Density and Trends of Grassland Birds on City of Fort Collins Properties in the Mountains to Plains area of Northern Colorado

2018 TECHNICAL REPORT

Bird Conservancy of the Rockies

Connecting People, Birds and Land

Bird Conservancy of the Rockies
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Technical Report: I-MTP-FCNAP-18

BIRD CONSERVANCY OF THE ROCKIES

***Mission**: To conserve birds and their habitats*

***Vision**: Native bird populations are sustained in healthy ecosystems*

***Core Values**: (Our goals for achieving our mission)*

1. ***Science** provides the foundation for effective bird conservation.*
2. ***Education** is critical to the success of bird conservation.*
3. ***Stewardship** of birds and their habitats is a responsibility we all share.*

Bird Conservancy accomplishes its mission by:

***Monitoring** long-term trends in bird populations as a scientific foundation for conservation action.*

***Researching** bird ecology and response to anthropogenic and natural processes. Our research informs management and conservation strategies using the best available science.*

***Educating** people of all ages to instill an awareness and appreciation for birds and a conservation ethic.*

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***Partnering** with local, state and federal agencies, private citizens, schools, universities, and other organizations for bird conservation.*

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***Cover Photos:** Fledgling Baird's sparrow found in Soapstone Prairie Natural Area in July, 2018. Photo (and hand) by Andrew Bankert*

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EXECUTIVE SUMMARY

The City of Fort Collins and other partners have been working since 2004 to protect a unique biological and scenic corridor stretching between the Rocky Mountains and the Great Plains of northern Colorado in a project called The Laramie Foothills Mountains to Plains (MTP) Project. The area has been identified by The Nature Conservancy, Colorado Parks and Wildlife, the US Forest Service, the US Fish and Wildlife Service and others as one of the highest priority conservation areas in the Shortgrass Prairie Bird Conservation Region (BCR 18). Beginning in 2006, Bird Conservancy of the Rockies partnered with the City of Fort Collins in what has become an ongoing effort to aid conservation and management of the shortgrass prairie in the area through grassland bird inventory and monitoring on over 45,000 acres of city-owned properties in Larimer and Weld Counties. This report summarizes the 12th year of monitoring activities and highlights our findings of 2018.

This region supports 16 high-priority grassland birds, including Ferruginous hawk, Swainson's hawk, Golden eagle, Northern harrier, Loggerhead shrike, Burrowing owl, Mountain plover, Prairie falcon, Lark bunting, McCown's and Chestnut-collared longspur, Long-billed curlew, Vesper, Grasshopper, Brewer's sparrow, and more recently; Baird's Sparrow. Grassland birds have declined more steeply and consistently in the last 50 years than any other North American group of birds and are among the top priorities for governmental and non-governmental wildlife conservation organizations.

During the 2018 breeding season we conducted point count surveys at 308 stations. We surveyed 223 of those points on approximately 2,238 acres of prairie dog colony habitat (PDCH) on Meadow Springs Ranch, Soapstone Prairie Natural Area and Round Butte Ranch. We also surveyed 85 points on 457 acres of a recent burn on previously active prairie dog colony habitat. At each station we also surveyed vegetation and recorded observations of other wildlife. During 20 survey days in 2018, we observed 5,817 individual birds of 58 species. We estimated densities of 19 breeding bird species occurring within PDCH on the properties.

The most common birds within the 2018 study area were Horned lark, Western meadowlark McCown's longspur, and Vesper sparrow, which together accounted for 84% of all individual birds observed. The trend of annual densities of McCown's longspur within the prairie dog colony habitat suggests that the population continues to decline steadily and rapidly, especially after the documented plague event in 2009, resulting in a >50% reduction in population since 2006. Mountain plovers have not been detected in Soapstone Prairie Natural Area since 2014. Plague management activities have been somewhat effective in aiding the recovery of the prairie dogs, and it seems that any recovery response from the plovers is extremely delayed. Additional prescribed burns and adaptive grazing management actions are necessary to keep the species from disappearing from the MTP area. Populations of Burrowing owl appear to be fairly stable in the area. We were able to confirm the breeding of Baird's sparrows on the properties, which is exciting because they are a species of continental conservation concern and have never been documented breeding this far from their known range, representing a first state record for Colorado.

The City of Fort Collins' lands in northeast Colorado offer an exceptional opportunity to steward a diverse landscape and sustain populations of several unique species of wildlife that are declining within this disappearing ecosystem. Managers should pay particular attention to the shortgrass prairie obligate species that are declining on the properties and range-wide. In order to maintain populations of these and other grassland-obligate species, managers should strive to conserve and augment prairie dog populations, maintain and restore native shortgrass prairie through prescribed burns and intensive grazing, minimize disturbance from natural resource development and recreation, and continue monitoring to inform management priorities and actions.

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INTRODUCTION

The area in northeastern Colorado known as the Laramie Foothills contain some of the last remaining high-quality, extensive shrubland and shortgrass prairie along the Colorado Front Range, and comprise the southern end of the largest remaining contiguous shortgrass prairie in North America, which stretches from northeastern Colorado to Alberta and Saskatchewan and east into Nebraska and the Dakotas. The region is considered one of the highest priority conservation areas in the Shortgrass Prairie Bird Conservation Region (BCR 18) by TNC, Colorado Parks and Wildlife (CPW), the US Forest Service, the US Fish and Wildlife Service and others. Several Colorado partners have been working since 2004 to protect this biological and scenic corridor stretching between the Rocky Mountains and the Great Plains in a project called The Laramie Foothills Mountains to Plains (MTP) Project. The shortgrass prairie of the MTP area supports breeding populations of 16 high-priority grassland bird species. Bird Conservancy of the Rockies (BCR) has partnered with the City of Fort Collins Natural Areas (FCNA) since 2006 to aid in the conservation and management of these grasslands through grassland bird inventory and monitoring on over 45,000 acres of city-owned properties in the MTP region.

The goal of this long-term monitoring is to help managers conserve grassland bird species and their habitats on FCNA properties in northern Colorado by understanding the abundance, distribution, trends and habitat requirements of breeding birds on the properties. The area has experienced several cycles of documented sylvatic plague since 2008 that have significantly decreased the Black-tailed prairie dog (*Cynomys ludovicianus*) populations, a keystone species that creates ideal nesting habitat for bird species of concern like Mountain plover, Burrowing owl and McCown's longspur. Successful efforts have been made by the FCNA and CPW to encourage prairie dog re-colonization including prescribed burns, dusting treatments for fleas, and a 3-year oral vaccination program from 2013-2015. The objectives are to monitor populations of grassland bird species, document the migratory and breeding bird use of the project area and their response to management activities, and to provide locations of sensitive bird species.

STUDY AREA & METHODS

Between May 1st and July 4th of 2018, we conducted breeding grassland bird point count surveys on Fort Collins' properties in Larimer and Weld counties of northern Colorado (Appendix A): Soapstone Prairie Natural Area (SPNA), Meadow Springs Ranch (MSR), and Round Butte Ranch (RBR).

Figure 1: BCR biologists in Jack Springs pasture of Soapstone Natural Area in 2018

Soapstone is dominated by native shortgrass prairie on the eastern half, with the primary species being blue grama (*Bouteloua gracilis*) & buffalo grass (*Bouteloua dactyloides*), edged by rolling hills, wide shallow washes, and abrupt rocky outcroppings (Fig 1). On the west the terrain rises into the foothills that are home to one of the largest contiguous communities of Mountain mahogany (*Cercocarpus montanus*) in the state of Colorado (Rondeau et al. 2011), with a large patch of old growth ponderosa pine, limestone cliffs running northwest to southeast, and hills dotted with Skunkbush (*Rhus trilobata*).

Meadow Springs Ranch is comprised primarily of native shortgrass and mixed-grass prairie grassland, but also has riparian and cliff areas dotted with Plains cottonwood (*Populus deltoides*) in the northern Lonetree pastures, rolling hills scattered with Four-winged saltbush (*Atriplex canescens*) in the Lewis and Benson pastures, tall grass ranchland in the Meadow pasture, and an extensive gently sloping prairie dog colony surrounding the US Fish & Wildlife's Ferret Center in the southern Bulger pastures.

Round Butte Ranch has two large buttes in the middle of the property surrounded by Mountain Mahogany which transitions to Saltbush. Yucca (*Yucca* spp.) is the next most abundant ground cover, and there are several weathered sandstone outcroppings throughout the property.

Figure 2: An "active" prairie dog burrow in Soapstone Prairie Natural Area (photo by M. Forsburg)

We limited our point counts in 2018 to areas of prairie dog colony habitat (PDCH) using spatial data provided by FCNAP of prairie dog colony habitat that was active in the preceding fall of 2017. A point was considered in PDCH if it was within 100m of a burrow, and labeled as "active" if the nearest burrow showed signs of recent prairie dog activity (grazing, scat, fresh digging) (Fig 2), and labeled as "inactive" if there were no signs of recent activity. We also surveyed a recent burn

area on MSR in the hopes of detecting Mountain plover, as past burns have been successful at attracting the birds (Youngberg et al., 2011, Augustine et al., 2012).

Avian Point Count Surveys

Using a systematic 250-m grid of point count stations created in Arc Map 9.3.1 to survey the properties since 2006, we identified 223 point count stations in 2018 in the PDCH habitat (Fig 3). Points were surveyed earlier in the season between May 1st and May 30th 2018 to increase detectability of the early nesting species. Each point count station was surveyed twice, with the second survey between June 20th and July 4th. There were 85 point count stations in burn areas that were surveyed once between May 1st and May 30th in hopes of detecting any returning plovers. Point count surveys started one half-hour before sunrise and ended by 11 a.m., often earlier.

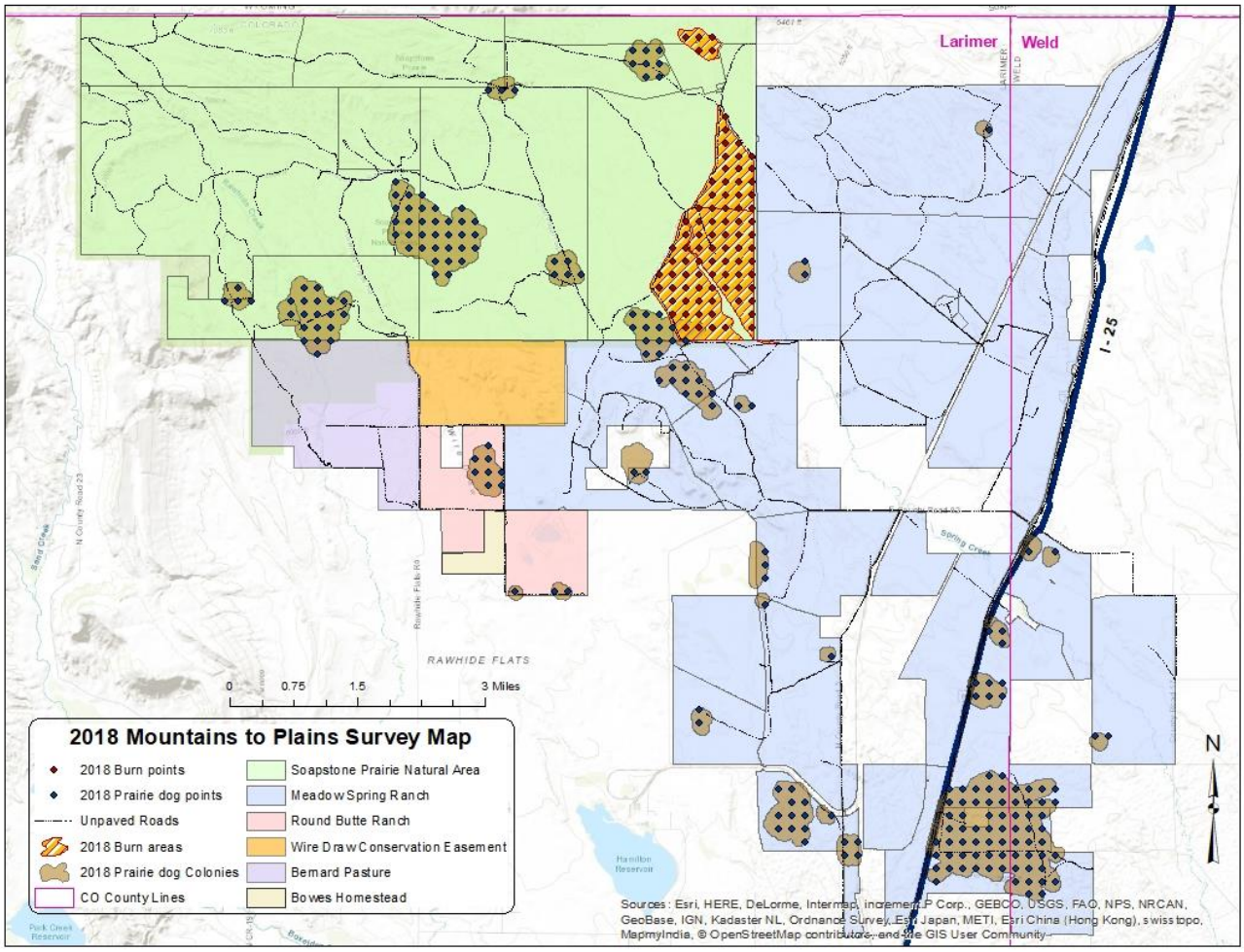

Figure 3: 2018 Survey area and point count stations on FCNA properties in the MTP region.

