

Breeding Bird Surveys in the Kansas Flint Hills 2022

Missouri River Bird Observatory report to
the Bobolink Foundation and the 3CP Partnership



Introduction

The Flint Hills region of Kansas and Oklahoma is critically important to the conservation of tallgrass prairie ecosystems, as it is the largest area of remnant tallgrass prairie remaining in North America. The lack of widespread land conversion to row crops, largely due to the Flint Hills' thin soil layer and flint-laden terrain, has allowed this geographic area to preserve much of its pre-colonialization biota. However, despite the region's expansive remnant prairie, most tallgrass prairie species have suffered range-wide declines because of habitat loss, fragmentation, and degradation. In some areas, this is due to overapplication of land management practices, such as over-grazing, annual burning of vast amounts of acreage, and in some cases the establishment of non-native monocultures. One of the barriers to widespread adoption of conservation-focused management practices can be the lack of funds for more prescriptive and heterogeneous management. As much of the remaining grassland in the Flint Hills is privately owned ranching operations, it has become a conservation priority to find a working model that ranchers can adopt to thrive financially while implementing ecologically beneficial and resilient management practices.

Currently, solutions to private land conservation are dominated by subsidies or buyouts that rely on financial aid from government agencies. The Bobolink Foundation is experimenting with an alternative to current, widespread methods by focusing on investing in the resilience of working landscapes. The goal is to invest money into a region that can then become self-financed, protected areas that can withstand the hardships of "bad years" without compromising the integrity of the ecosystem. In "good years" ranchers can afford to focus on more conservation management, resulting in an ecologically resilient landscape without the need of government aid.

The study area for this experiment is the 3CP public benefit corporation, situated in the heart of the Flint Hills (Chase County, KS). This working group has implemented a patch-burn grazing (PBG) program - resting portions from fire and grazing as a prescriptive management technique. This technique is expected to create a mosaic landscape that is more resilient to years of drought and the effects of climate change stresses. To assess the effects these practices have on native biota, the monitoring of bio-indicators like birds is useful. The Missouri River Bird Observatory (MRBO) has been contracted to do such an assessment.

MRBO's bird monitoring of the area now known as 3CP started in 2012 and 2013 in which the Flying W Ranch was surveyed. In 2019, 2021, and 2022, survey coverage was extended to include the adjacent properties that comprise the 3CP partnership. In this report, MRBO provides context and comparison of bird use and occupancy in the 3CP area over the years of surveys and resulting from PBG and resting management practices.

Methodology

For all years in which bird surveys have been conducted in the Kansas Flint Hills, MRBO methodology has involved line-transect surveys in which surveyors walk 400-meter transects at a pace of approximately 1 mile/hour. All birds seen and heard are recorded. Surveys start at sunrise and last no more than 3.5 hours. All years' surveys took place during peak breeding season in late-May and early-June, maximizing detectability rates. Transects were placed in a way to maximize coverage of prairie habitat within property boundaries of the 3CP group.

In 2022, the 3CP partnership lands were surveyed during the period of May 23rd to June 7th, on mornings with no precipitation and wind <10 miles per hour. Birds were recorded with spatially explicit information using the ArcGIS Field Maps application and uploaded to the ArcGIS Online (AGOL) platform for further analysis. Survey results were thoroughly reviewed to correct any inaccuracies. Based on a provided 3CP 2021 burn layer shapefile that was verified using Sentinel-2a satellite imagery, field observations, and discussions with 3CP landowners, 2022 detections were classified as either being in a burned and grazed area or a rested area. Management data were integral for MRBO's examination of resilient management practices on species abundance and distribution within the 3CP cooperative.

Using the program Distance in R, density estimates were calculated for target, grassland-obligate species where sample size is sufficient ($n \geq 15$ individuals). Density estimates show the estimated number of birds per 100 acres for each species at a yearly, property, and burned/rested level. Comparative maps were generated using ESRI's ArcGIS Pro software and the ArcGIS Online platform while tables were generated in Microsoft Excel using data stored in ArcGIS Online.



Line-transects within 3CP property boundaries.

