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

2016 TECHNICAL REPORT

Bird Conservancy of the Rockies

Connecting People, Birds and Land

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Technical Report: I-MTP-FCNAP-16

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.*

***Fostering** good stewardship on private and public lands through voluntary, cooperative partnerships that create win-win solutions for wildlife and people.*

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

***Sharing** the latest information on bird populations, land management and conservation practices to create informed publics.*

***Delivering** bird conservation at biologically relevant scales by working across political and jurisdictional boundaries in the Americas.*

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Cover Photos: Soapstone Prairie Natural Area and Meadow Springs Ranch 2016 by E. Youngberg

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EXECUTIVE SUMMARY

The City of Fort Collins has been working for the past 12 years 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 region. For the past 10 years, Bird Conservancy of the Rockies has partnered with the City of Fort Collins in an ongoing effort to aid conservation and management of these grasslands through grassland bird inventory and monitoring on over 45,000 acres of city-owned properties in Larimer and Weld Counties in the MTP area. This report summarizes the monitoring activities and highlights our findings of 2016.

This region supports 19 high-priority grassland birds, including Ferruginous Hawk, Swainson's Hawk, Golden Eagle, Burrowing Owl, Mountain Plover, Prairie Falcon, Lark Bunting, McCown's and Chestnut-collared Longspur, Vesper, Grasshopper, Cassin's, Brewer's Sparrow, Long-billed Curlew, and newly detected in our surveys this year, Baird's Sparrow. Grassland birds have declined more steeply and consistently in our lifetime than any other North American bird groups and are among the top priorities for governmental and non-governmental wildlife conservation organizations. Among the management concerns for these species in the MTP are grazing management, energy development, recreation, invasive species, and prairie dog and plague management.

During the 2016 nesting season we conducted point count surveys at 224 stations. We surveyed approximately 1,417 acres of prairie dog colony habitat on Meadow Springs Ranch and Soapstone Prairie Natural Area, as well as a small colony on Round Butte Ranch. At each station we also surveyed vegetation and recorded observations of other wildlife. During 35 survey days in 2016, we observed 5,124 individual birds of 53 species. We estimated densities of 14 common breeding bird species across the study area and post-stratified estimates by prairie dog colony habitat (PDCH) and non-prairie dog colony habitat (non-PDCH).

The most common birds within the 2016 study area were Horned Lark, Western Meadowlark McCown's Longspur, and Lark Bunting, which together accounted for 83% of all individual birds observed. The detection of numerous Baird's sparrows on the properties is exciting as they are a species of conservation concern that prefers taller grasses, but have never been documented or suspected of breeding in Colorado. A comparison of annual densities of McCown's Longspur within the prairie dog colony habitat suggests that the population continues to decline steadily and rapidly, especially since 2009, resulting in a >50% reduction in population since 2006. Mountain Plovers have not persisted in the Jack Springs pasture after the 2011 prescribed burn, with the last one detected there in 2014. It is hoped that plague management will help in the recovery of the prairie dogs, and thus the plover population, but additional prescribed burns and other actions are warranted to keep the species from disappearing from the MTP area. Continued monitoring efforts are warranted for these species. Interestingly, populations of Burrowing Owl appear to be largely stable in the area.

The City of Fort Collins Natural Areas and Utilities Department lands in northeast Larimer and northwest Weld counties, 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 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 area has been identified by TNC, Colorado Parks and Wildlife (CPW), the US Forest Service, the US Fish and Wildlife Service and others as one of the highest priority conservation areas in the Shortgrass Prairie BCR. Partners in Colorado 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. For the past eight years, Bird Conservancy of the Rockies (BCR) has partnered with the City of Fort Collins Natural Areas Program (FCNAP) in an ongoing effort to aid conservation and management of these grasslands through grassland bird inventory and monitoring on 45,000 acres of city-owned properties in the MTP region. These properties support breeding populations of 16 high-priority grassland bird species.

The goal of this long-term project is to help managers conserve grassland bird species and their habitats on FCNAP properties in northern Colorado by better understanding the abundance, distribution, trends and habitat requirements of breeding birds on the properties. The area has experienced 2-3 cycles of sylvatic plague since 2008 that have significantly decreased the Black-tailed prairie dog (*Cynomys ludovicianus*) populations. Successful efforts have been made by the FCNAP and CPW to encourage re-colonization including prescribed burns, dusting treatments for fleas, and a 3-year prairie dog oral vaccination program from 2013-2015. This year was the first year BCR resumed monitoring efforts following the CPW study. 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 2nd and June 17th of 2016, we conducted breeding grassland bird point count surveys on FCNAP 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). Soapstone is dominated on the east by native shortgrass prairie with rolling hills, wide shallow washes, and abrupt rocky outcroppings, and on the west is bordered by an old growth stand of ponderosa pine, and below that hosts the largest contiguous community of Mountain mahogany (*Cercocarpus montanus*) in the state of Colorado (Rondeau et al. 2011), limestone cliff areas, 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 bordered by Plains Cottonwood (*Populus deltoides*) in the northern Lonetree pastures, rolling hills spotted 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 transition to Saltbush. Yucca (*Yucca* spp.) is the next most abundant ground cover, and there are several weathered sandstone outcroppings throughout the property.

We limited our point counts on SPNA and MSR in 2016 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 2015. A point was considered in PDCH if it was within 100m of an active burrow. The acreage of PDCH has not returned to its pre-plague size of 4,321 acres, with approximately 1,417 acres of active PDCH surveyed in 2016. We also surveyed approximately 585 additional acres of previously active (within the last 3 yrs) PDCH as the abandoned burrows will often continue to attract Burrowing Owls.

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 224 point count stations in 2016 in the target habitat (38 of them in recently plagued-out PDCH, 186 in active PDCH) (Fig 1). Points in PDCH were surveyed earlier in the season between May 2nd and May 25th 2016 to increase detectability of the early nesting species. Each point count station was surveyed twice, about 2-3 weeks apart.