Point count locations were navigated to on foot using a handheld GPS unit. We recorded atmospheric data (temperature, cloud cover, precipitation, and wind speed) and time of day at the start and end of each daily survey effort. All GPS data were logged in Universal Transverse Mercator (UTM) North American Datum 1927. At each station, we conducted a 6-minute point count survey consisting of six consecutive 1-minute intervals. This protocol, which is described more fully by Hanni et al. (2016), uses Distance sampling (Buckland et al. 2001) with removal (Farnsworth et al. 2002). For each bird detected, observers recorded species, sex, how it was

detected (call, song, visual, wing beat, other), distance from observer at time of detection, and the 1-minute interval in which it was detected. We measured distances using a Bushnell Yardage Pro laser rangefinder. Point counts were not conducted during periods of heavy snow, rain, or wind greater than 10 mph. Between point count surveys, we recorded the presence of high-priority and other rare (Fig 4) or unusual bird species, but we did not use these observations in our analyses. We also noted the presence of any other wildlife or interesting site observations.

Figure 4: Singing male Baird's Sparrow in Jack Springs pasture in SPNA, 2018 (photo: A. Bankert)

Habitat Surveys

After each avian point count survey, we completed a rapid habitat survey by estimating several vegetation parameters. Within 5 m of each point we visually estimated percent cover of grasses, forbs, bare ground, exotic/ non-native plants, cactus, low woody plants (< 30cm), animal scat, rock, and 'other cover' to the nearest 1%. 'Other cover' included other minor ground cover types such as lichen, litter, or categories defined in the notes (i.e. metal scraps). Also within this radius we measured average grass height with a ruler to the nearest cm and listed the dominant grass species. Within 50 m of each station we documented any shrub (> 30cm) and over-story tree species, estimated the percent cover to the nearest 1%, and the average height of each. We recorded whether point count stations in PDCH were 'active' or 'inactive'.

Analyses

We estimated bird species density using Program Distance 6.0 release 2 (Thomas et al. 2010). We appended the 2018 survey data to previous years' data (2006-2017) which used Half-normal cosine, Hazard-rate cosine, and Uniform cosine detection function models to determine the best fit model for each species (see Youngberg, et al. 2012). For estimating bird densities, we pooled all point count data from 2006 through 2018 to generate species-specific detection functions, and then post-stratified density estimates by active PDCH. Although species' density estimates calculated with less than 75 observations may be unreliable representations of true populations (Buckland et al. 2001), we present density and population estimates for all species with $n \geq 25$ (non-truncated values) from 2018, and for high-priority species with fewer observations. Many

species of high conservation interest often occur in low density, and having even rough estimates of density in a comparable format to other species, along with associated measures of error, can aid in the conservation and management of these species. Nonetheless, we urge that caution be used in interpreting estimates derived from relatively few observations, and that special attention be paid to %CV and confidence limits.

RESULTS

Avian Surveys

In 2018 we detected 5,817 birds during point count surveys, and observed 58 species within the study area. Of the species detected, 18 are of conservation interest. (Appendix B).

We analyzed data for 19 breeding bird species. Western meadowlark and Horned lark had the highest detections (Table 1).

Table 1: Density estimates in 2018 in Prairie Dog Colony Habitat (n = truncated # detections in 2018, D = # of birds/ km^2), % Coefficient of Variation, and 95% lower (LCL) and upper (UCL) confidence limits.

Species	n	D	%CV	LCL	UCL
Western Meadowlark	3092	32.14	4.93	29.18	35.40
Horned Lark	2074	147.76	3.29	138.52	157.61
McCown's Longspur	573	41.72	7.34	36.12	48.18
Grasshopper Sparrow	223	11.18	8.88	9.40	13.31
Red-winged Blackbird	158	8.22	15.21	6.11	11.07
Vesper Sparrow	143	4.58	14.48	3.45	6.07
Lark Bunting	124	6.22	14.32	4.70	8.23
Barn Swallow	64	10.86	19.28	7.46	15.80
Brewer's Blackbird	62	6.94	17.57	4.93	9.77
Burrowing Owl	56	0.83	16.88	0.60	1.16
Lark Sparrow	46	3.99	18.08	2.80	5.67
Mourning Dove	43	1.50	19.79	1.02	2.20
Cliff Swallow	27	7.06	31.11	3.89	12.83
Swainson's Hawk	26	0.12	22.57	0.08	0.19
Spotted Towhee	25	0.87	27.81	0.51	1.49
Baird's Sparrow	23	0.69	28.57	0.39	1.19
Common Nighthawk	21	0.86	36.72	0.43	1.74
Cassin's Sparrow	20	0.38	27.5	0.22	0.64
Ferruginous Hawk	3	0.10	63.52	0.03	0.33

McCown’s longspur, Burrowing owl, Meadowlark, and even Horned lark all showed decreases this year after a spike in density estimates from 2017. McCown’s longspurs have showed a steady and consistent decline since surveys began in 2006, but the Burrowing owl population seemed to be exploding from 2014 – 2-17, taking a sharp decline in 2018, back to previous years’ recorded density.