Target Species



Summary of Results

- » The detected number of individual grassland-obligate birds decreased just slightly between 2021 and 2022.
- » When compared to available data from 2012 and 2013 at the Flying W, the proportionate number of grassland birds detected in 2022 is similar, while 2019 and 2021 detections were slightly higher.
- » Relative abundance and density of grassland obligate birds were significantly higher in 2019 than 2021 or 2022. The reasons for this are unclear. 2019 seems to represent a spike in numbers that is inconsistent with legacy (2012-2013) and more current (2021-2022) data. Survey staff were the same individuals across years, suggesting that this is not a result of observer variation.
- » At the species level, birds per 100 acres declined between 2019 and 2022 for Dickcissel, Eastern Meadowlark, Field Sparrow, Grasshopper Sparrow, Northern Bobwhite, Upland Sandpiper, the meadowlark guild, and all grassland obligates as a guild.
- » At the species level, birds per 100 acres increased between 2019 and 2022 for Bell's Vireo, Common Nighthawk, and Henslow's Sparrow.
- » Initial data from 2021-2022 suggest that most species show slightly higher densities in rested areas than in burned areas. This pattern held true for two years post-burn as compared to one year post-burn.

3CP All Species Counts

Common Name	2019	2021	2022
Alder Flycatcher	1	2	1
American Crow	14	12	8
American Goldfinch	8	33	32
American Kestrel	1	1	1
American Robin	1	1	
Barred Owl	2	2	2
Baltimore Oriole	4	9	
Barn Swallow	9	11	10
Black-capped Chickadee	3	19	12
Bell's Vireo	22	38	37
Belted Kingfisher		4	
Bewick's Wren	3		
Black-billed Cuckoo		1	1
Blue-gray Gnatcatcher	8	19	26
Brown-headed Cowbird	106	170	130
Blue Grosbeak	5	14	10
Blue Jay	4	13	10
Brown Thrasher	8	16	8
Canada Goose	26	36	1
Carolina Wren	12	2	9
Cedar Waxwing		1	
Chimney Swift			1
Chipping Sparrow	1	1	1
Cliff Swallow	14		
Common Grackle	3	5	3
Common Nighthawk	15	23	10

Common Name	2019	2021	2022
Common Poorwill		1	
Common Yellowthroat		1	
Cooper's Hawk		1	
Chuck-will's-widow	3		
Dickcissel	281	397	409
Downy Woodpecker	2	5	11
Eastern Bluebird	14	2	13
Eastern Kingbird	6	12	4
Eastern Meadowlark	283	177	170
Eastern Phoebe	3	6	2
Eastern Towhee		1	2
Eastern Wood-Pewee	4	18	15
European Starling	13	6	4
Field Sparrow	14	26	20
Franklin's Gull			1
Gray Catbird		1	2
Great Blue Heron	5	4	5
Great Crested Flycatcher	18	37	34
Great Horned Owl		1	
Greater Prairie-Chicken	10	12	1
Grasshopper Sparrow	209	190	182
Hairy Woodpecker		4	2
Henslow's Sparrow		4	6
Horned Lark	9	30	4
House Finch		2	1
House Sparrow			1

3CP All Species Counts (Continued)

Common Name	2019	2021	2022
House Wren	3	1	3
Indigo Bunting	14	30	36
Killdeer	12	17	3
Lark Sparrow	30	30	25
Least Bittern		1	
Louisiana Waterthrush	2	4	2
Mallard		3	
Mourning Dove	29	42	38
Northern Bobwhite	39	43	31
Northern Cardinal	14	44	55
Northern Mockingbird	6	1	1
Northern Parula		7	8
Northern Rough-winged Swallow	4	2	1
Orchard Oriole	9	8	6
Painted Bunting	2	11	15
Pileated Woodpecker	4	4	2
Purple Martin		3	
Red-bellied Woodpecker	8	10	22
Red-eyed Vireo	6	24	12
Red-headed Woodpecker		6	2
Red-tailed Hawk	2	3	4
Red-winged Blackbird	2	4	9
Ring-necked Pheasant		2	