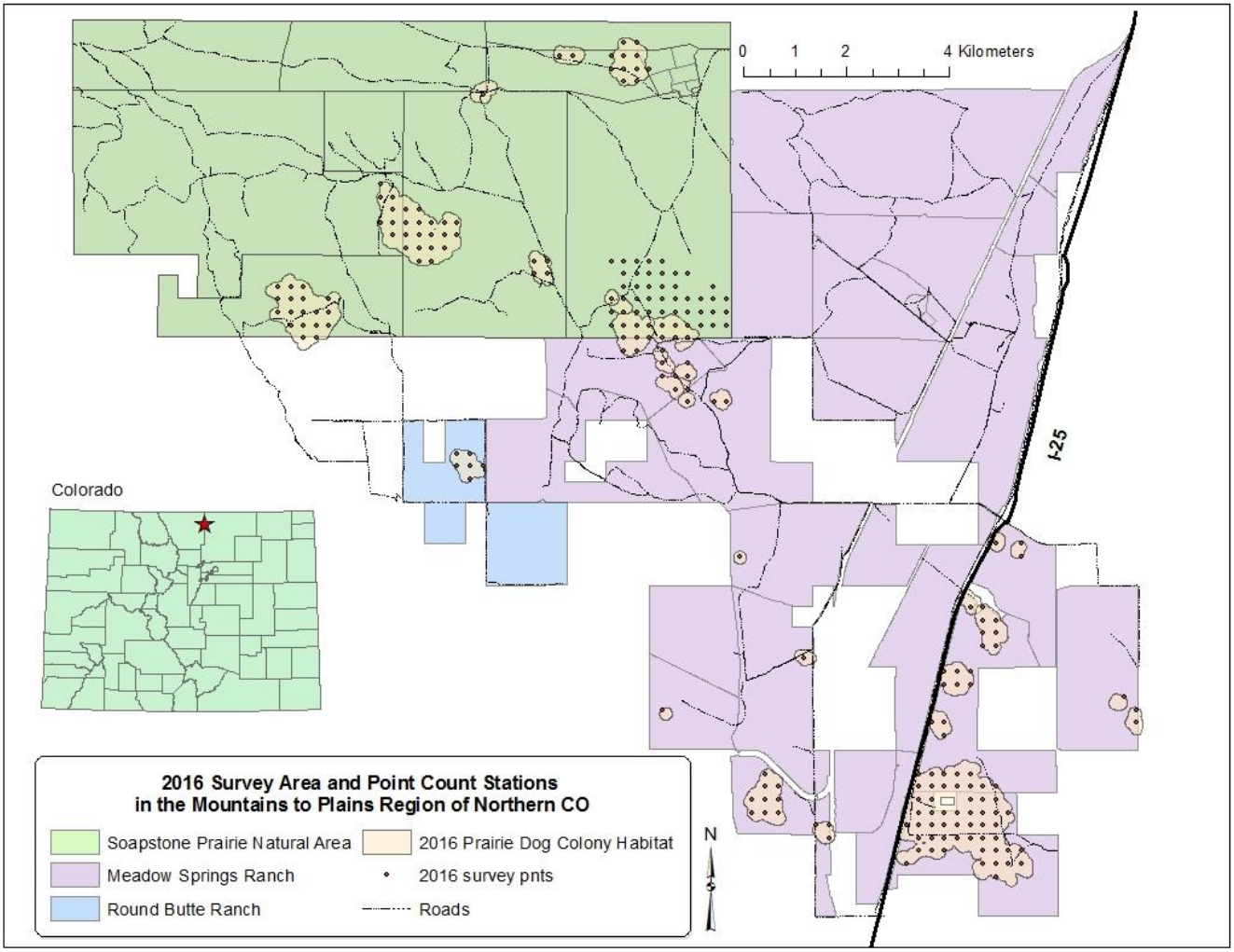

Figure 1: 2016 Survey area and point count stations on FCNAP properties in the MTP region.

Point count surveys started one half-hour before sunrise and ended by 11 a.m., often earlier. 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. (2009), 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 Nikon ProStaff 550 laser rangefinder. In 2016 we documented whether the bird was seen inside the PDCH boundary, and if there was visual confirmation of the bird. 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 or unusual bird species, but we did not use these observations in our analyses. We also noted the presence of any other wildlife.

Habitat Surveys

After completing each avian point count survey we completed a rapid habitat survey at each point 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, 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 two dominant grass species. Within 50 m of each station we documented shrub and over story tree species and estimated 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 2016 survey data to previous years' data (2006-2015) 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 2016 to generate species-specific detection functions, and then post-stratified density estimates by habitat type. Although species' density estimates calculated with less than 75 observations may be unreliable representations of true populations (Buckland et al. 2001), we present estimates for all species with $n \geq 25$ across all years, 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 2016 we detected 5,124 birds during point count surveys, and observed 53 species within the study area. Of the species detected, 12 are of conservation interest. (Appendix B). Willets, Long-billed Curlew, Least Sandpipers and Avocets were observed using the area for migration.

We analyzed data for 14 breeding bird species. Horned Lark and McCown's Longspur had the highest densities within PDCH grasslands (Table 1), but their densities in 2016 are still considerably lower than their historic averages since BCR monitoring began in 2006 (Youngberg et al. 2012).

Table 1: Density estimates in 2016 in Prairie Dog Colony Habitat (n = truncated # detections in 2016, D = # of birds/ km^2), % Coefficient of Variation, and 95% lower (LCL) and upper (UCL) confidence limits.

Species	n	D	CV	LCL	UCL
Horned Lark	1323	89.20	4.43	81.77	97.29
McCown's Longspur*	407	31.77	8.42	26.93	37.48
Western Meadowlark	1261	14.24	4.47	13.05	15.55
Grasshopper Sparrow*	70	3.74	14.45	2.82	4.96
Brewer's Blackbird	25	3.14	26.22	1.89	5.21
Vesper Sparrow*	70	2.41	17.49	1.71	3.39

Lark Bunting*	23	1.19	23.18	0.76	1.86
Baird's Sparrow*	37	0.67	19.85	0.45	0.98
Burrowing Owl*	35	0.62	23.53	0.39	0.98
Loggerhead Shrike*	17	0.40	30.01	0.23	0.72
American Kestrel	18	0.27	29.11	0.16	0.48
Mountain Plover*	2	0.07	82.65	0.02	0.29
Swainson's Hawk*	9	0.05	38.15	0.02	0.11
Ferruginous Hawk*	1	0.03	103.12	0.01	0.15

* = Species of special concern

In particular, McCown's Longspur densities in PDCH have continued to steadily decline since 2006 (Fig. 2) from an estimated density of 250 birds/km^2 to less than 50 birds/ km^2. Also of note, Mountain Plover densities have not recovered since the last BCR survey effort in 2013 (Fig 3). Burrowing owl densities have fluctuated but remained fairly stable at 0.6 birds/ km^2 (Fig 4), and their population trend does not follow the same pattern as the other two prairie dog colony obligate species.

Interestingly, the 37 detections of Baird's Sparrows (mostly singing males) during our survey, many of which were observed again later in the summer in the same places, suggests the species established territories for the purpose of breeding here, a new phenomenon for the MTP area. Most of the detections occurred on the points in the recently plagued areas that were surveyed, or on the edges of the PDCH where the grass is significantly taller. They are a mixed – tall grass prairie specialist, and are known to be sensitive to disturbance and habitat alteration/ fragmentation/ degradation.