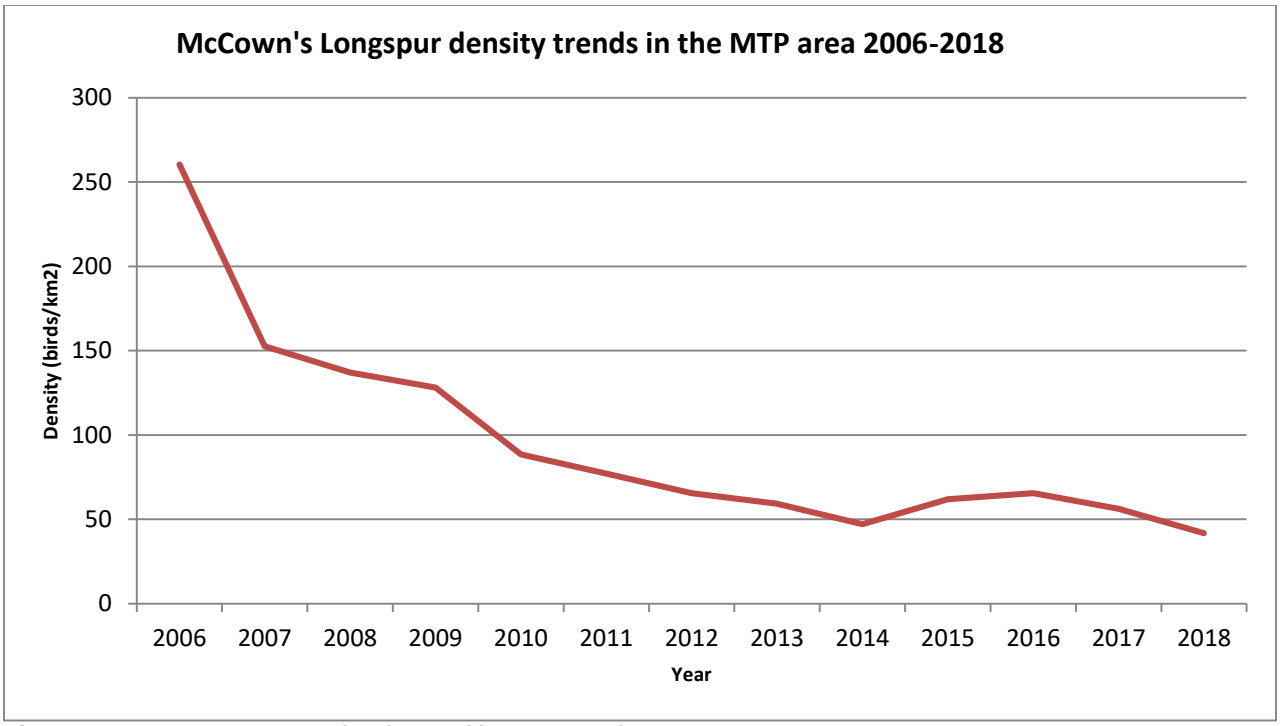

Figure 5: McCown's Longspur density trend in MTP area from 2006-2018

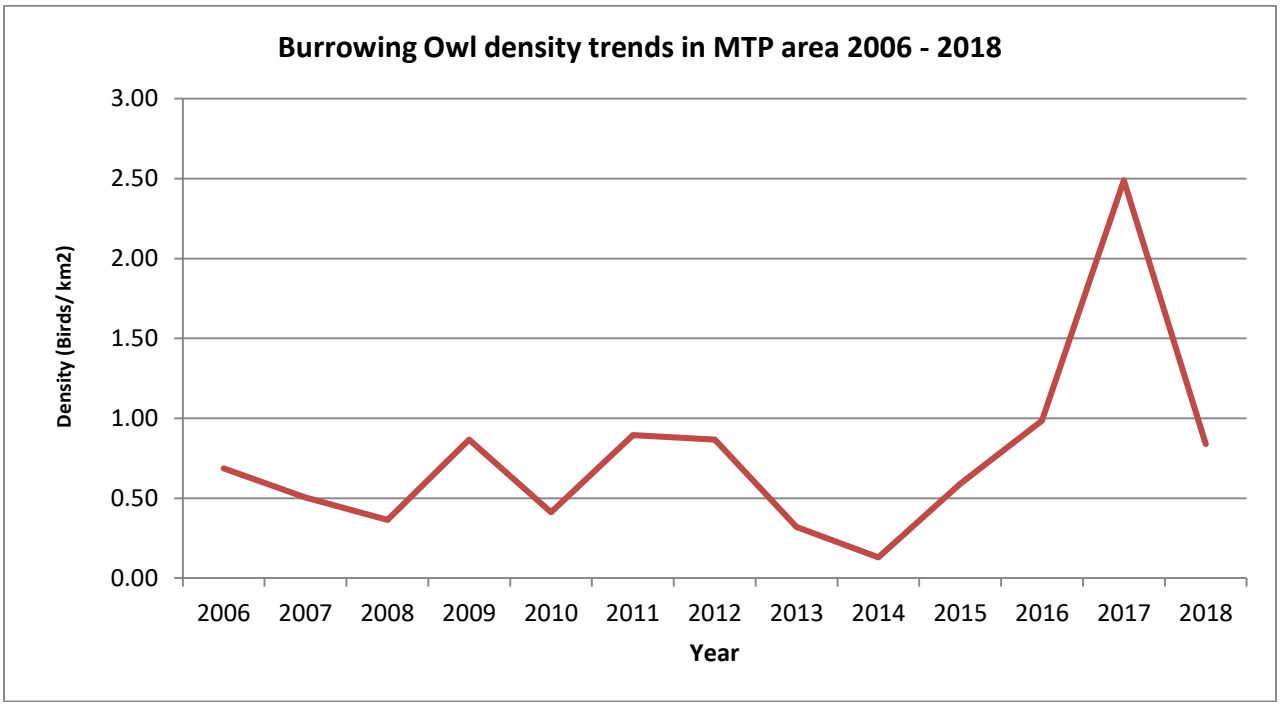

Figure 6: Burrowing owl density trend in the MTP area from 2006-2018

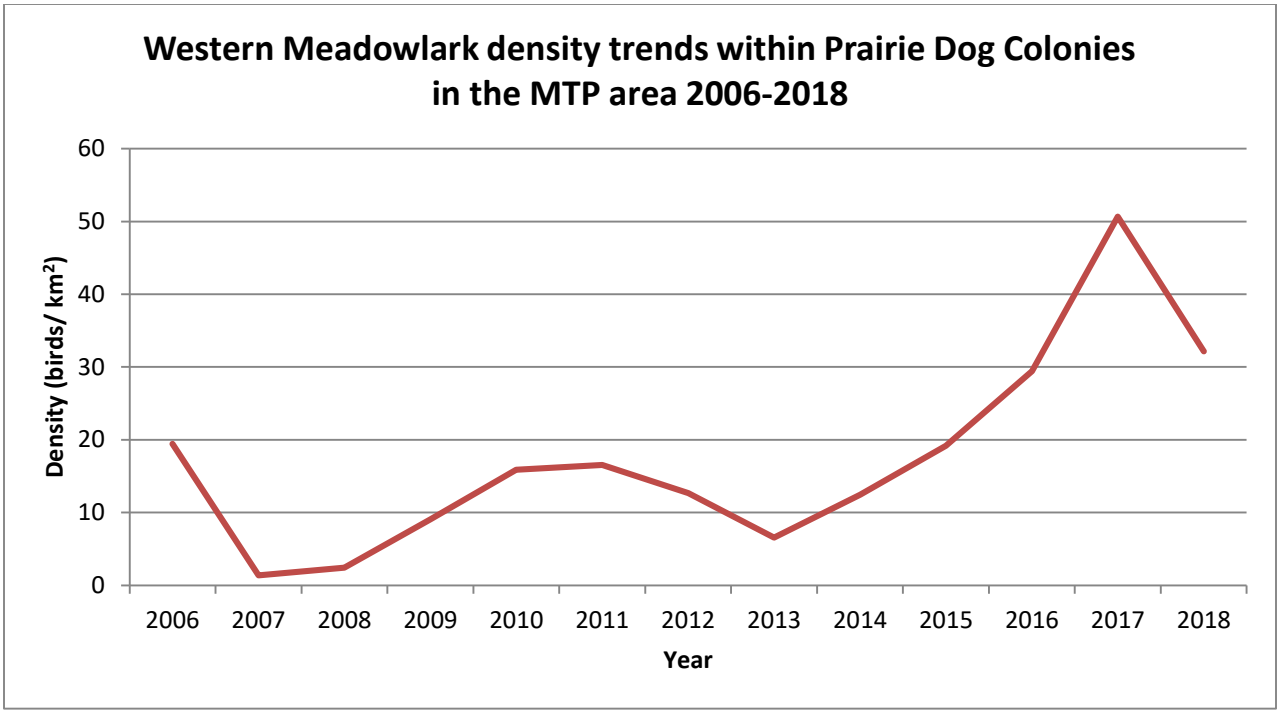

Figure 7: Western meadowlark density trend in the MTP area from 2006-2018

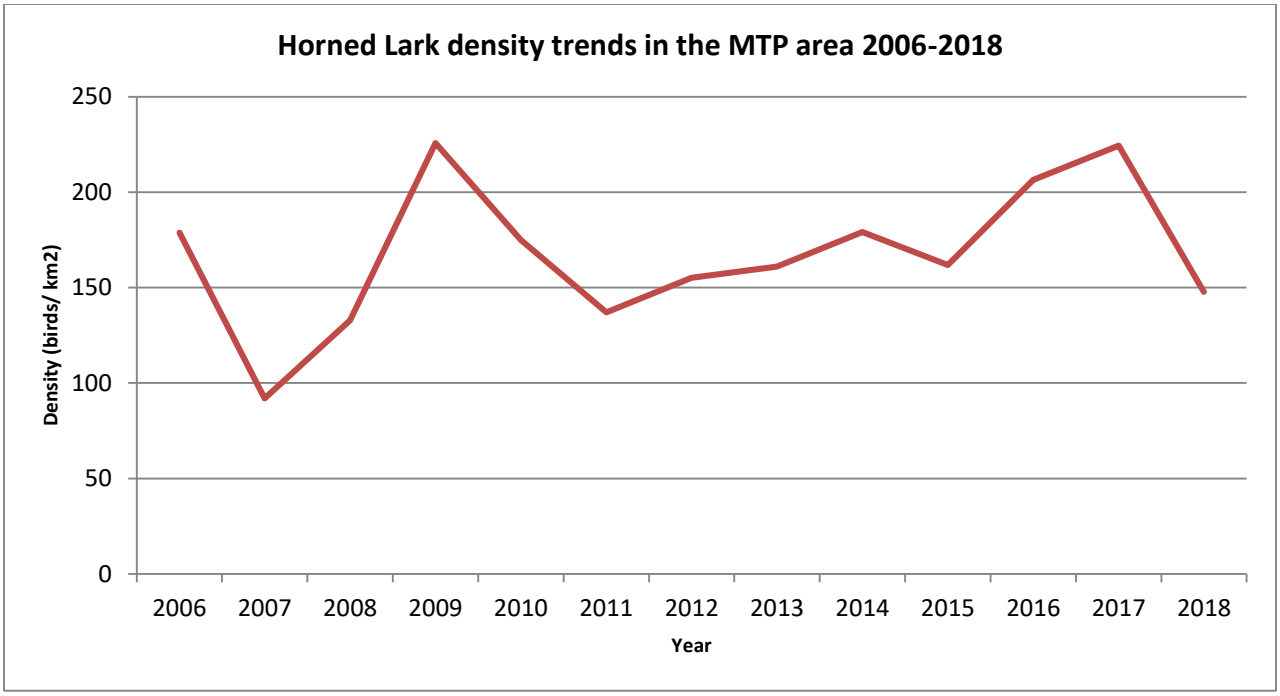

Figure 8: Horned lark density trend in the MTP area from 2006-2018

In 2018, we made concerted effort outside of official point count survey to locate singing Baird's sparrow males and map their territories (Fig 9). On the mornings of May 24 and 25 we deployed 10 geolocators on males captured via playback and mist nets. With a team of 4 biologists and several volunteers, we tagged four individuals in Jack Springs two individuals in Brannigan on the

24th, and four more individuals on the 25th in the Carr pasture of Meadow Springs Ranch (Figs 10 & 11).

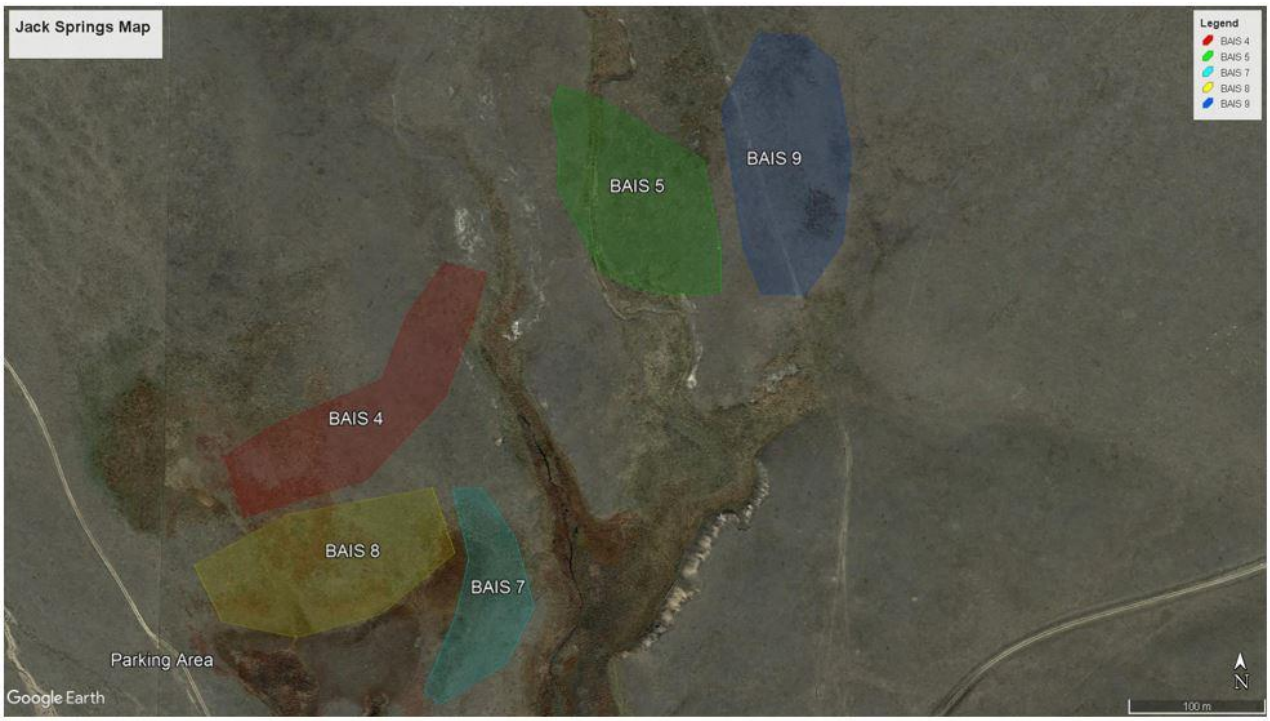

Figure 9: Mapped territories of 5 different singing males in Jack Springs pasture

Figure 10: Left - Mobile banding station for attaching geolocators in the field. Right – Geolocator with the beading elastic in the figure-8 loop-leg harness.

Figure 11: Left – BCR biologists extracting a Baird's sparrow male from a mist net after it was captured using playback. Right – Geolocator being attached to a male Baird's sparrow after measurements were taken and leg bands were put on.

These birds will need to be recaptured in the spring of 2019 to remove the geolocators and analyze the data from them to see how these birds are using the landscape regionally during the breeding season, where they spend the winter, and which routes they use for migration. This data will give us insight to the areas for conservation consideration. The birds can be easily resighted with the orange color band on the left leg, and the photo sensor that protrudes from the back (Fig 12).

Figure 12: Male Baird's sparrow in Meadow Springs with an orange color band on the left leg, a USGS aluminum band on the right, and a geolocator attached to his back.

Habitat Surveys

Grass was the dominant ground cover type (65%) in the 2018 PDCH, but less than the 70% grass cover in 2017. Bare ground was again the second dominant cover type in 2018 (17%) compared to 12% in 2017 (Fig 13). There was 1% higher coverage of forbs in 2018 than in 2017(9% vs 8%).