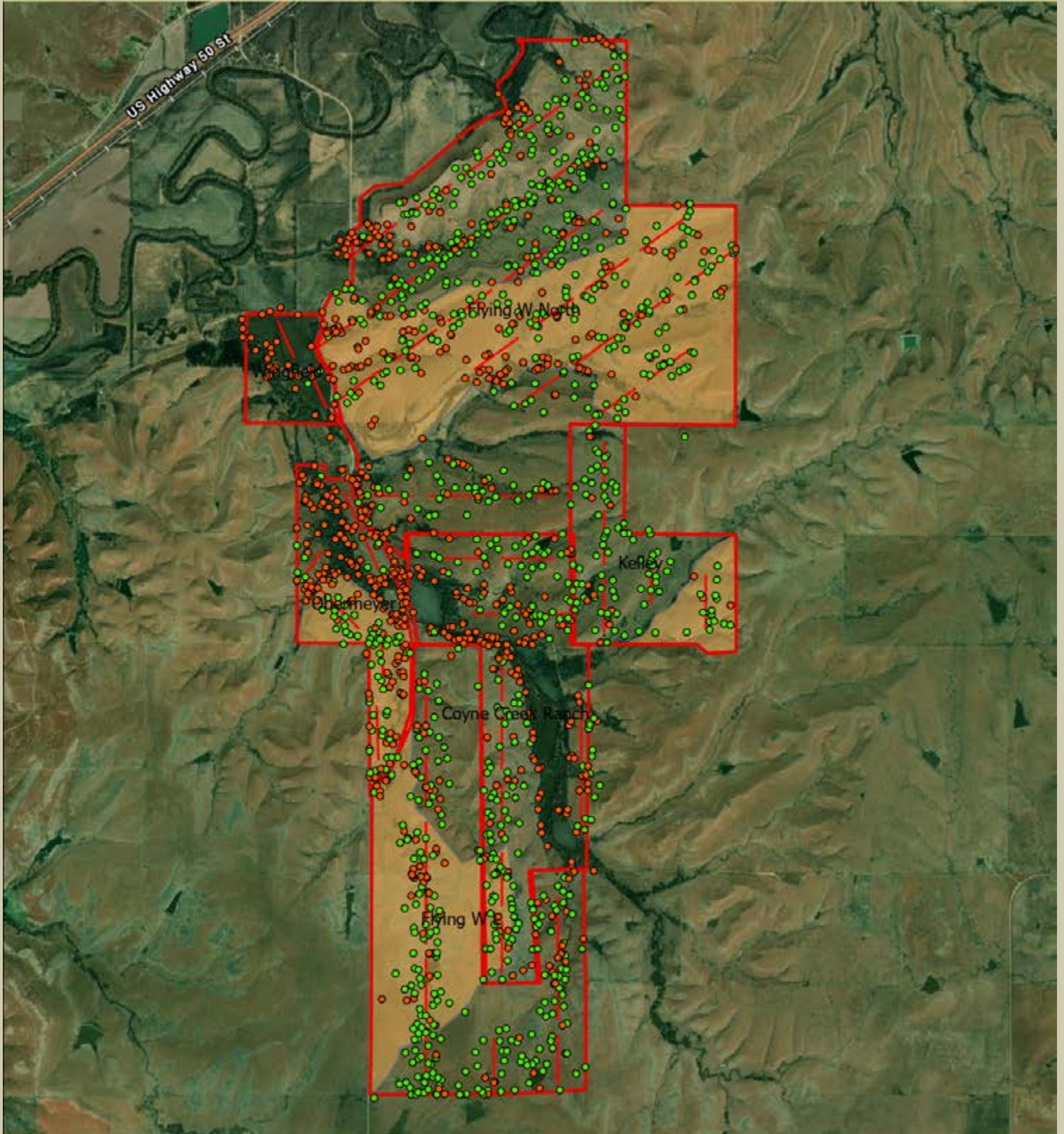
Common Name	2019	2021	2022
Ruby-throated Hummingbird		3	2
Snowy Egret	2		
Scissor-tailed Flycatcher	6	2	4
Summer Tanager	2	6	5
Tree Swallow	2		
Tufted Titmouse	7	12	23
Turkey Vulture	14	7	11
Crow Sp	1	1	
Unidentified Flycatcher Sp		2	1
Unidentified Hummingbird			2
Meadowlark Sp	8		8
Unidentified Sparrow Sp		1	9
Unidentified Swallow			1
Unidentified Woodpecker			1
Upland Sandpiper	41	54	13
White-breasted Nuthatch	1	3	7
Western Kingbird	1		
Western Meadowlark	3		
Willow Flycatcher	1	1	
Wild Turkey	7	7	3
Wood Duck	2		2
Yellow-billed Cuckoo	8	41	18
Yellow-breasted Chat			2
Total	1436	1811	1589

Counts of target species detected on all 3CP Properties in 2012, 2013, 2019, 2021, and 2022.

Of the 3CP properties, only Flying W North and L were surveyed in 2012 and 2013.

Species	2012	2013	2019	2021	2022
Bell's Vireo	5	5	22	38	37
Common Nighthawk	2	14	15	23	10
Dickcissel	50	78	281	397	409
Eastern Meadowlark	68	58	283	177	170
Eastern/Western Meadowlark			8		8
Field Sparrow		1	14	26	20
Grasshopper Sparrow	144	100	209	190	182
Greater Prairie-Chicken			10	12	1
Henslow's Sparrow				4	6
Northern Bobwhite	11	2	39	43	31
Upland Sandpiper	25	20	41	54	13
Western Meadowlark	1	10	3		
Total	306	288	925	964	887

Bird Detections 2022



Grassland Detections 2022
is Grassland Obligate Species?