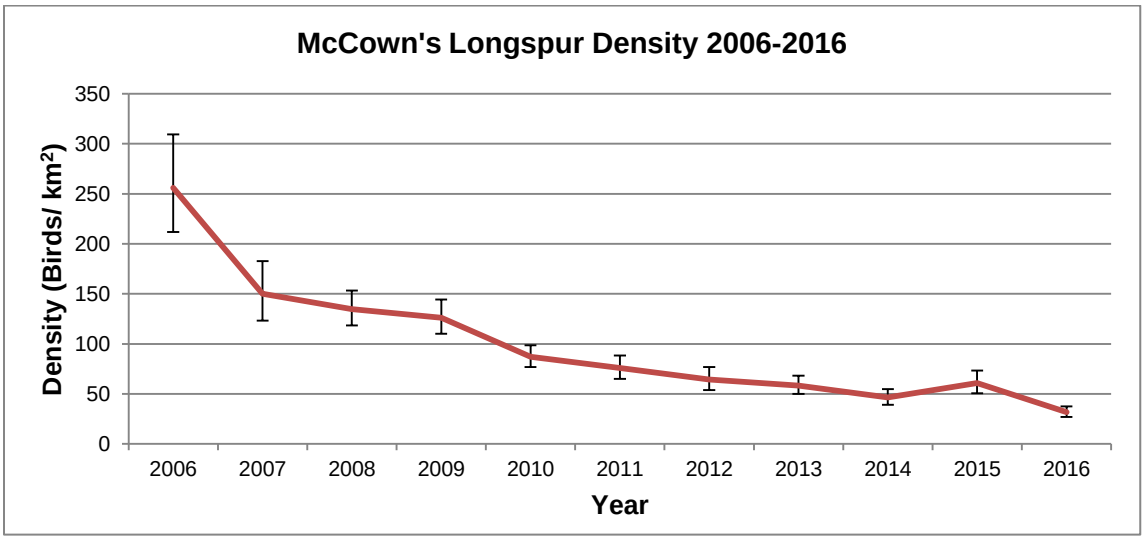

Figure 2: McCown's Longspur density trend within PDCH from 2006-2016

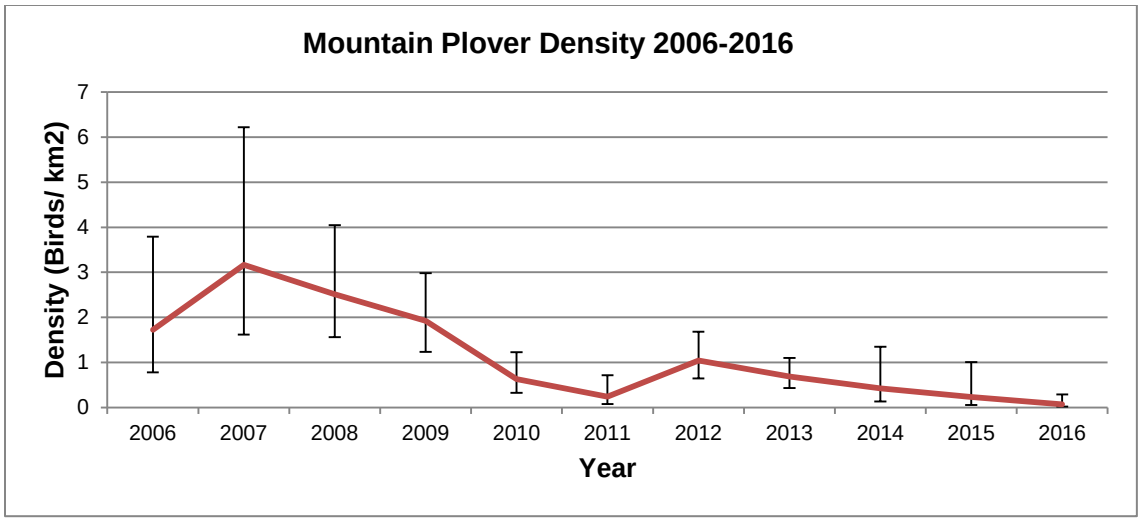

Figure 3: Mountain Plover density trend within PDCH from 2006-2016

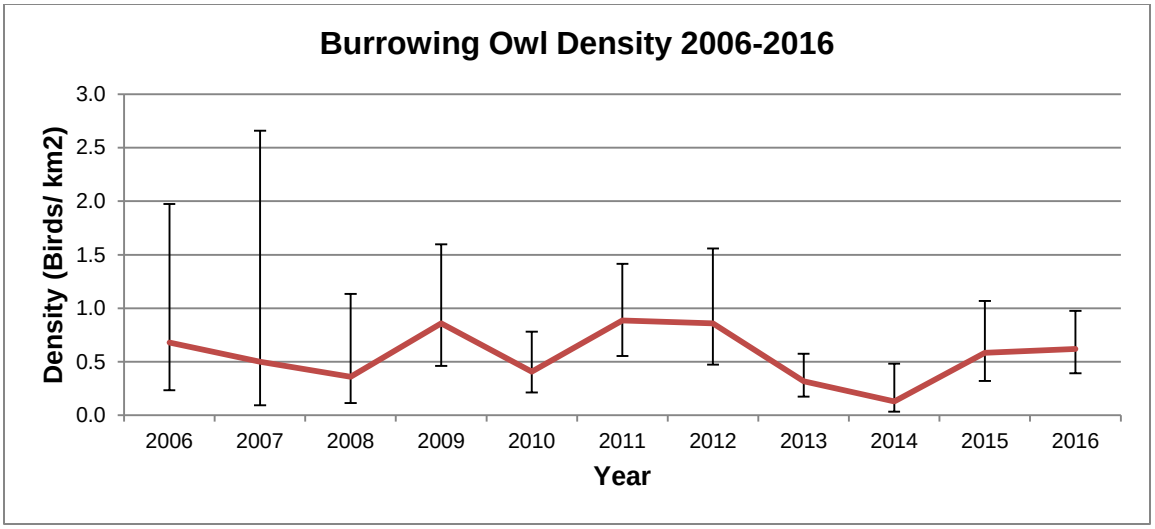

Figure 4: Burrowing Owl Density trend within PDCH from 2006-2016

Habitat Surveys

Grass was the dominant ground cover type (79%) in the 2016 study area, followed by bare ground (8%) (Fig 5). 'Other' cover consisted of litter, lichen, dead woody material, etc. The surveys in active PDCH had a higher percent of bare ground (8% vs. 6%) and less grass cover (78% vs. 82%) than the areas no longer inhabited by prairie dogs (Fig 6). All survey sites had low percentages of cactus, rock, and low woody shrub cover (less than 30cm tall).