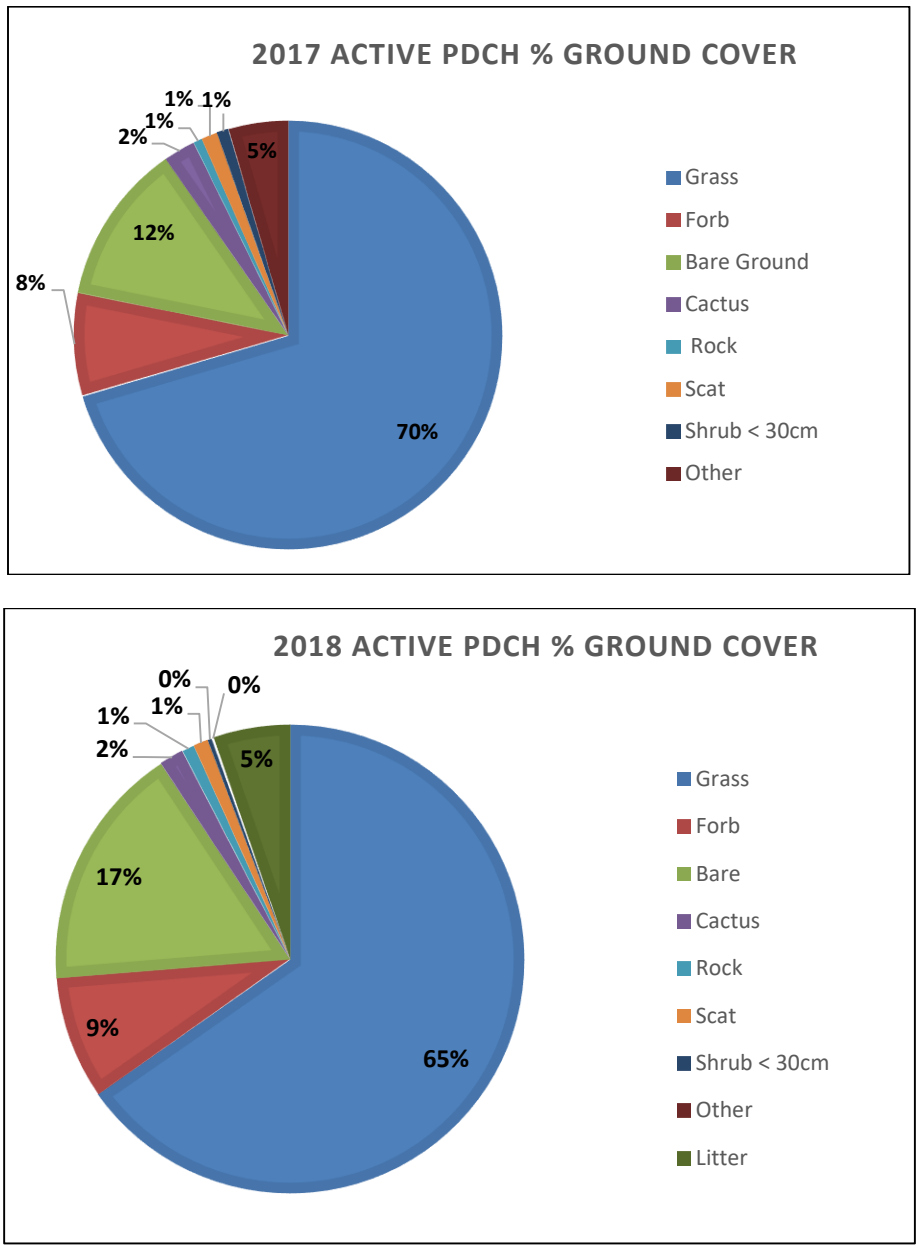

Figure 13: Percent ground cover within active Prairie Dog Colony Habitat in the MTP area (top: 2017, bottom: 2018).

Discussion and Management Recommendations

With the survey effort in 2018, there is now 12 consecutive years of bird monitoring data for the MTP region where Bird Conservancy has monitored grassland birds annually since 2006. The cyclical reoccurrence of the sylvatic plague in the area (which was first documented in 2008) continues to affect the black-tailed prairie dog population, and consequently the short and sparse vegetative structure that several shortgrass prairie birds depend on. The decreased grazing activities of the prairie dogs has encouraged more forbs to grow into the areas that were once sparsely vegetated and used by Mountain plover and McCown's longspur as nesting habitat, and created a shift in the avifauna to birds that are more tolerant to forbs and taller grasses like Horned larks. The decline in Burrowing owls may be explained by the length of time some of the prairie dog colonies have gone uninhabited. Because Burrowing owls do not dig their own burrows, they rely on other burrowing animals, such as prairie dogs to constantly create new burrows for nesting habitat. More data on that is available from a separate study on the effects of plague management on the avian population on Soapstone & Meadow Springs being conducted by Colorado Parks and Wildlife (Conrey, personal comm. 2018). The National Climate Data Center (NCDC) local weather stations in Carr, CO and Cheyenne, WY showed there was more average precipitation in the area between March and August in 2018 than in 2017, which also may have encouraged grass growth in areas that were not heavily grazed by cattle. With the occurrence of taller grasses, a potential new population of Baird's sparrows have moved into the area.

The confirmation of breeding Baird's sparrow in Soapstone (and potentially on the other properties) is fascinating and exciting to the regional birding community! Baird's sparrows typically breed in the northern Great Plains, from northern Wyoming and South Dakota north to Alberta, Saskatchewan and Manitoba. They are a species of high conservation concern that has experienced significant habitat loss and alteration on both its breeding and wintering grounds, resulting in an estimated 72% loss in global population since 1970 (Rosenberg et al. 2016). First reported in 2015 by the Colorado Parks and Wildlife bird monitoring crew, Baird's sparrow detections increased each year from 2016 – 2018. Baird's sparrows prefer taller grass than most shortgrass prairie species and had never before been documented breeding in Colorado; in fact, the species had rarely been encountered in the state, even during migration.

Between 9 May and 6 August 2018, we detected over 30 Baird's sparrows singing in six wet meadows and tall grass patches across SPNA. Our territory mapping and color-banding efforts revealed that most birds abandoned their original territories sometime in June and new sparrows replaced them within a few weeks. We only observed one of the 10 sparrows we color-banded on 24-25 May holding its original territory after 1 July, and another color-banded individual had set up a new territory over 2 km from its initial capture location by 25 June.

During nest searching efforts on 17 July, an adult Baird's sparrow was detected giving the frequent, metallic chips often indicative of nesting activity. After extended observation of this individual, it was seen carrying a small prey item to an area of grassland and returned without it (Figure 14a), indicating likely provisioning of nestlings or fledglings in the area. After repeated searching of the apparent provisioning sites, a recently-fledged juvenile Baird's sparrow was discovered incapable of sustained flight hidden in the grass, indicating it had been born in the immediate area. The bird was easily captured by hand and photographed (Figure 14b). We returned to the site 18 July and observed four juveniles being actively fed by the adult Baird's sparrow. We also observed a family group with the same number of juveniles in the area a week later.

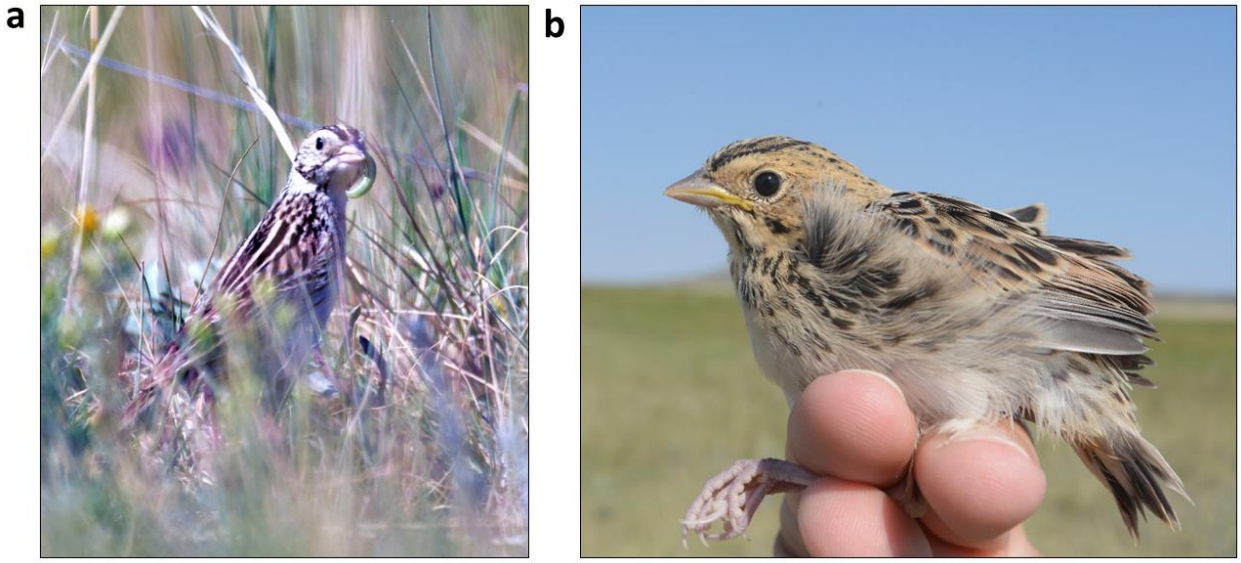

Figure 14: a. - Adult Baird's Sparrow carrying food. **b.** - fledgling Baird's sparrow in SPNA

The successful raising and fledging of young in this newly-colonized region shows that the selected habitat is of high enough quality to support nesting success in the species. This injects some hope that specialist species that appear to maintain fairly strict habitat requirements (like the Baird's sparrow) may actually be able to successfully colonize new habitat in the face of extreme habitat loss or other stressors. Keeping large contiguous patches of mid – tall grass prairie intact will be beneficial to the success of the species on SPNA.

Annual meetings with the Natural Areas Department, ranch managers, the grazing association, and BCR to share data & results and determine management, grazing and conservation goals using birds as indicators would help inform and direct future actions and survey efforts.

ACKNOWLEDGEMENTS

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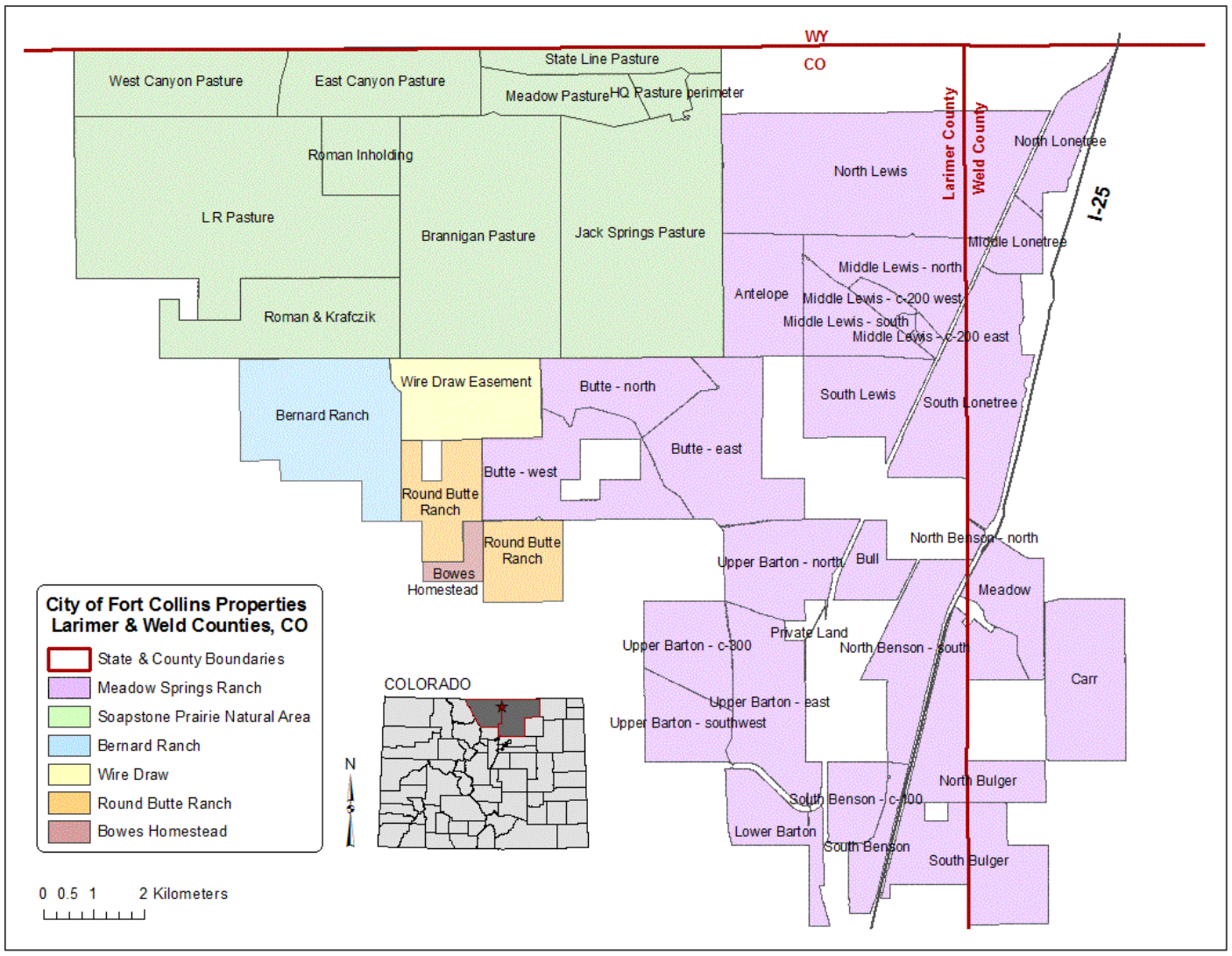
Appendix (A): Map of Fort Collins Properties

Map of Mountains to Plains properties owned and managed by the City of Fort Collins Natural Areas Program and Utilities: Soapstone Prairie Natural Area, Meadow Springs Ranch, Round Butte Ranch, Bernard Ranch, Wire Draw Easement, and the Bowes Homestead with pasture names.