Prescribed Burn 2021
Prescribed Burn

Transects

- Red circle: No
- Green circle: Yes



0 0.4 0.8 1.6 Miles

Target Species Densities at 3CP

Tables display estimated densities in **birds per 100 acres** at 3CP .

"-" indicates that less than 10 individuals of a species were detected on that property's surveys, rendering the density estimate unreliable.

Species/Year	2019	2021	2022
Bell's Vireo	1	2	5
Common Nighthawk	2	-	7
Dickcissel	24	16	19
Eastern Meadowlark	24	6	6
Field Sparrow	-	-	2
Grasshopper Sparrow	25	10	11
Greater Prairie-Chicken	-	-	-
Henslow's Sparrow	-	-	3
Meadowlark Guild	2	1	-
Northern Bobwhite	2	2	2
Upland Sandpiper	25	6	3
All Grassland Obligates	81	40	35

Target Species Densities in Burned and Rested Areas

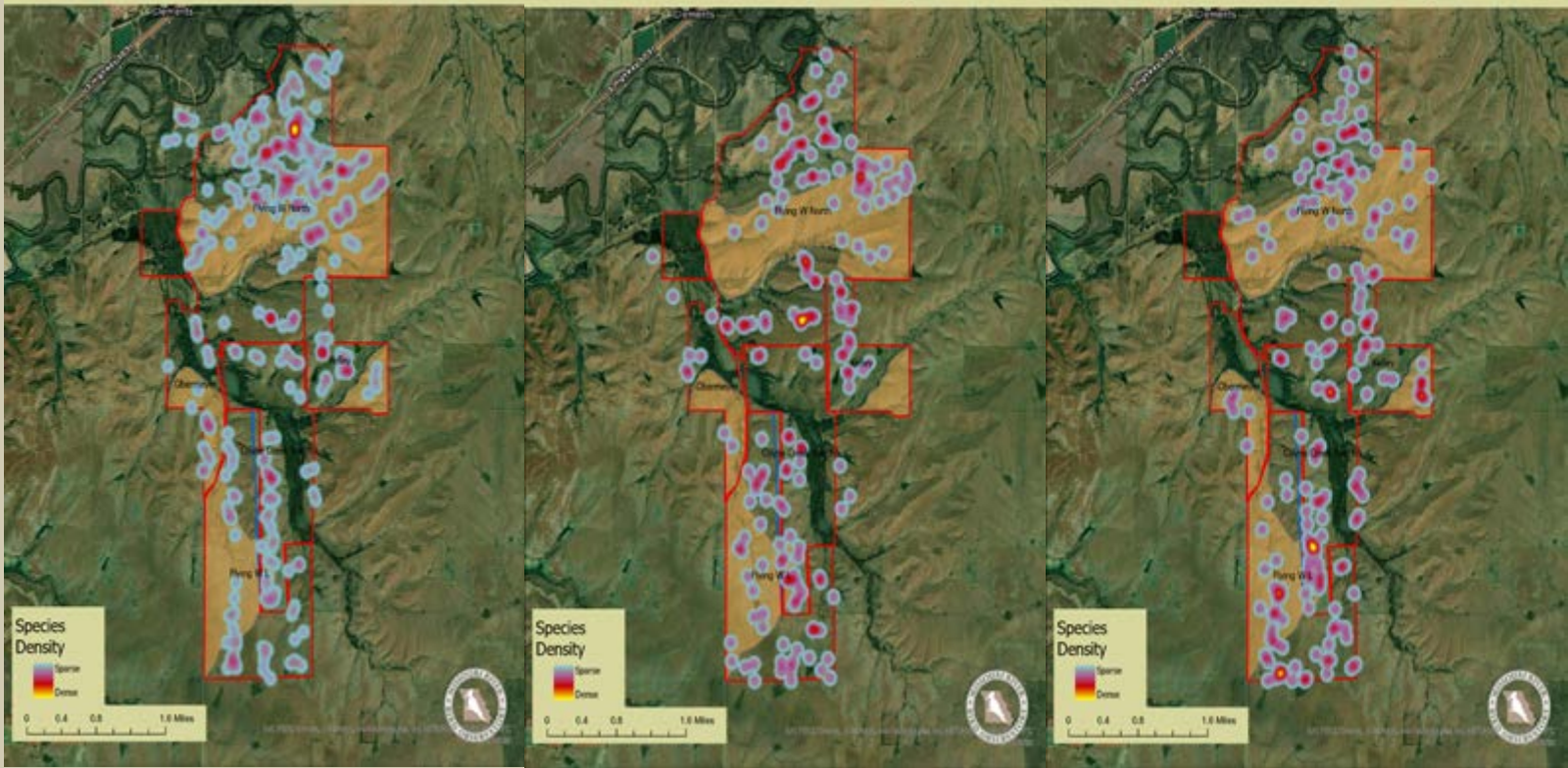
Species/Management	2021		2022	
	Burned	Rested	1 year post-burn	2 years post-burn
Bell's Vireo	-	2	3	6
Common Nighthawk	-	-	6	13
Dickcissel	7	17	16	17
Eastern Meadowlark	3	6	5	5
Field Sparrow	-	-	-	2
Grasshopper Sparrow	4	10	10	12
Greater Prairie-Chicken	-	-	-	-
Henslow's Sparrow	-	-	-	3
Meadowlark guild	3	6	5	4
Northern Bobwhite	-	1	3	2
Upland Sandpiper	-	1	5	2
All Grassland Obligates	19	40	32	29