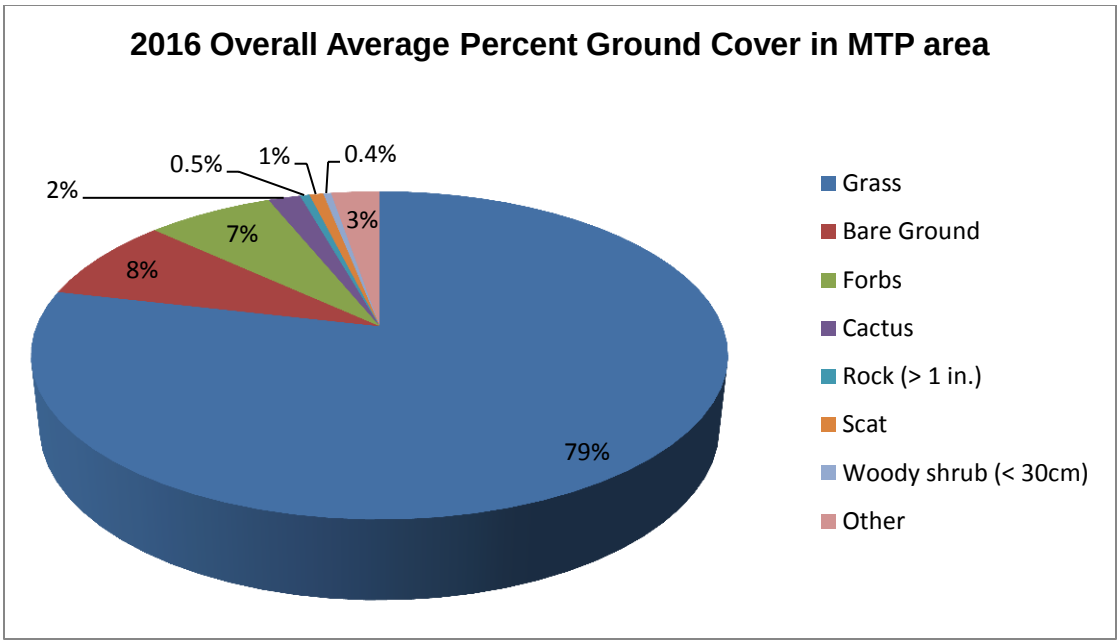

Figure 5: Average percent ground cover in 2016 across surveys in MTP area

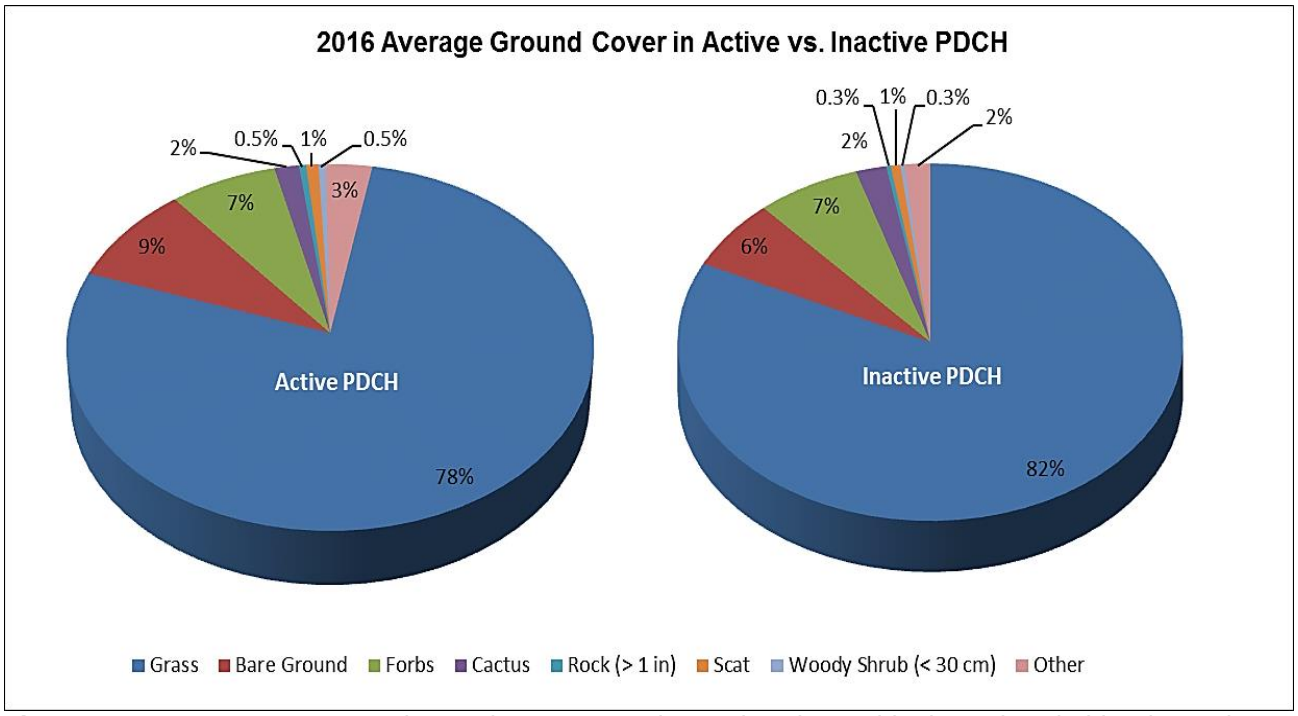

Figure 6: Average percent ground cover in 2016 on active vs. inactive prairie dog colony habitat (PDCH)

Discussion and Management Recommendations

BCR has monitored grassland birds in the MTP area annually since 2006, and with 2016's survey effort, we now have 10 years of consecutive monitoring data for the MTP region. The reoccurrence of the sylvatic plague in the area (which was first detected in 2008) has significantly affected the black-tailed prairie dog population, and thus the short and sparse vegetative structure that several shortgrass prairie birds depend on. With the decreased grazing activities of the prairie dogs, taller grasses and forbs have grown into the areas that were once sparsely vegetated and used by Mountain Plover and McCown's Longspur as nesting habitat.

Our data indicate that Mountain Plover densities have declined from 1.72 birds/km^2 in 2006 to .07 birds/km^2 in 2016, with only 2 individual detections. A prescribed burn conducted in 2011 in the Jack Springs pasture of Soapstone was successful in accelerating the recolonization of this area by prairie dogs and at least two pairs of Mountain Plover the following year, however, no plovers were detected here in 2016. Prescribed burns have been shown to attract Mountain Plovers elsewhere (Augustine and Derner 2012). The positive response by Mountain Plovers (and McCown's Longspur, see Youngberg and Panjabi 2011) to the prescribed burns in Jack Springs demonstrates the effectiveness of prescribed fire as a management tool for Mountain Plover, and is testament to the importance of targeted and well-timed management efforts by City of Fort Collins Natural Areas Program staff. However, Mountain Plover populations in the Jack Springs pasture area of Soapstone Prairie have not recovered, and the species is now in danger of disappearing from the entire MTP area.

Since the 2008 plague event, the prairie dog colony around the USFWS ferret center has consistently hosted the largest and most stable population of Mountain Plovers within the MTP area. However, there were only 2 individual birds seen in that colony in 2016. It is hoped that the implemented plague vaccine and insecticidal dusting for fleas in the colonies will help to reduce the incidence of plague to further aid in the recovery of the prairie dog populations, and in turn restore the populations of Mountain Plover and McCown's Longspur. However, given that the plovers do not appear to be recolonizing other recently expanding prairie dog colonies in the MTP region, additional management actions such as increased grazing pressure and especially controlled burns may be needed in targeted areas to prevent the immediate loss of Mountain Plovers from the MTP area. These actions will likely have a positive effect for McCown's Longspur as well, which also prefers the very short vegetation structure of heavily grazed grasslands. Continued monitoring of bird populations will help measure the response of these and other bird species to those actions. Interestingly, Burrowing Owl density has remained fairly constant over the last ten years, and the species appears to be adaptable to changes in prairie dog abundance and habitat management.

By far the most interesting discovery in 2016 was the observation of numerous territorial/singing Baird's sparrows on the properties. Baird's Sparrows typically breed in the northern Great Plains, from northern Wyoming and South Dakota north to Alberta, Saskatchewan and Manitoba. First reported in 2015 by the Colorado Parks and Wildlife bird monitoring crew, Baird's Sparrows increased significantly in numbers in 2016 (see map in Appendix C). There were four Baird's sparrow detections on 2 points in the Brannigan pasture in 2015 (blue points), and 39 detections on 25 points in the east half of Soapstone in 2016 (Pink points). Several other individual birds were heard singing during non-survey times and outside of PDCH, or in the recently plagued-out PDCH in Jack Springs pasture.

Baird's sparrows 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). Baird's Sparrows prefer taller grass than most shortgrass prairie species and have never before been documented breeding in Colorado; in fact, the species is rarely encountered in the state, even during migration. However, the >30 observations in 2016, including several apparent male-female pairs (the species is not dimorphic), suggests it likely did nest here, both in 2015 and 2016. Several attempts were made to confirm breeding in 2016, however the species' nests are notoriously hard to find.
A concerted effort should be made in 2017 to confirm breeding and locate additional Baird's Sparrow territories. Our 2016 survey effort focused exclusively on prairie dog towns, however, this is not the expected habitat for the species. Most observations were at the edges of dog towns, often near wet areas where the mix of taller and shorter grasses likely provided the needed habitat structure, including nesting cover. Given its preference for taller vegetation, the species probably also occurred elsewhere on Soapstone and Meadow Springs in 2016. A expanded survey on City-owned lands targeting wet meadows and similar habitats would provide more information on Baird's Sparrow occurrence, distribution, habitat use, and breeding status within the MTP area. Establishment and documentation of a breeding population in Colorado would be a significant contribution to the current state of knowledge and conservation of this species.