Appendix (B): Species Detections in the Mountains to Plains Area

Number of individuals (non-truncated detections) of all species during point counts in The Mountains to Plains Area on Fort Collins' Properties from 2006 – 2018.

* Indicates species of special concern and/or high conservation priority status in Canada and the U.S. as determined by Partners in Flight, the USFWS and Colorado Parks & Wildlife.

[t] Indicates the years Colorado Parks and Wildlife conducted bird monitoring

Common Name	Scientific Name	2006 800pts	2007 737pts	2008 730pts	2009 1169pts	2010 408pts	2011 531pts (1373 effort)	2012 302pts (604 effort)	2013 507pts (1014 effort)	2014 412pts	2015 522pts	2016 224pts (448 effort)	2017 275pts (550 effort)	2018 223pts	Total
Canada Goose	*Branta canadensis*		12	33	13	11	13			20	14	29	27	1	**173**
Gadwall	*Mareca strepera*						2								**2**
American Wigeon	*Mareca americana*										5				**5**
Mallard	*Anas platyrhynchos*	6	2	2	18	3	38		5	2	7	7	9	1	**100**
Blue-winged Teal	*Spatula discors*						2				6				**8**
Green-winged Teal	*Anas crecca*						1								**1**
Cinnamon Teal	*Spatula cyanoptera*											2			**2**
Northern Shoveler	*Spatula clypeata*				2										**2**
Chukar	*Alectoris chukar*		2												**2**
American White Pelican	*Pelecanus erythrorhynchos*				18	9	6								**33**
Double-crested Cormorant	*Phalacrocorax auritus*				20	6	9					4			**39**
Great Blue Heron	*Ardea herodias*	1			26	4	10				4		1	3	**49**
Cattle Egret	*Bubulcus ibis*	1													**1**
Turkey Vulture	*Cathartes aura*	9	10		5		3		2	1	2	1	2		**35**
Bald Eagle	*Haliaeetus leucocephalus*								1						**1**
Northern Harrier *	*Circus hudsonius*	2	1	2	11	8	6	4	5	4	1	4	1	2	**51**
Sharp-shinned Hawk	*Accipiter striatus*		1				2								**3**
Cooper's Hawk	*Accipiter cooperii*		2			2									**4**
Swainson's Hawk *	*Buteo swainsoni*	11	6	5	60	9	22	4	7	8	5	18	11	18	**184**

Common Name	Scientific Name	2006 800pts	2007 737pts	2008 730pts	2009 1169pts	2010 408pts	2011 531pts (1373 effort)	2012 302pts (604 effort)	2013 507pts (1014 effort)	2014 412pts	2015 522pts	2016 224pts (448 effort)	2017 275pts (550 effort)	2018 223pts	Total
Red-tailed Hawk	*Buteo jamaicensis*		4	4	31		10	2	3						**54**
Ferruginous Hawk *	*Buteo regalis*	11	2	2	18	1	32	2	6	1		6	7	8	**96**
Golden Eagle *	*Aquila chrysaetos*	6	4	4	7	3	5	2	3	1			2	3	**40**
American Kestrel	*Falco sparverius*	10	6	7	27	15	68	13	10	4	3	19	29	9	**220**
Merlin	*Falco columbarius*				1		1								**2**
Peregrine Falcon	*Falco peregrinus*					1									**1**
Prairie Falcon *	*Falco mexicanus*	5	5	5	9	10	9	1	2	5	5	5	1	1	**63**
Sora	*Porzana carolina*												1		**1**
Sandhill Crane *	*Antigone canadensis*					2			1		1			1	**5**
American Golden-Plover	*Pluvialis dominica*									1					**1**
Killdeer	*Charadrius vociferus*	90	28	16	123	15	79	10	10	18	24	18	15	20	**466**
Mountain Plover *	*Charadrius montanus*	6	18	7	42	14	16	30	26	5	6	2	5		**177**
American Avocet	*Recurvirostra americana*				4		7				6				**17**
Greater Yellowlegs	*Tringa melanoleuca*				1										**1**
Willet	*Tringa semipalmata*											1			**1**
Upland Sandpiper	*Bartramia longicauda*		2	1			3							2	**8**
Whimbrel	*Numenius phaeopus*									2					**2**
Long-billed Curlew *	*Numenius americanus*	3		1	11	14	72	11	2	1		6	8		**129**
Wilson's Snipe	*Gallinago delicata*	55	11	9	13		30	2	5	3	9	10	13	19	**179**
Wilson's Phalarope	*Phalaropus tricolor*	2	4		7	3	2				4				**22**
Red-necked Phalarope	*Phalaropus lobatus*				7										**7**
Rock Pigeon	*Columba livia*	11	2	3	7	3	43		6				11	7	**93**

Common Name	Scientific Name	2006 800pts	2007 737pts	2008 730pts	2009 1169pts	2010 408pts	2011 531pts (1373 effort)	2012 302pts (604 effort)	2013 507pts (1014 effort)	2014 412pts	2015 522pts	2016 224pts (448 effort)	2017 275pts (550 effort)	2018 223pts	Total
Eurasian Collared-Dove	*Streptopelia decaocto*		1	2			1								**4**
Mourning Dove	*Zenaida macroura*	238	155	104	53	40	137	25	86	26	28	19		48	**959**
Barn Owl	*Tyto alba*		1												**1**
Great Horned Owl	*Bubo virginianus*	1													**1**
Burrowing Owl *	*Athene cunicularia*	6	2	5	21	10	54	30	16	3	19	38	59	51	**314**
Short-eared Owl	*Asio flammeus*		1												**1**
Common Nighthawk	*Chordeiles minor*	67	14	31	24	7	20	11	20	4	2	1	8	17	**226**
Common Poorwill	*Phalaenoptilus nuttallii*	1	1						1						**3**
Broad-tailed Hummingbird	*Selasphorus platycercus*	1	3	1	2	1					2			1	**11**
Red-headed Woodpecker	*Melanerpes erythrocephalus*						1								**1**
Northern Flicker	*Colaptes auratus*			1			11		1		2				**15**
Western Wood-Pewee	*Contopus sordidulus*	3	3	3	3				2						**14**
Dusky Flycatcher	*Empidonax oberholseri*		2												**2**
Cordilleran Flycatcher	*Empidonax occidentalis*		1												**1**
Say's Phoebe	*Sayornis saya*	56	14	15	26	8	31	10	14	1	2	1	5	2	**185**
Cassin's Kingbird	*Tyrannus vociferans*												1		**1**
Western Kingbird	*Tyrannus verticalis*	11	5	16	69	4	35	8	25	18	22		17	7	**237**
Eastern Kingbird	*Tyrannus tyrannus*	10	5	11	13	1	13				7		1		**61**
Loggerhead Shrike *	*Lanius ludovicianus*	3	21	11	10	5	27	25	48	6	1	12	6	8	**183**
Warbling Vireo	*Vireo gilvus*		2		1										**3**
Woodhouse's (Western) Scrub-Jay	*Aphelocoma woodhouseii*	6	6						2						**14**
Black-billed Magpie	*Pica hudsonia*	12	6					1	6				1	8	**34**

Common Name	Scientific Name	2006 800pts	2007 737pts	2008 730pts	2009 1169pts	2010 408pts	2011 531pts (1373 effort)	2012 302pts (604 effort)	2013 507pts (1014 effort)	2014 412pts	2015 522pts	2016 224pts (448 effort)	2017 275pts (550 effort)	2018 223pts	Total
American Crow	*Corvus brachyrhynchos*		2		2							3			**7**
Common Raven	*Corvus corax*	7	8	1	10	9	32	5	15	31	34	7	26	15	**200**
Horned Lark	*Eremophila alpestris*	3661	1006	1375	4378	1617	3559	1694	2464	1356	1737	1845	1229	2010	**27931**
Tree Swallow	*Tachycineta bicolor*	2	7		10		3		2	6		1		1	**32**
Violet-green Swallow	*Tachycineta thalassina*	12	12	1	4						1				**30**
Northern Rough-winged Swallow	*Steligdopteryx serripennis*	22	15	13	3	6	1	4	12	1	24	15	1	15	**132**
Bank Swallow	*Riparia riparia*	3	5		1		4	1		1			1	7	**23**
Cliff Swallow	*Petrochelidon pyrrhonota*	22	24	82	166	96	175	12	13	1	1	2	11	31	**636**
Barn Swallow	*Hirundo rustica*	46	62	13	35	12	160	1	15	47	28	35	1	36	**491**
Black-capped Chickadee	*Poecile atricapillus*						1								**1**
Mountain Chickadee	*Poecile gambeli*										1				**1**
Red-breasted Nuthatch	*Sitta canadensis*		1												**1**
Rock Wren	*Salpinctes obsoletus*	103	37	63	13	18	11	13	44	2	1	2	8	18	**333**
House Wren	*Troglodytes aedon*	1	2				1								**4**
Ruby-crowned Kinglet	*Regulus calendula*										1				**1**
Blue-gray Gnatcatcher	*Polioptila caerulea*	10	47	1			1		5			1	1		**66**
Mountain Bluebird	*Sialia currucoides*	1	1						2						**4**
Western Bluebird	*Sialia mexicana*				1				1					1	**3**
Hermit Thrush	*Catharus guttatus*		1												
Swainson's Thrush	*Catharus ustulatus*						2								**2**
American Robin	*Turdus migratorius*	23	27	9	7	3	40		1			2			**112**
Gray Catbird	*Dumetella carolinensis*	6													**6**

Common Name	Scientific Name	2006 800pts	2007 737pts	2008 730pts	2009 1169pts	2010 408pts	2011 531pts (1373 effort)	2012 302pts (604 effort)	2013 507pts (1014 effort)	2014 412pts	2015 522pts	2016 224pts (448 effort)	2017 275pts (550 effort)	2018 223pts	Total
Northern Mockingbird	*Mimus polyglottos*	16	7	1	1		7	3	27		1		4		**67**
Sage Thrasher	*Oreoscoptes montanus*	8		1			1	22	15		4				**51**
Brown Thrasher	*Toxostoma rufum*	22	16						13			1	3	7	**62**
Curve-billed Thrasher	*Toxostoma curvirostre*	1													**1**
European Starling	*Sturnus vulgaris*	4	4	39	198	11	116	1	2	65	64	9	8	190	**711**
Virginia's Warbler	*Oreothlypis virginiae*		9												**9**
Yellow Warbler	*Setophaga petechia*	2	14	4	2		7								**29**
Yellow-rumped Warbler	*Setophaga coronata*		1				2			17					**20**
Common Yellowthroat	*Geothlypis trichas*	1													**1**
Wilson's Warbler	*Cardellina pusilla*	1													**1**
Yellow-breasted Chat	*Icteria virens*	1	1				1								**3**
Western Tanager	*Piranga ludoviciana*						2								**2**
Green-tailed Towhee	*Pipilo chlorurus*	150	177			7		1	31					2	**368**
Spotted Towhee	*Pipilo maculatus*	524	288	2		4			183	5	2	8	18	41	**1075**
Cassin's Sparrow *	*Peucaea cassinii*			26	13	19	63		54					34	**209**
Chipping Sparrow	*Spizella passerina*	11	2		10	5	47		3		26	44		4	**152**
Clay-colored Sparrow	*Spizella pallida*	31		1	14	4	23		6					2	**81**
Brewer's Sparrow *	*Spizella breweri*	74	87	111	244	113	95	193	220	31	48	22	17	20	**1275**
Vesper Sparrow *	*Pooecetes gramineus*	369	187	103	102	130	122	210	346	42	139	87	142	153	**2132**
Lark Sparrow	*Chondestes grammacus*	50	54	36	43	14	138	44	69	12	65	18	12	33	**588**
Bells' (Sage) Sparrow	*Amphispiza belli*									2					**2**