Meadowlark Heat Maps

Meadowlark 2019 Heatmap

Meadowlark 2021 Heatmap

Meadowlark 2022 Heatmap

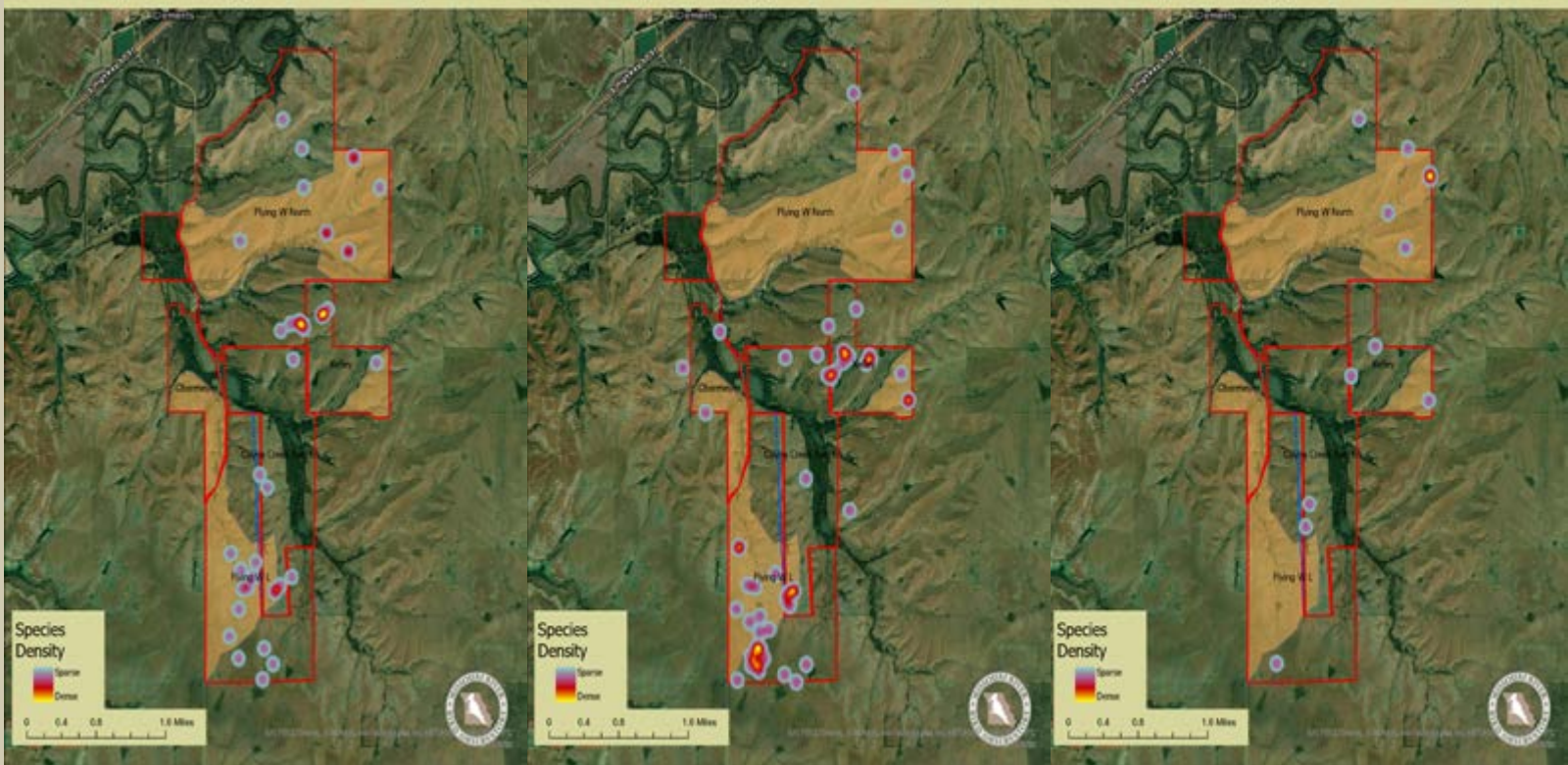


Upland Sandpiper Heat Maps

Upland Sandpiper 2019 Heatmap

Upland Sandpiper 2021 Heatmap

Upland Sandpiper 2022 Heatmap

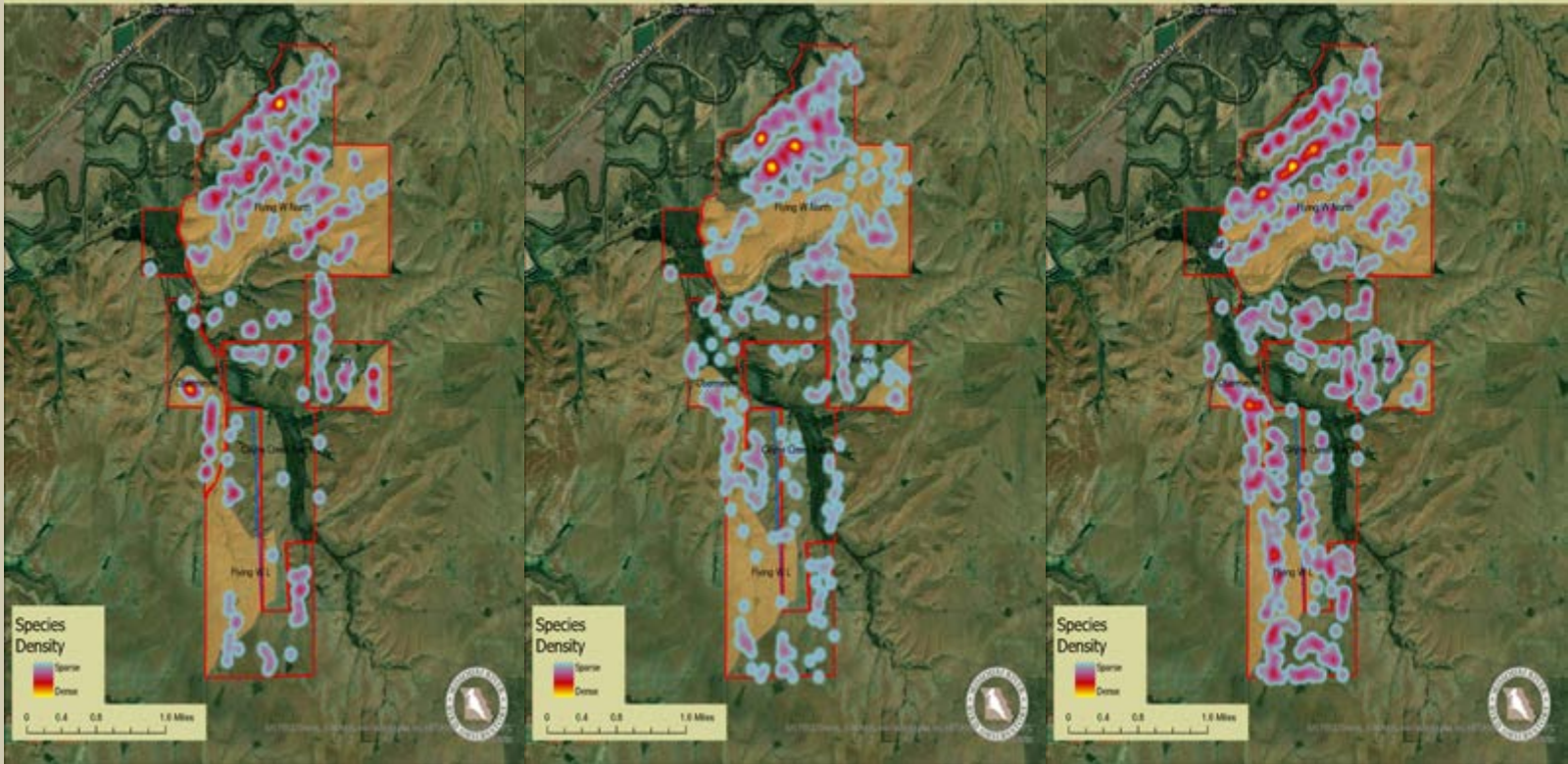


Dickcissel Heat Maps

Dickcissel 2019 Heatmap

Dickcissel 2021 Heatmap

Dickcissel 2022 Heatmap

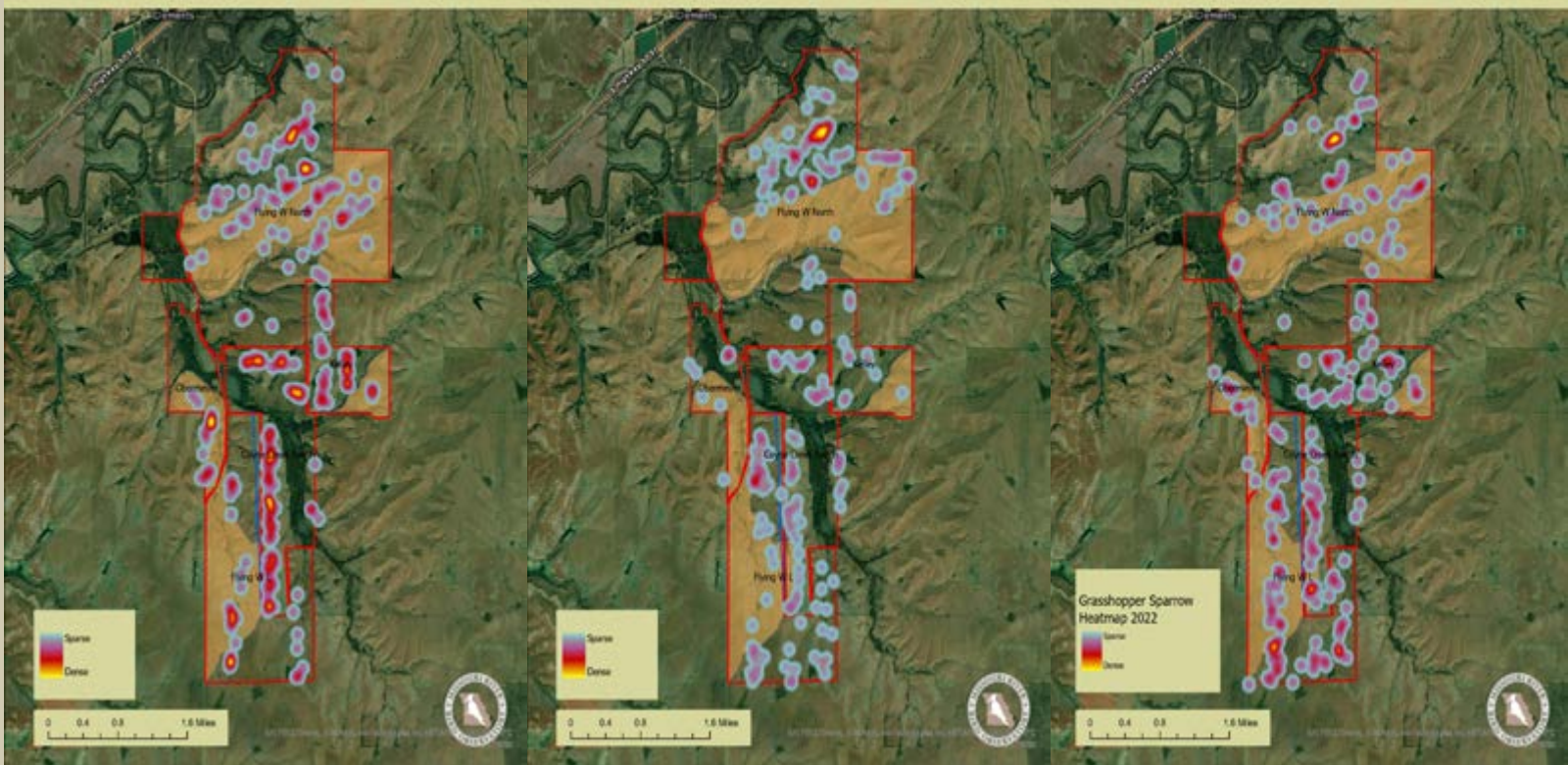


Grasshopper Sparrow Heat Maps

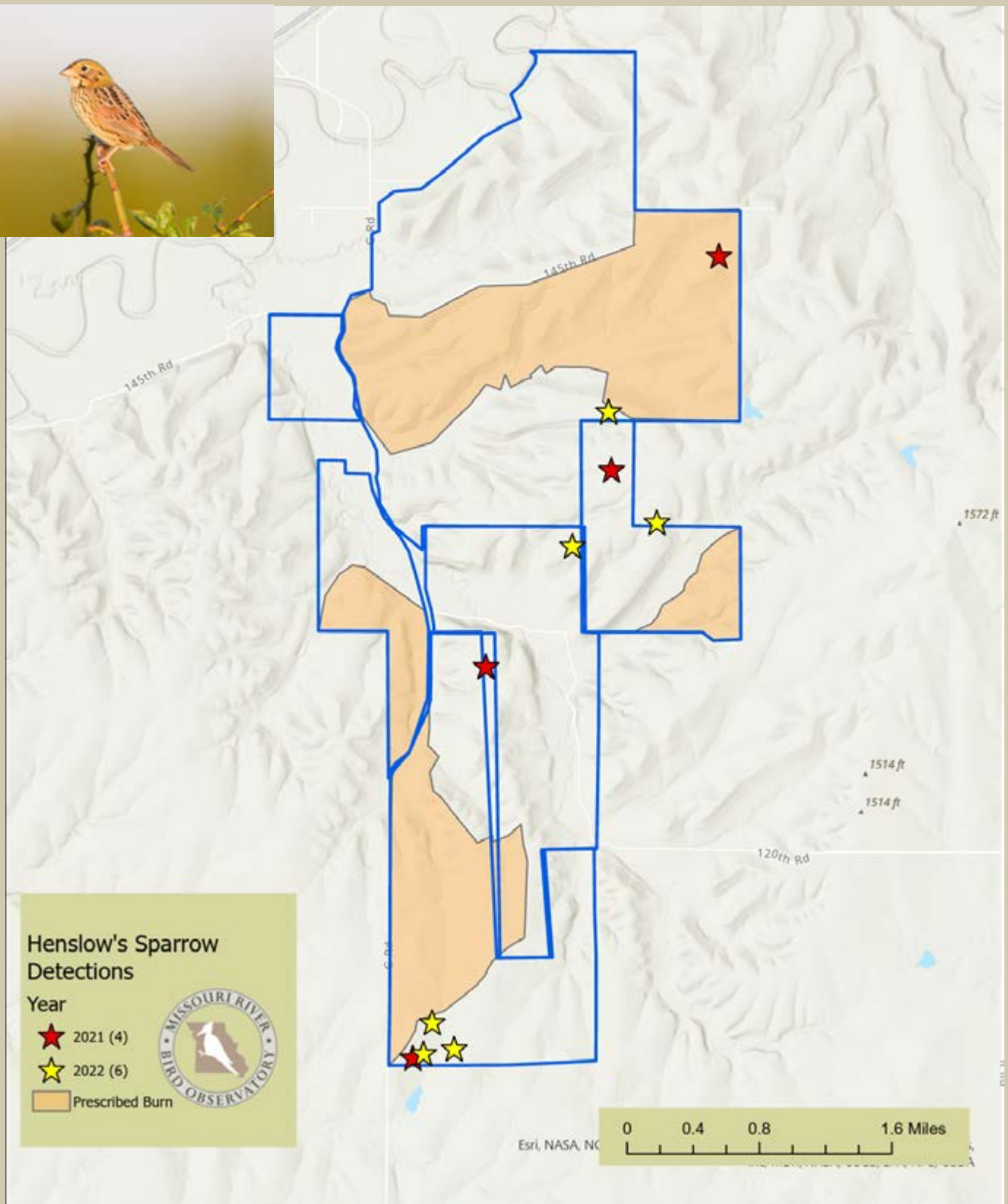
