-	-	53	7	0.17	80	7	0.15	0	-	-
Grasshopper Sparrow	4	-	-	21	10	0.29	3	-	-	85	0.12	0.21	56	5	0.23	0	-	-
Henslow's Sparrow	13	-	-	1	-	-	13	-	-	37	6	0.45	8	-	-	34	66	0.17
Loggerhead Shrike	0	-	-	0	-	-	0	-	-	0	-	-	5	-	-	0	-	-
Northern Bobwhite	6	-	-	4	-	-	15	-	-	34	2	0.25	29	2	0.24	11	6	0.18
Sedge Wren	2	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Upland Sandpiper	0	-	-	0	-	-	0	-	-	2	-	-	1	-	-	0	-	-
Grassland Obligate Guild	100	101	0.14	161	85	0.23	176	83	0.13	551	75	0.1	651	63	0.08	90	152	0.08

**In 2020, the only property surveyed outside a PG or COA was Schwartz Prairie, which lies just barely outside the Upper Osage Grasslands PG. Schwartz Prairie showed a slight increase in grassland obligate density compared to 2018, and a significant increase since 2016. These increases were driven largely by Henslow's Sparrow and Northern Bobwhite.**

# Appendix: Grassland sites surveyed by MRBO 2012-2020

			Survey Year/Number of Grassland Obligate Birds Detected*								
Missouri Department of Conservation Priority Geography (PG) or Conservation Opportunity Area (COA)	Property	Ownership	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Grand River Grasslands PG</b>	Dunn Ranch	TNC		1110	1667	1293		1476		876	
	Frank Ranch	Private <sup>1</sup>	191	710	733		665		742		
	Little Creek Farm	TNC								41	
	Lueken Hensley	Private			219	201		272			
	Pawnee Prairie	TNC		137	153	197	128		149		
	Pawnee Prairie NA	MDC		75	181	154	161		121		
	Poteet Farms	Private				324	284				
	Runyon	Private				46	31				
<b>Upper Osage Grasslands PG</b>	Francis	Private			39	39		64			
	Linscomb WA	MDC			125	72	62	151		127	
	Monegaw Prairie CA	MDC				123	82		111		105
	Morton	Private <sup>1</sup>	194	105	185		122		248		187
	Schell-Osage CA	MDC			331	115	162	321		304	
	Sewell	Private				101	112				
	Taberville Prairie CA	MDC		239	520	695	757	851	652	563	678
	Wah'Kon-Tah Prairie	MDC		432	961	1432	887	1501	1194	1131	1174
<b>Cole Camp Prairies COA</b>	Brauer	Private			145	114		128			
	Bruns Tract	MPF		38	47	143		64	73		
	Bryson's Hope CA	MDC		72	110	101		120		105	
	Clubine	Private <sup>1</sup>			57	32		36		48	
	Drovers Prairie CA	MPF		24	45	23			52		
	Friendly Prairie	MPF		9		17			19		
	Good-Night Henry Prairie	TNC		8							
	Grandfather Prairie CA	MDC		8		91			16		



**Survey Year/Number of Grassland Obligate Birds Detected\***

Missouri Department of Conservation Priority Geography (PG) or Conservation Opportunity Area (COA)	Property	Ownership	Survey Year/Number of Grassland Obligate Birds Detected*								
			2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Cole Camp Prairies COA cont.</b>	Hartwell CA	MDC	23	36	77		58		49		
	Hi Lonesome Prairie CA	MDC	352	215	306	402	186	385	340	181	
	Ionia Ridge CA	MDC	66	80	159		118		66		
	Kearn (W.R.) Memorial CA	MDC	31	103	71		81	75	69		
	Mora CA	MDC	118	154	265		103	123			
	Paint Brush Prairie CA	MDC	71	112	184		100		103		
	Marker	MPF									113
<b>Diamond Grove COA</b>	Carver Prairie	MPF					54			41	
	Diamond Grove Prairie CA	MDC	49	182	462	346	389	387	296		
	Diamond Grove Prairie CA-PBG	MDC	43	109	152	156	223	211	222		
	George Washington Carver	NPS	20								
<b>Golden Grasslands COA</b>	Cook Meadow Prairie	MPF	24					72		35	
	Coyne-Pennsylvania-Welch Tract	MPF	69			175		264	258	171	
	Eight-mile Farm	Private <sup>1</sup>								16	41
	Golden Prairie	MPF	89					377		238	
	Haubein	Private <sup>1</sup>			48	34		70			
	Haubein - Hickman Osage	Private <sup>1</sup>								243	
	Horse Creek Prairie CA	MDC	9			61			100	51	65
	Indigo Prairie CA	MDC	6				10		28		24
	Kickapoo Prairie CA	MDC	7	50	73	116	140	136	76	90	
	Kremp	Private		74	111	1	130			93	
	Linden's Prairie	MPF									106
	Muddy Creek	Private <sup>1</sup>									95
	Niawathe Prairie CA	MDC	72	125	129				198	141	170
	Providence Prairie CA	MDC	21	102	90	184	299	202	181	228	