Common Name	Scientific Name	2006 800pts	2007 737pts	2008 730pts	2009 1169pts	2010 408pts	2011 531pts (1373 effort)	2012 302pts (604 effort)	2013 507pts (1014 effort)	2014 412pts	2015 522pts	2016 224pts (448 effort)	2017 275pts (550 effort)	2018 223pts	Total
Lark Bunting *	*Calamospiza melanocorys*	451	554	233	3171	119	1212	504	1336	1385	837	122	76	95	**10095**
Savannah Sparrow	*Passerculus sandwichensis*	93	56	1	34	2	7		1			11	13	17	**235**
Grasshopper Sparrow *	*Ammodramus savannarum*	1	2	24	150	49	220		11	7	210	102	25	100	**901**
Baird's Sparrow	*Centronyx bairdii*										2	39	11	7	**59**
Song Sparrow	*Melospiza melodia*	1		1			1					1			**4**
Lincoln's Sparrow	*Melospiza lincolnii*											10			**10**
White-crowned Sparrow	*Zonotrichia leucophrys*						2						1		**3**
McCown's Longspur *	*Rhyncophanes mccownii*	1620	725	951	2334	735	1772	480	679	377	564	514	264	661	**11676**
Chestnut-collared Longspur *	*Calcarius ornatus*	11	1	1	29	78	26	12	10	2	4	1			**175**
Snow Bunting	*Plectrophenax nivalis*										5				**5**
Black-headed Grosbeak	*Pheucticus melanocephalus*	1	29						4						**34**
Blue Grosbeak	*Passerina caerulea*		1	2					11						**14**
Lazuli Bunting	*Passerina amoena*		10				1								**11**
Dickcissel	*Spiza americana*													3	**3**
Bobolink *	*Dolichonyx oryzivorus*					2									**2**
Red-winged Blackbird	*Agelaius phoeniceus*	355	84	53	190	29	311	23	65	129	190	65	141	100	**1735**
Eastern Meadowlark	*Sturnella magna*	1		2		1	2	4	5			2	1		**18**
Western Meadowlark	*Sturnella neglecta*	3156	699	581	1693	757	2824	1074	933	672	1208	1335	1558	1847	**18337**
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*		27	4	1						1			3	**36**
Brewer's Blackbird	*Euphagus cyanocephalus*	197	223	33	112	30	62	12	162	22	157	75	33	60	**1178**

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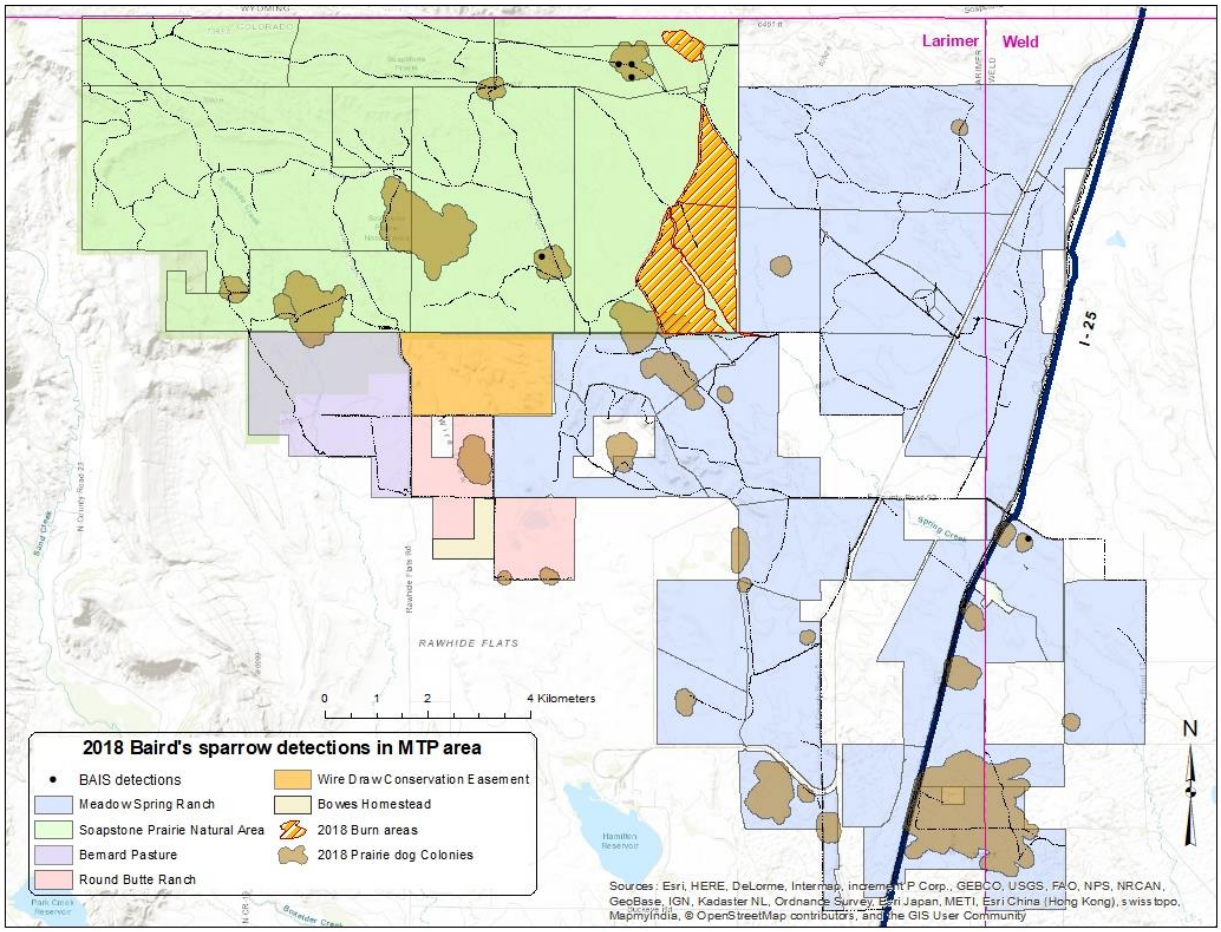
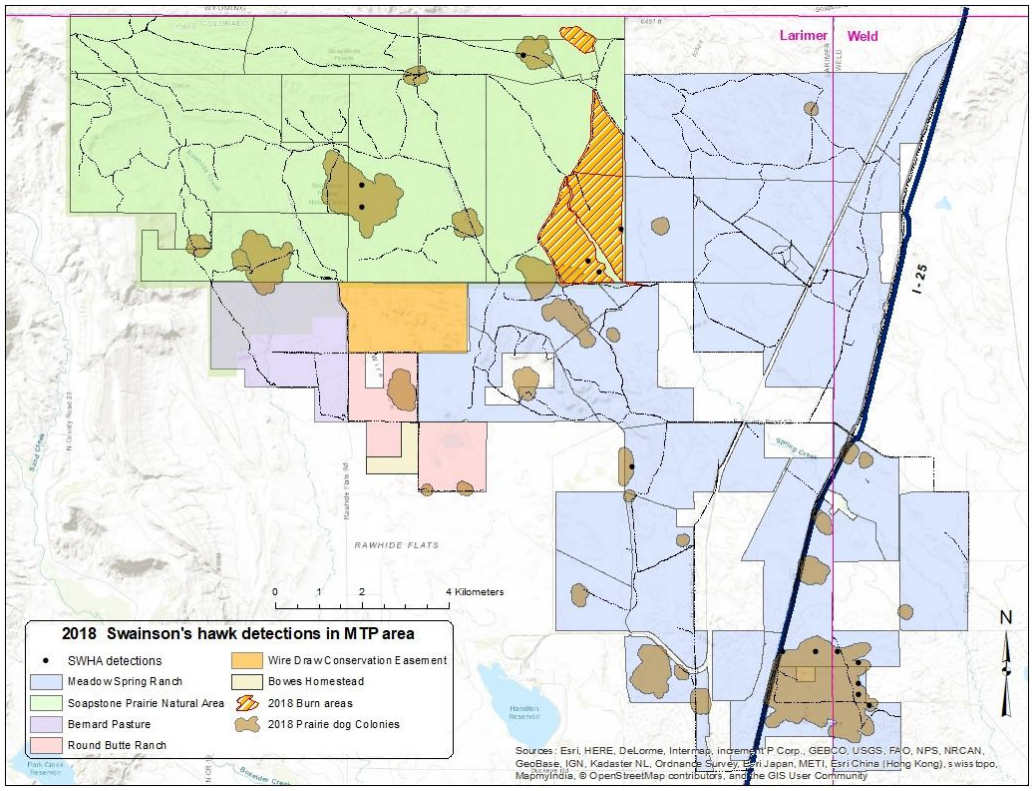
Common Grackle	*Quiscalus quiscula*	5	9	1	11		32		18	3	1	6	1		**87**
Great-tailed Grackle	*Quiscalus mexicanus*						48			1					**49**
Brown-headed Cowbird	*Molothrus ater*	224	309	25	40	15	21	2	60	43	16	1	11	31	**798**
Bullock's Oriole	*Icterus bullockii*	18	35	12	3	2	6	4	15						**95**
House Finch	*Haemorhous mexicanus*		2		4									2	**8**
Red Crossbill	*Loxia curvirostra*		1												**1**
Pine Siskin	*Spinus pinus*		4											1	**5**
Lesser Goldfinch	*Spinus psaltria*		11			1	9			4				1	**26**
American Goldfinch	*Spinus tristis*	50	88	3	1	2	4	3	4			1	1	5	**162**
House Sparrow	*Passer domesticus*				75		29				1			1	**106**
Totals	***135 species***	**12012**	**5339**	**4110**	**13808**	**4099**	**12024**	**4513**	**7172**	**4398**	**5560**	**4590**	**3859**	**5791**	**87275**

Appendix (C): Species Accounts

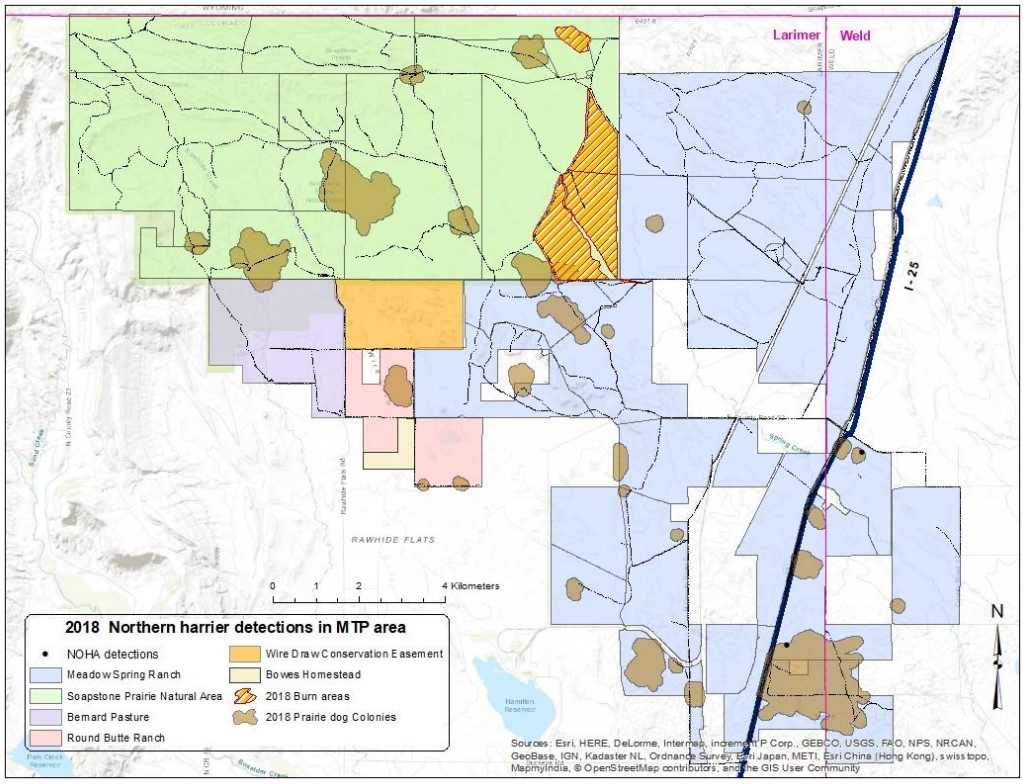
This section presents distribution maps for species of high priority conservation concern in the Mountains to Plains Area. The map for each species indicates location of individual observations recorded during the point count surveys between May 1st – July 4th, 2018.