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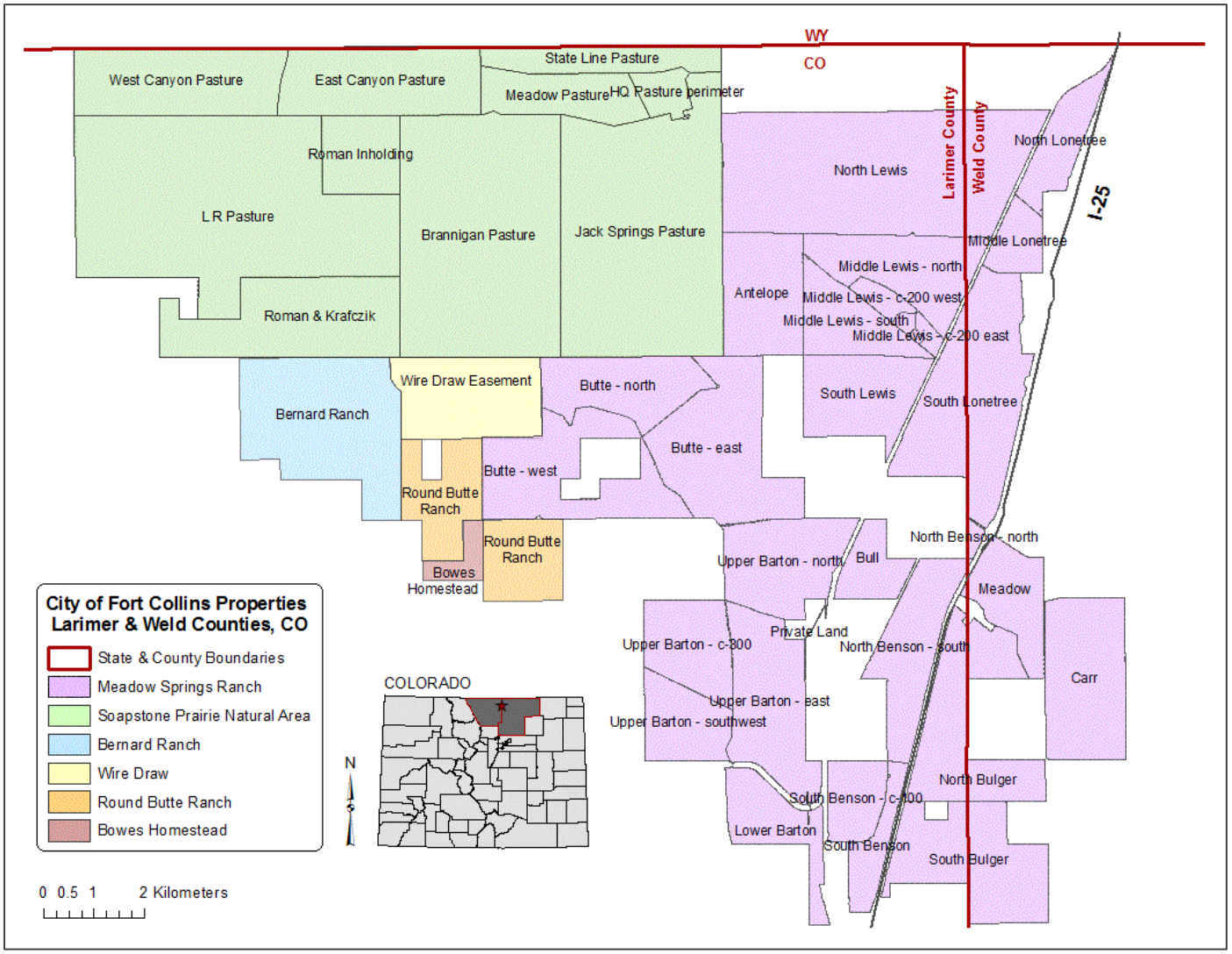
Appendix (A): Map of Fort Collins Properties

Map of Mountains to Plains properties owned and managed by the City of Fort Collins: 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 Prairie Dog Colony Habitat

Number of individuals (non-truncated detections) of all species during point counts in Prairie Dog Colony Habitat on Fort Collins Properties from 2006 – 2016.

Common Name	*Scientific Name*	2006 (64pts)	2007 (58pts)	2008 (165pts)+	2009 (307pts)	2010 (296pts)	2011 (482 pts)+	2012 (388pts)+	2013 (611pts)+	2014 (359pnts)*	2015 (420pnts)*	2016 (413pts)*	Total
Canada Goose	*Branta canadensis*					11				21	14	29	**75**
American Wigeon	*Anas americana*										10		**10**
Mallard	*Anas platyrhynchos*				3	3	1		5	6	15	7	**40**
Blue-winged Teal	*Anas discors*										12		**12**
Cinnamon Teal	*Anas cyanoptera*											2	**2**
Double-crested Cormorant	*Phalacrocorax auritus*				7	6						8	**21**
Great Blue Heron	*Ardea herodias*				19	4							**23**
Turkey Vulture	*Cathartes aura*		1						1	2	2	1	**7**
Bald Eagle	*Haliaeetus leucocephalus*								1				**1**
Northern Harrier *	*Circus cyaneus*				8	7	2	4	5	8	1	4	**39**
Sharp-shinned Hawk	*Accipiter striatus*						1						**1**
Cooper's Hawk	*Accipiter cooperii*					2							**2**
Swainson's Hawk *	*Buteo swainsoni*		1		8	8	6	2	6	16	15	18	**80**
Red-tailed Hawk	*Buteo jamaicensis*				5		4	2	2	4		3	**20**
Ferruginous Hawk *	*Buteo regalis*	1			3	1	22	2	6	5	4	6	**50**
Golden Eagle *	*Aquila chrysaetos*				2	3	1	1		1	2		**10**
American Kestrel	*Falco sparverius*				17	12	25	6	11	9	6	22	**108**
Merlin	*Falco columbarius*				1								**1**
Peregrine Falcon	*Falco peregrinus*					1							**1**
Prairie Falcon *	*Falco mexicanus*	1			4	7	4	1	1	6	12	5	**41**
Sandhill Crane *	*Grus canadensis*					2			2		1		**5**
American Golden-Plover	*Pluvialis dominica*									2			**2**
Killdeer	*Charadrius vociferus*				18	13	12	8	11	36	32	18	**148**
Mountain Plover *	*Charadrius montanus*	6	18		41	13	13	30	26	5	3	2	**157**
American Avocet	*Recurvirostra americana*										9		**9**
Greater Yellowlegs	*Tringa melanoleuca*				1								**1**
Willet	*Tringa semipalmata*											9	**9**

Common Name	*Scientific Name*	2006 (64pts)	2007 (58pts)	2008 (165pts)+	2009 (307pts)	2010 (296pts)	2011 (482 pts)+	2012 (388pts)+	2013 (611pts)+	2014 (359pnts)*	2015 (420pnts)*	2016 (413pts)*	Total
Whimbrel	*Numenius phaeopus*									2			**2**
Long-billed Curlew *	*Numenius americanus*				9	3	56	11	2	2		7	**90**
Wilson's Snipe	*Gallinago delicata*	1			1		1	2	1	4	14	9	**33**
Wilson's Phalarope	*Phalaropus tricolor*					1				2			**3**
Rock Pigeon	*Columba livia*					3	9		6	4	2	2	**26**
Mourning Dove	*Zenaida macroura*	1			5	22	28	2	11	48	37	19	**173**
Burrowing Owl *	*Athene cunicularia*	3	2		19	10	43	30	17	8	33	40	**205**
Common Nighthawk	*Chordeiles minor*	4	1				3		3		1	1	**13**
Broad-tailed Hummingbird	*Selasphorus platycercus*					1					2		**3**
Northern Flicker	*Colaptes auratus*										4		
Western Wood-Pewee	*Contopus sordidulus*								1				**1**
Say's Phoebe	*Sayornis saya*				11	3	15	6	7	3	4	2	**51**
Western Kingbird	*Tyrannus verticalis*		1		1	4	10	6	21	25	20		**88**
Eastern Kingbird	*Tyrannus tyrannus*					1					8		**9**
Loggerhead Shrike *	*Lanius ludovicianus*	1			6	1	14	3	14	10	5	17	**71**
Black-billed Magpie	*Pica hudsonia*								1	2			**3**
American Crow	*Corvus brachyrhynchos*											3	**3**
Common Raven	*Corvus corax*				3	7	9		16	62	59	9	**165**
Horned Lark	*Eremophila alpestris*	227	107	3	1714	1302	1812	1256	2155	2154	2445	1958	**15133**
Tree Swallow	*Tachycineta bicolor*				3		1		2	14		1	**21**
Violet-green Swallow	*Tachycineta thalassina*	7			4						1		**12**
Northern Rough-winged Swallow	*Steligdopteryx serripennis*	1				4	2		3	3	42	14	**69**
Cliff Swallow	*Petrochelidon pyrrhonota*	3	1		3	12	47	2	3	1	5	3	**80**
Barn Swallow	*Hirundo rustica*	2			10	11	41	1	16	57	75	34	**247**
Mountain Chickadee	*Poecile gambeli*										1		**1**
Rock Wren	*Salpinctes obsoletus*				7	10	8	2	12	4	1	2	**46**
Ruby-crowned Kinglet	*Regulus calendula*										3		**3**
Blue-gray Gnatcatcher	*Polioptila caerulea*											1	**1**
Western Bluebird	*Sialia mexicana*				1				1				**2**