**Survey Year/Number of Grassland Obligate Birds Detected\***

Missouri Department of Conservation Priority Geography (PG) or Conservation Opportunity Area (COA)	Property	Ownership	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Golden Grasslands COA cont.</b>	Shelton (Wade & June) Memorial CA	MDC		98	218	130	226		154		220
	Sloan (Dr. O. E. & Eloise) CA	MDC		29	43	59				64	
	Stony Point CA	MDC			262	322	247	445	404	308	
	Talbot (Robert E) CA	MDC		210		306	323	640	663	547	
	Theurer	Private <sup>1</sup>			192	175		236		298	
	Thomas	MPF								15	19
<b>Helton Prairie COA</b>	Helton (The Wayne) Mem WA	MDC			79	85	125		151		142
<b>Liberal Prairie COA</b>	Buffalo Wallow Prairie CA	MDC		94	223		391		335		252
	Bushwacker Lake CA	MDC		350	364		634		839		838
	Clear Creek CA	MDC		80	179		238		219		228
	Comstock Prairie CA	MDC					70		105		133
	Denison Prairie	MPF		39					147		103
	Drywood CA	MDC		1			4		3		4
	Lattner Prairie	MPF		14					34		30
	Little Osage Prairie	MDC		9			17		25		19
	Mo-No-I Prairie CA	MPF		49			105		133		143
	Osage Prairie CA	MDC		253	258		465		616		615
	Pleasant Run Creek	MPF							51		41
	Prairie State Park	DNR		649							
	Redwing Prairie CA	MDC		19			91		55		62
	Shawnee Trail CA	MDC		341	709		1079		1251		
	<b>Prairie Forks COA</b>	Prairie Fork CA	MDC		83			60		81	
<b>Properties outside a PG or COA</b>	Arrow Rock State Historic Site	DNR						19	8	16	
	Brush Creek Ranch	Private <sup>1</sup>							246	259	
	Cope Farm	Private <sup>1</sup>								235	
	Gay Feather Prairie	MPF								36	

**Survey Year/Number of Grassland Obligate Birds Detected\***

Missouri Department of Conservation Priority Geography (PG) or Conservation Opportunity Area (COA)	Property	Ownership	Survey Year/Number of Grassland Obligate Birds Detected*								
			2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Properties outside a PG or COA cont.</b>	Hodges	Private <sup>1</sup>							35	26	
	La Petite Gemme Prairie	MPF									20
	Noah Brown Prairie	MPF									15
	Peterson	Private <sup>1</sup>		82	144		167		208		
	Roeslein	Private			77						
	Schwartz Prairie	MPF		29					100		109
	Shackles	Private			137	105		115			
	Snowball Hill Prairie	MPF									30
	Stilwell Prairie	MPF		20							56
	Van Meter SP (Utz Tract)	DNR							51	39	44
<b>Total Target Species</b>			385	6511	9793	8844	8964	9100	11382	7625	6185

<sup>1</sup>indicates association with Audubon Conservation Ranching Program

\*Patch-burn Grazing study sites (Diamond Grove, Taberville, Wah-Kon'Tah, Hi-Lonesome, Providence and Kickapoo) began receiving two survey visits in 2015, resulting in a higher number of raw detections.



Greater Prairie-Chickens by David Seidensticker