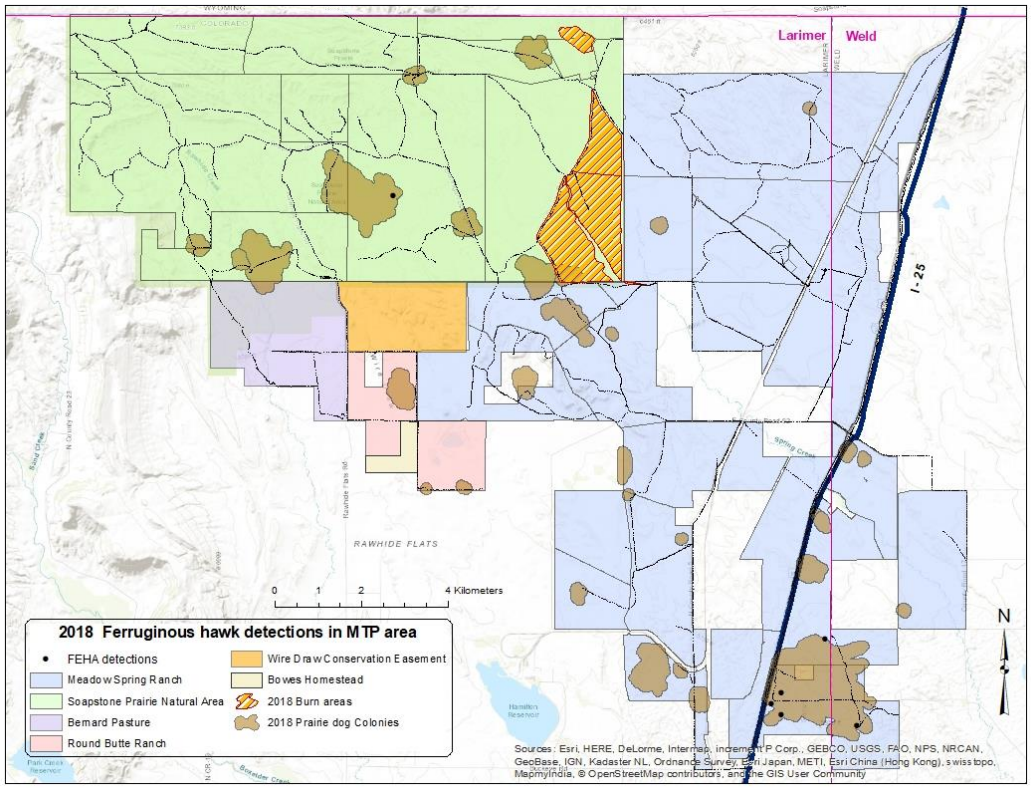
Baird's Sparrow (*Centronyx bairdii*)