Common Name	*Scientific Name*	2006 (64pts)	2007 (58pts)	2008 (165pts)+	2009 (307pts)	2010 (296pts)	2011 (482 pts)+	2012 (388pts)+	2013 (611pts)+	2014 (359pnts)*	2015 (420pnts)*	2016 (413pts)*	Total
Swainson's Thrush	*Catharus ustulatus*						2						**2**
American Robin	*Turdus migratorius*					2			1			2	**5**
Northern Mockingbird	*Mimus polyglottos*				1					1	1		**3**
Sage Thrasher	*Oreoscoptes montanus*						1				7		**8**
Brown Thrasher	*Toxostoma rufum*											4	**4**
European Starling	*Sturnus vulgaris*				2	11	13	1	1	129	24	9	**190**
Yellow Warbler	*Setophaga petechia*						1						**1**
Yellow-rumped Warbler	*Dendroica coronata*									47			**47**
Green-tailed Towhee	*Pipilo chlorurus*					2							**2**
Spotted Towhee	*Pipilo maculatus*								5	8	3	9	**25**
Cassin's Sparrow *	*Peucaea cassinii*			1			2						**3**
Chipping Sparrow	*Spizella passerina*				8	5	22		3	2	46	50	**136**
Clay-colored Sparrow	*Spizella pallida*				1	4	1		3		1		**10**
Brewer's Sparrow *	*Spizella breweri*				40	50	53	15	28	50	55	22	**313**
Vesper Sparrow *	*Pooecetes gramineus*	6	1		46	49	81	31	94	96	162	90	**656**
Lark Sparrow	*Chondestes grammacus*				2	3	46	3	15	24	78	21	**192**
Sagebrush Sparrow	*Artemisiospiza nevandensis*									2			**2**
Lark Bunting *	*Calamospiza melanocorys*	4	21	2	95	91	534	110	809	1851	896	118	**4531**
Savannah Sparrow	*Passerculus sandwichensis*				7	2			1			9	**19**
Grasshopper Sparrow *	*Ammodramus savannarum*				1	23	18		4	8	203	83	**340**
Baird's Sparrow*	*Ammodramus bairdii*										4	31	**35**
Song Sparrow	*Melospiza melodia*											1	**1**
Lincoln's Sparrow	*Melospiza lincolnii*											13	**13**
McCown's Longspur *	*Rhyncophanes mccownii*	324	163		891	733	1037	480	757	590	812	585	**6372**
Chestnut-collared Longspur *	*Calcarius ornatus*	4			6	65	9	12	17	1	6	2	**122**
Snow Bunting	*Plectrophenax nivalis*										10		**10**
Bobolink *	*Dolichonyx oryzivorus*					2							**2**
Red-winged Blackbird	*Agelaius phoeniceus*	1			30	20	32	15	51	157	300	55	**661**
Eastern Meadowlark	*Sturnella magna*					1		4				2	**7**

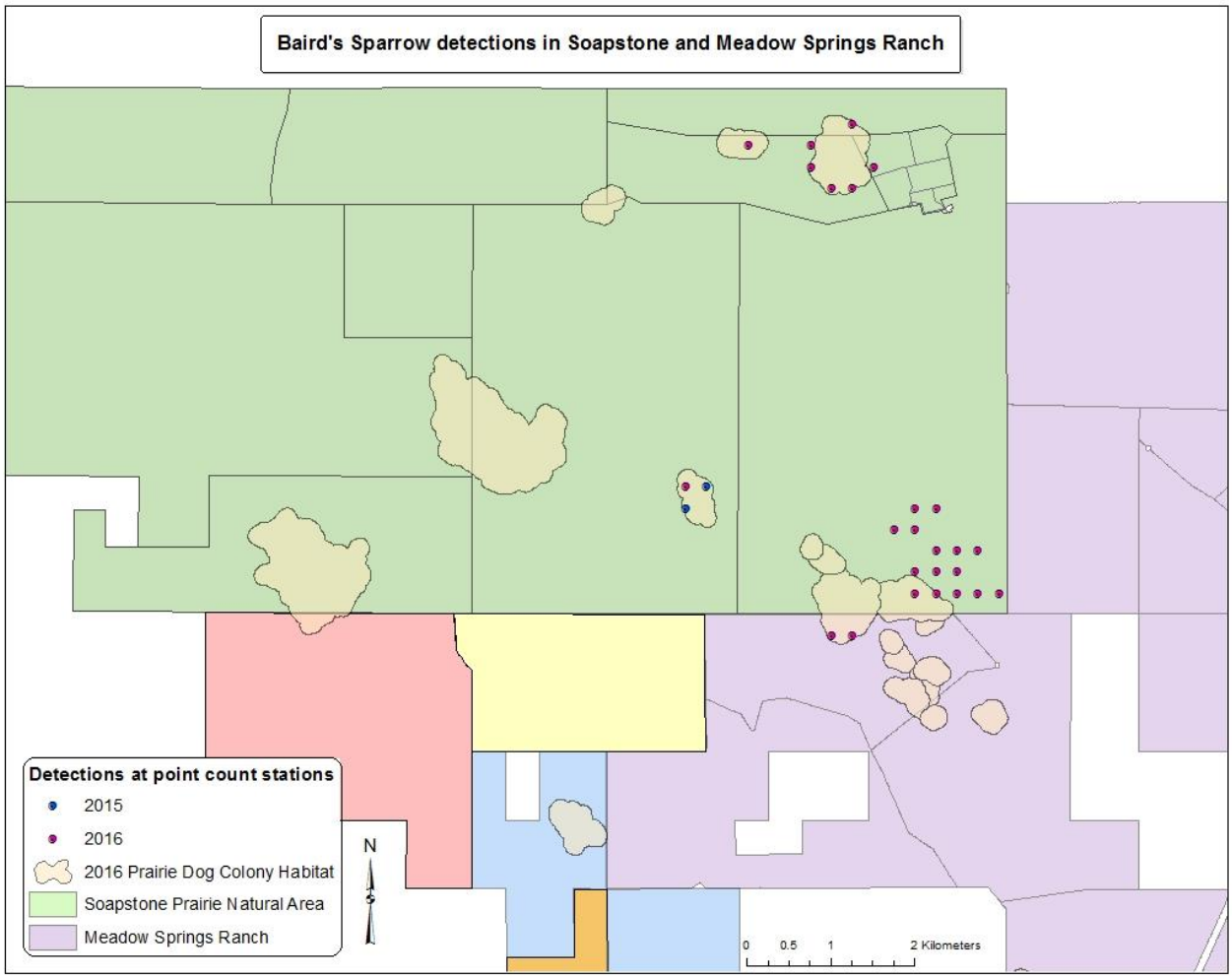
Common Name	*Scientific Name*	2006 (64pts)	2007 (58pts)	2008 (165pts)+	2009 (307pts)	2010 (296pts)	2011 (482 pts)+	2012 (388pts)+	2013 (611pts)+	2014 (359pnts)*	2015 (420pnts)*	2016 (413pts)*	Total
Western Meadowlark	*Sturnella neglecta*	182	9	5	357	631	1241	581	557	952	1602	1326	**7443**
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*				1						3		**4**
Brewer's Blackbird	*Euphagus cyanocephalus*	3			28	19	6	3	6	49	322	82	**518**
Common Grackle	*Quiscalus quiscula*				10		4		2	4	1	6	**27**
Great-tailed Grackle	*Quiscalus mexicanus*						43			3			**46**
Brown-headed Cowbird	*Molothrus ater*				14	7	5	2	7	48	24	1	**108**
House Finch	*Carpodacus mexicanus*				1				1				**2**
American Goldfinch	*Spinus tristis*					1	1					1	**3**
Lesser Goldfinch	*Spinus psaltria*									4			**4**
House Sparrow	*Passer domesticus*				2		1		1		1		**5**
Totals	***95 species***	**782**	**326**	**11**	**3,477**	**3,209**	**5,343**	**2,634**	**4,732**	**6,547**	**7,458**	**4,786**	**39,305**