Grasshopper Sparrow 2019 Heatmap

Grasshopper Sparrow 2021 Heatmap

Grasshopper Sparrow 2022 Heatmap



Henslow's Sparrow Presence



Surveys in 2022 resulted in six Henslow's Sparrow detections. This is remarkable considering this is the second year in a row Henslow's Sparrows have been present on the 3CP properties during MRBO surveys (2012-2022). Before 2021, Henslow's Sparrows had never been detected. Henslow's Sparrows typically require tallgrass prairie habitat that has been rested from fire for one or more consecutive seasons; this species needs a layer of dead and living plant material near the surface of the ground (thatch) to build their nests. Adequate thatch cannot exist in areas that are burned annually and thus the management philosophy of resting areas from burns and intensive grazing is key for this species to thrive.



Common Nighthawk hatchlings

MRBO MISSION

The Missouri River Bird Observatory is a 501(c)3 non-profit entity dedicated to the conservation of Missouri's migratory and resident birds through scientific research, community outreach, K-12 education and conservation policy advocacy.

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Photography Credits

Target Species, page 3:
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Bobolink - Paul Moffett
Dickcissel - Andrew Reago & Chrissy McClaren
Eastern Meadowlark - Carol Weston
Greater Prairie-Chicken - Eric Wilhoit
Loggerhead Shrike - Bill Blackledge
Northern Bobwhite - Mark Ramsey
Upland Sandpiper - Andrew Reago & Chrissy McClaren

All other photos taken by MRBO staff.