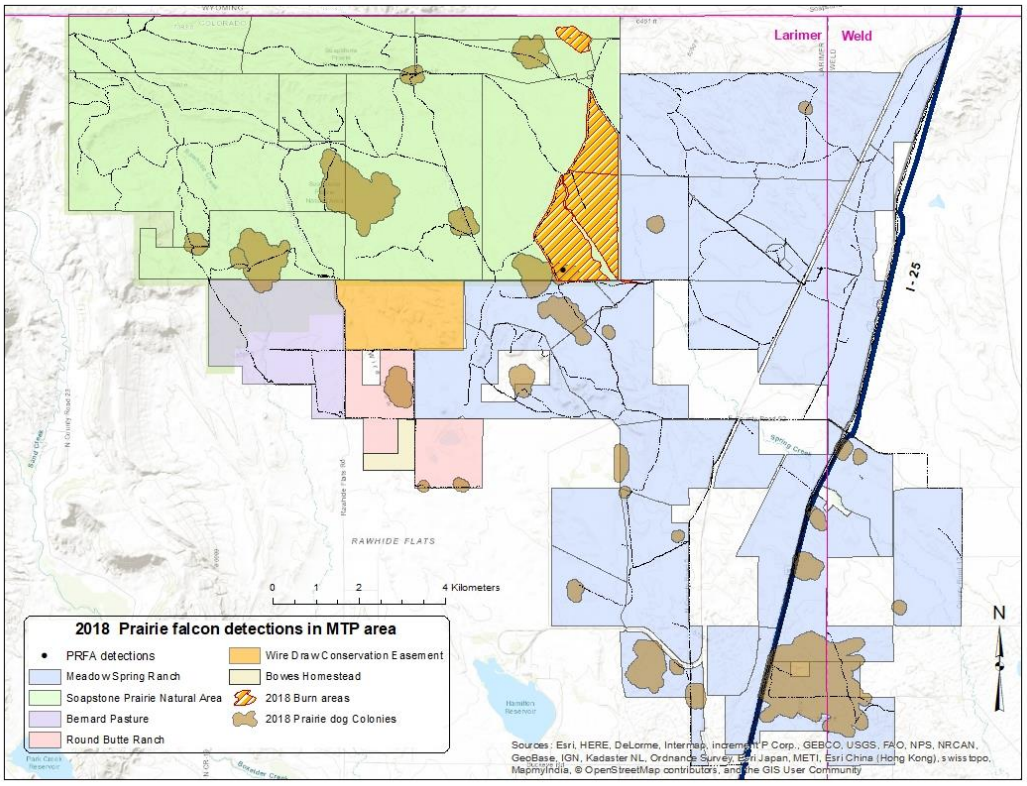
Swainson's Hawk (*Buteo swainsoni)*



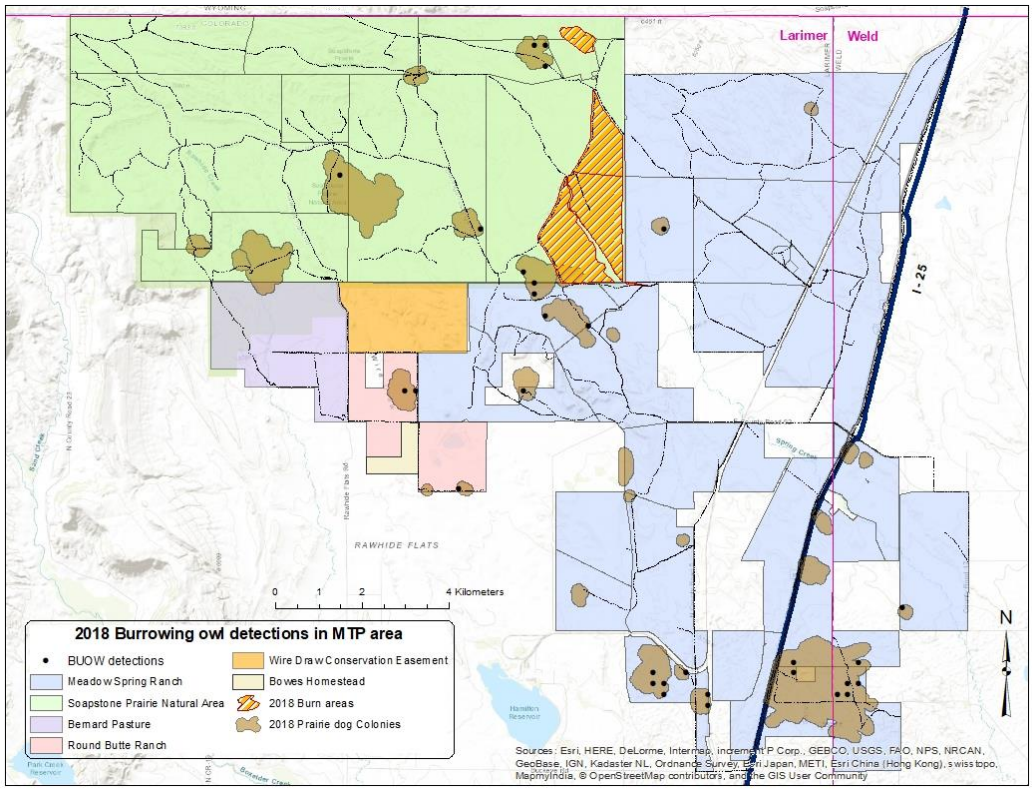
Northern Harrier (*Circus hudsonius)*



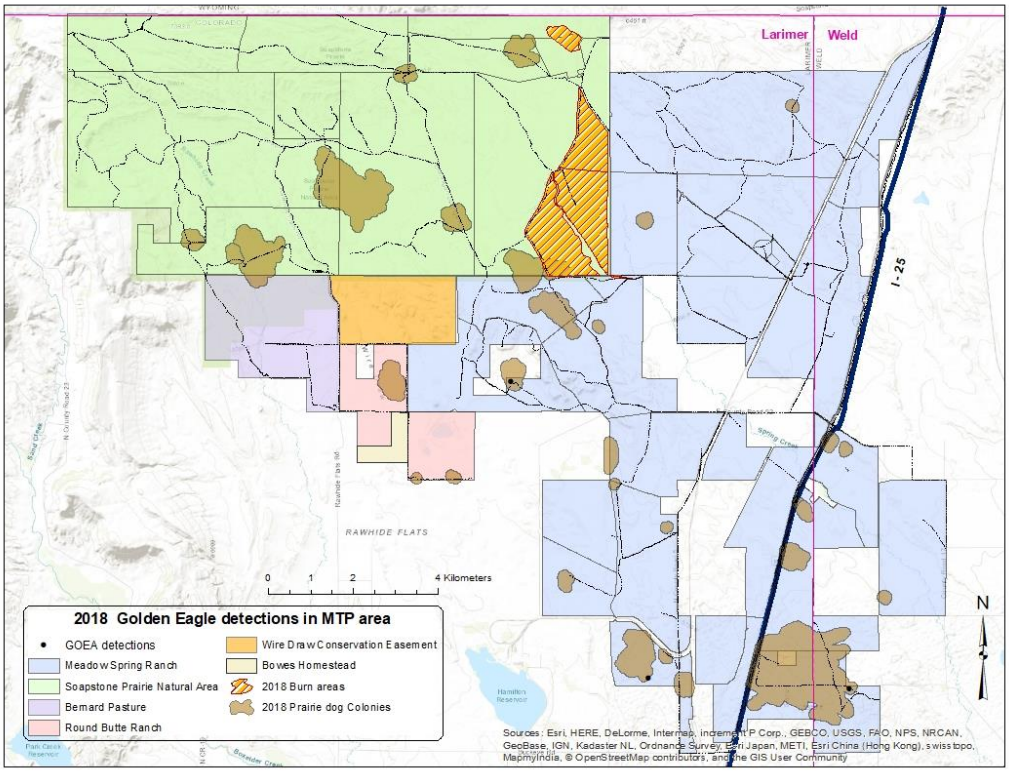
Ferruginous Hawk *(Buteo regalis)*



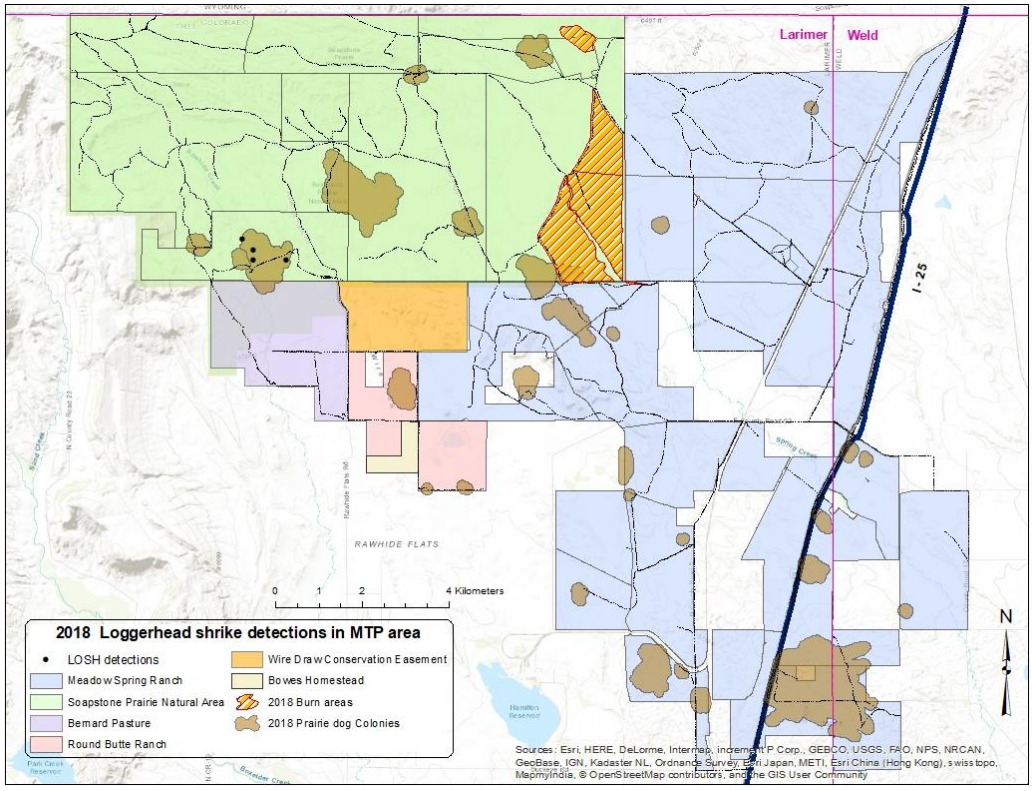
Prairie Falcon *(Falco mexicanus)*



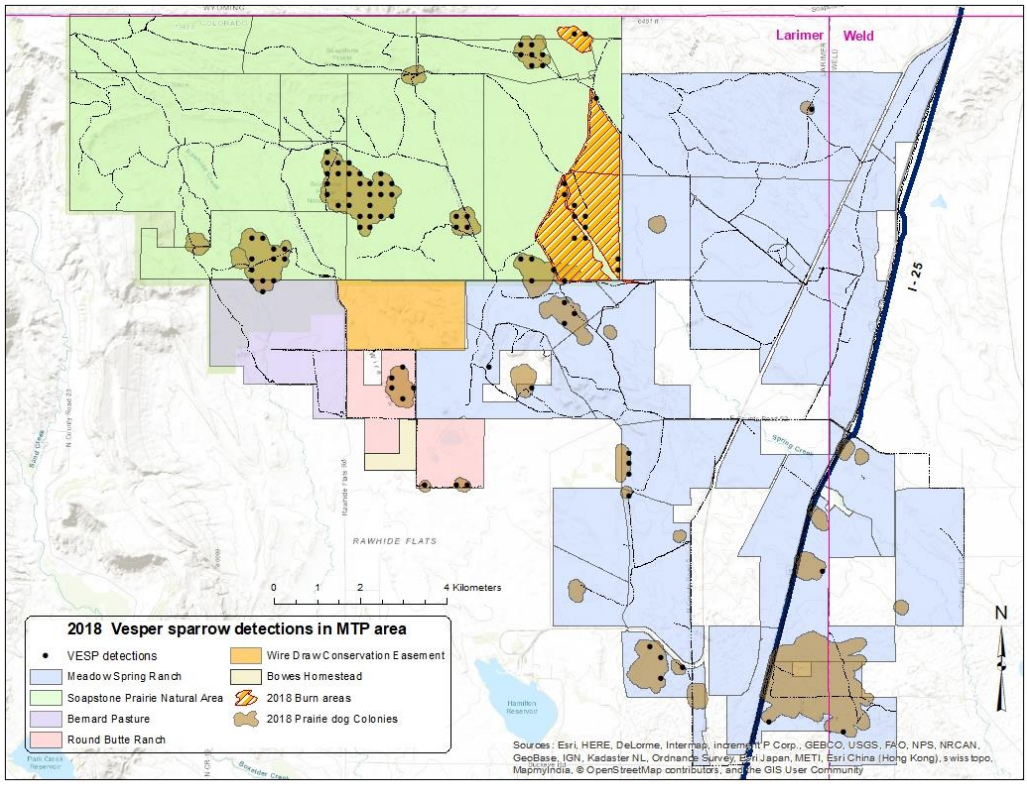
Burrowing Owl *(Athene cunicularia)*



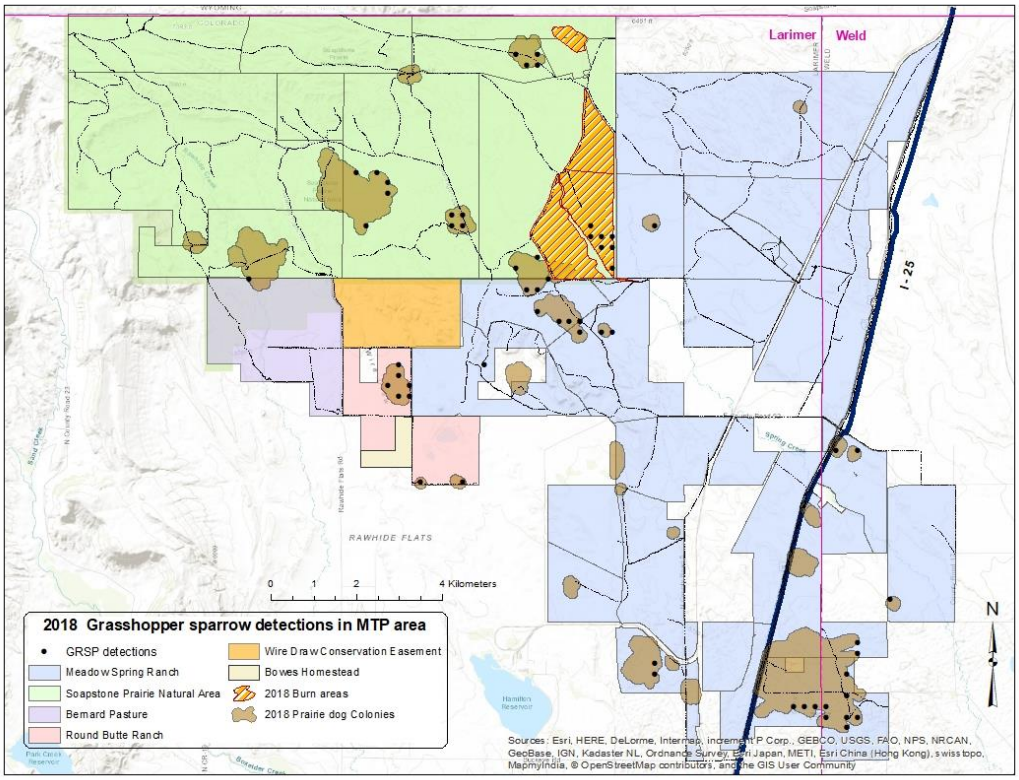
Golden Eagle *(Aquila Chrysaetos)*



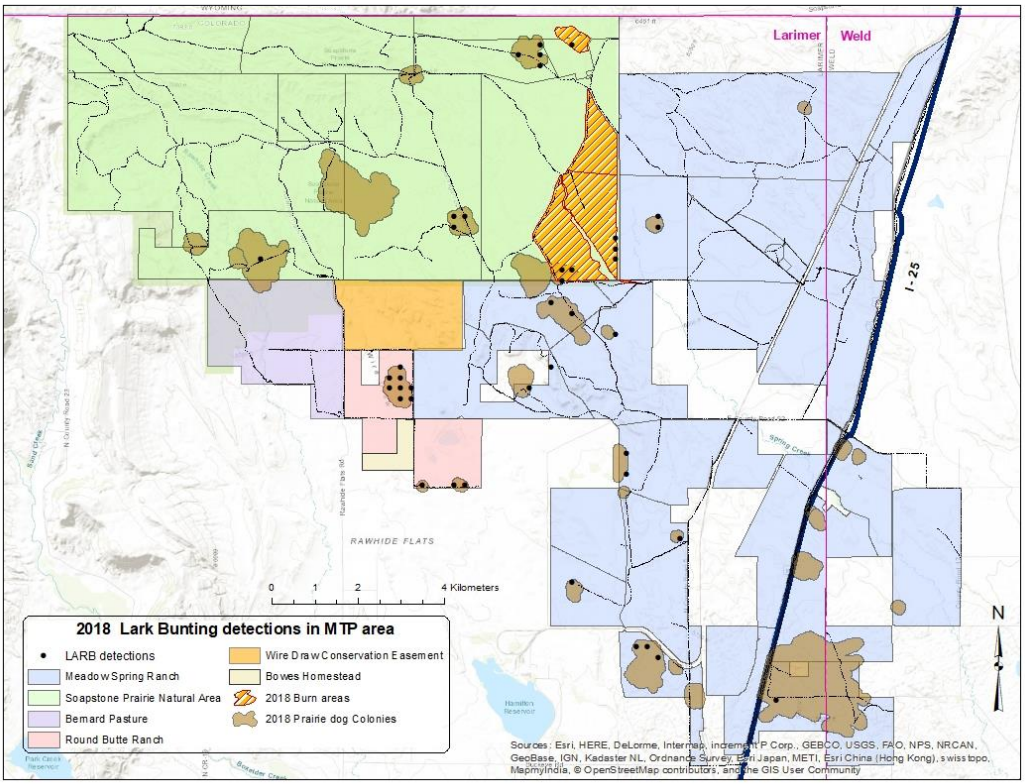
Loggerhead Shrike *(Lanius ludovicianus)*



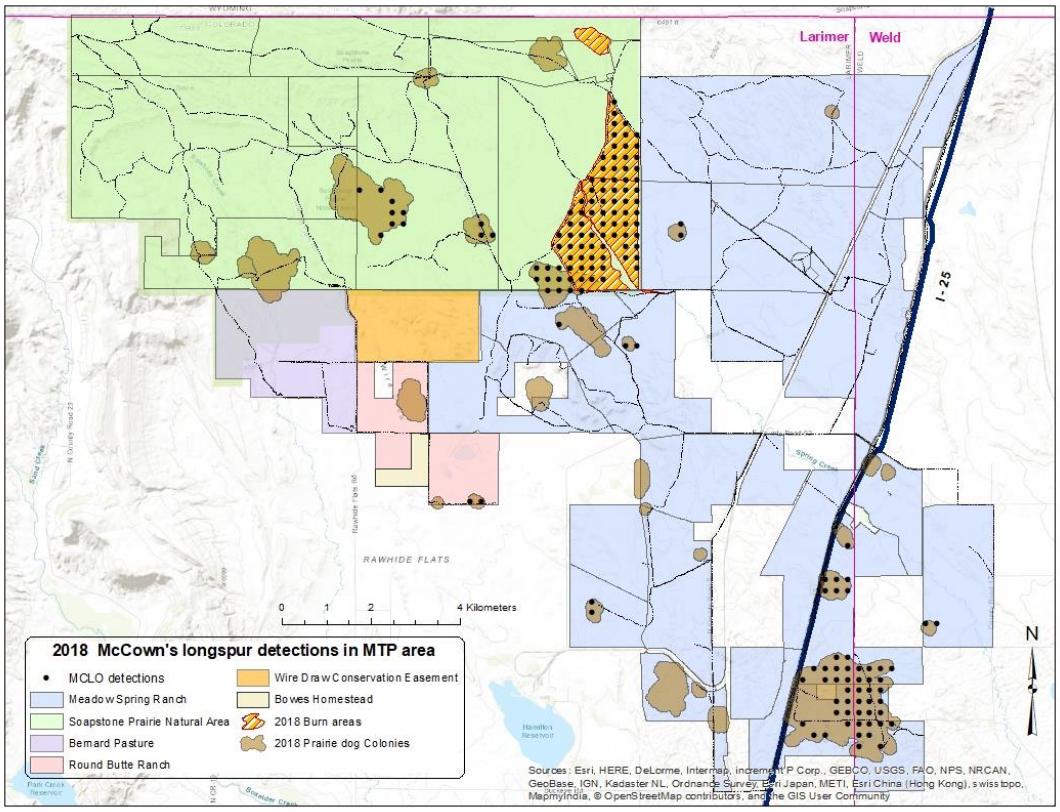
Vesper Sparrow *(Pooecetes gramineus)*



Grasshopper Sparrow (*Ammodramus savannarum*)



Lark Bunting *(Calamospiza melanocorys)*



McCown's Longspur *(Rhyncophanes mccownii)*