+ Number of points used indicates survey effort in PDCH each year with 35 points visited twice in 2008, 103 points visited 4 times (35 of them 6 times) in 2011, 194 points visited twice in 2012, and all points in 2013 – 2016 were visited twice

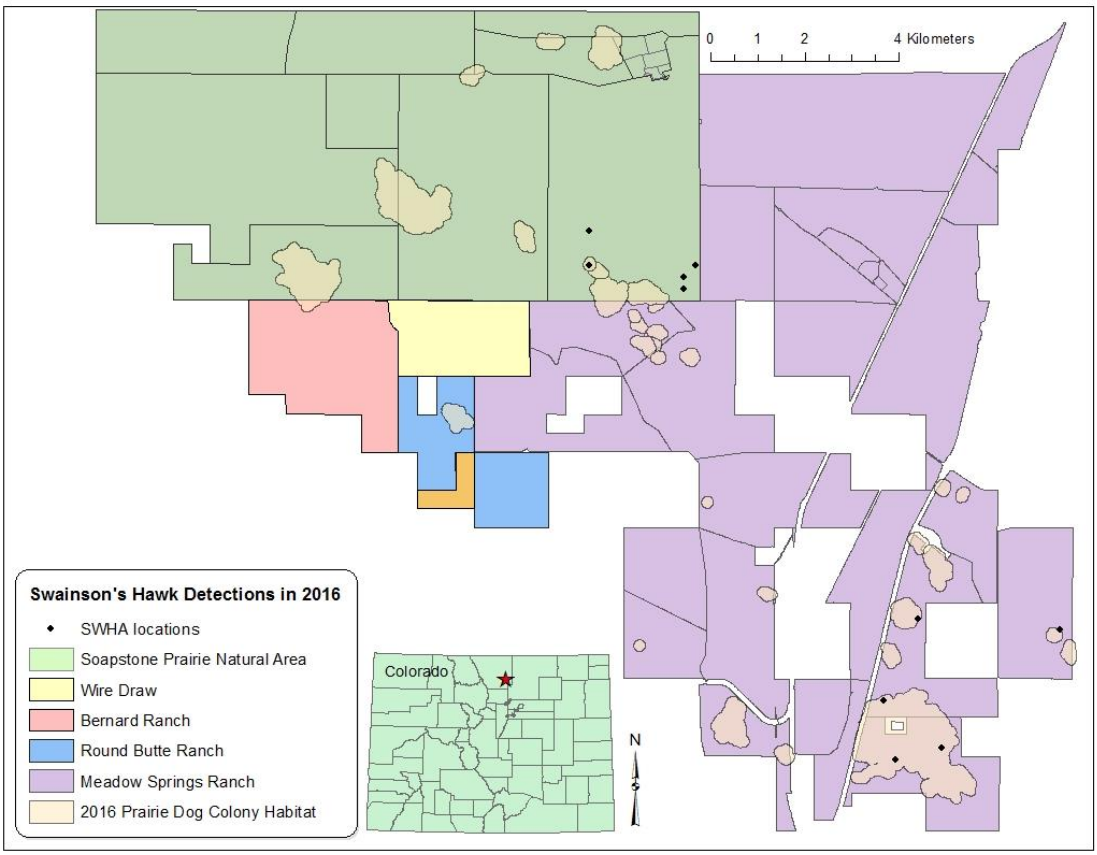
*** indicates species of special concern and/or high conservation priority status in Canada and the U.S. as determined by Partners in Flight, the USFWS and Colorado Parks & Wildlife.**

Appendix (C): Species Accounts

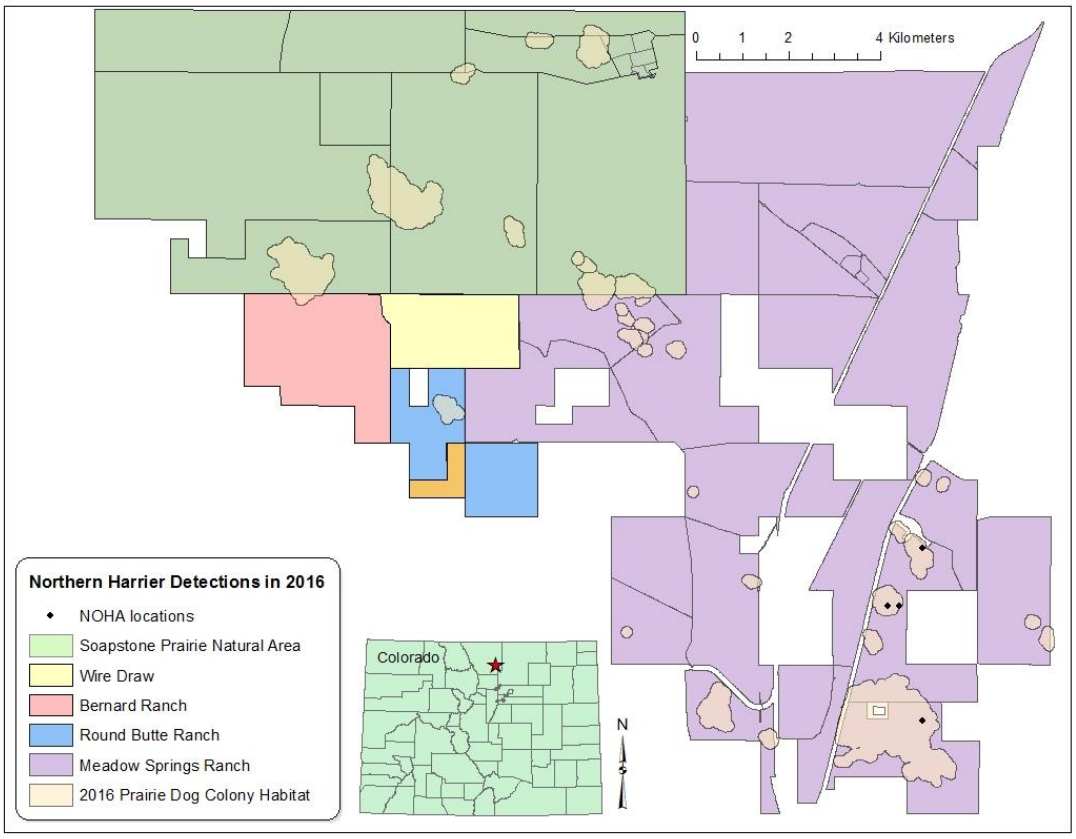
This section presents distribution maps for species of high priority conservation concern in the Mountains to Plains Area. The map for each species indicates location and number of individual observations recorded during the point count surveys between May 2nd – June 17th, 2016.



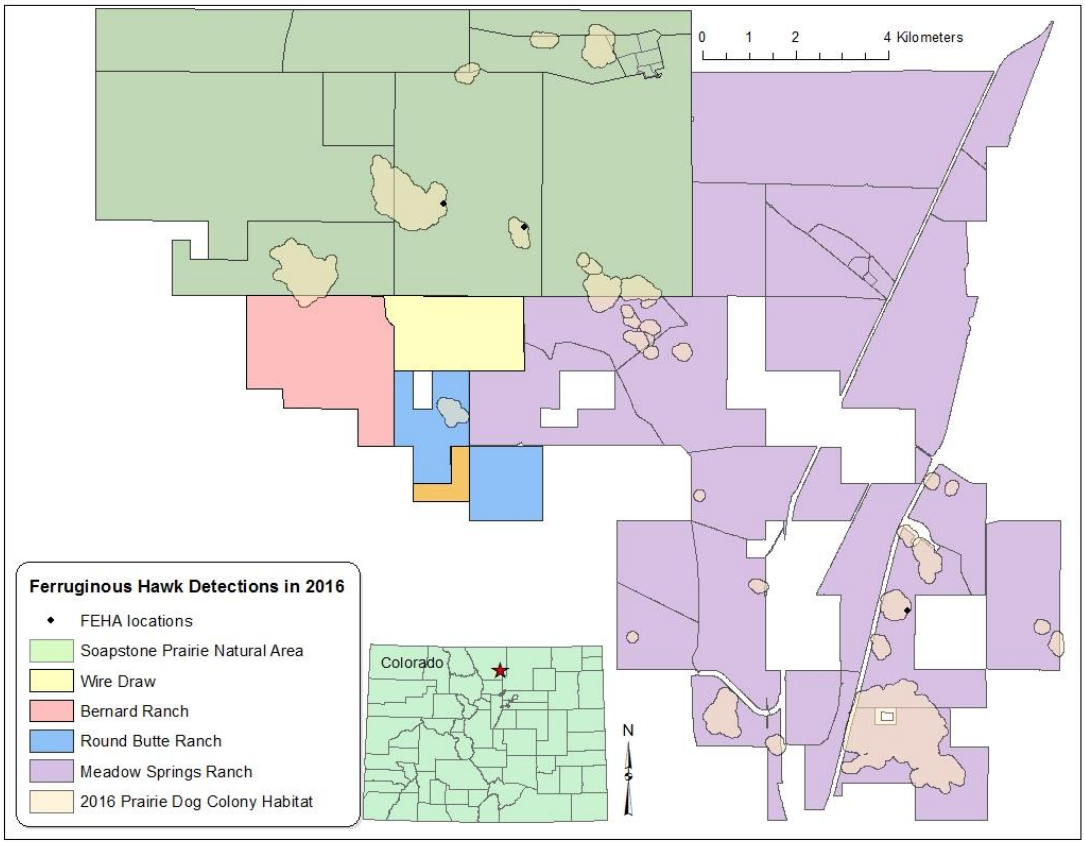
Baird's Sparrow (*Ammodramus bairdii*)
2015 and 2016 detection locations



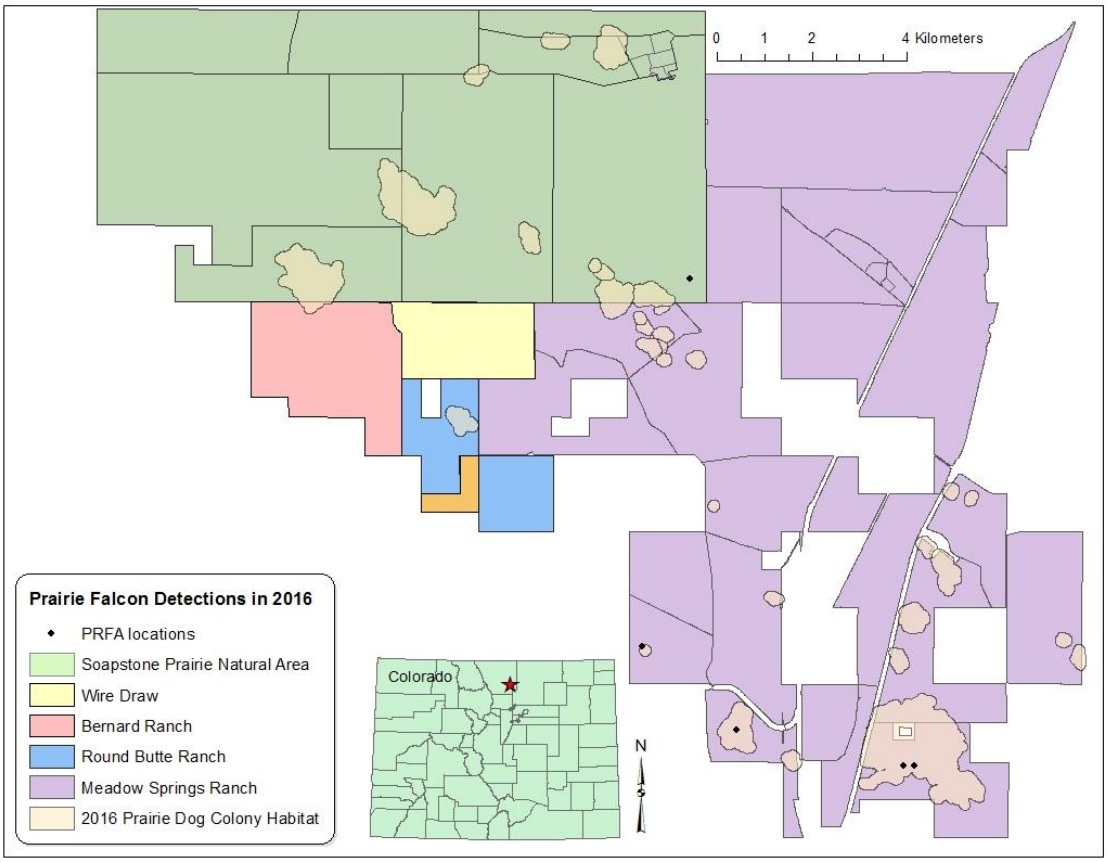
Swainson's Hawk (*Buteo swainsoni)*



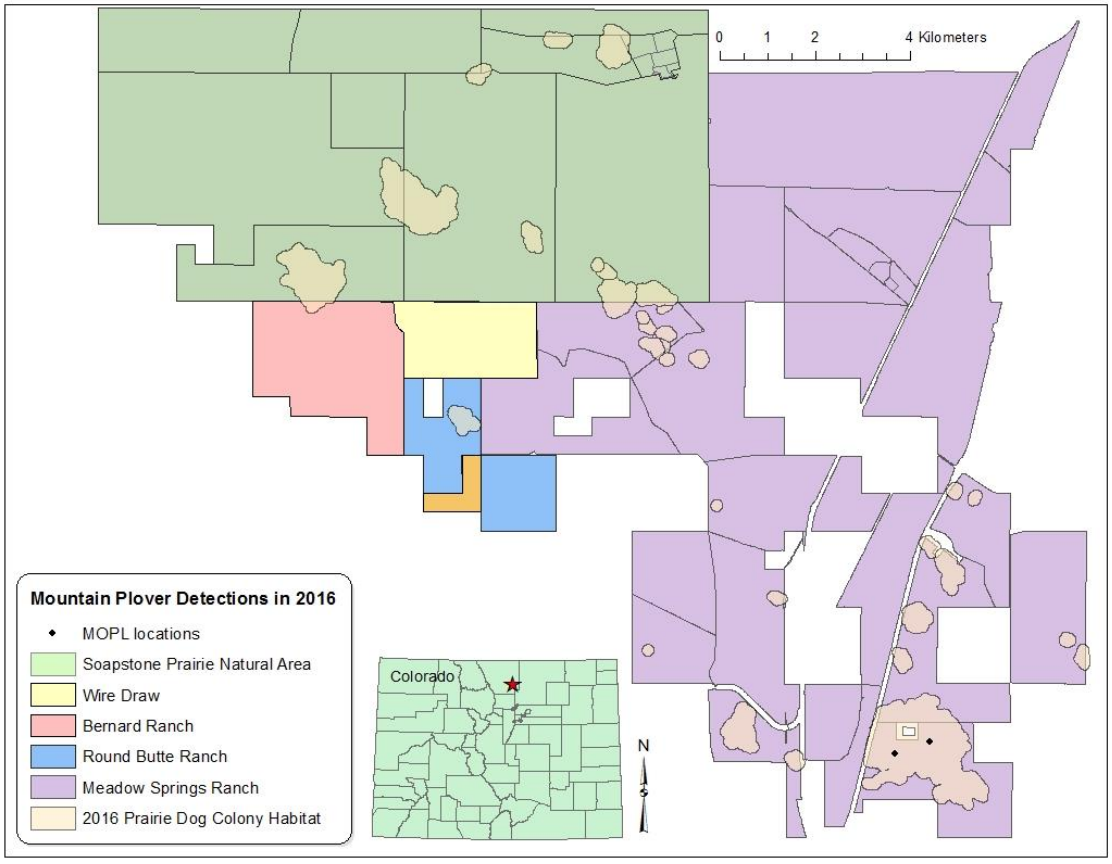
Northern Harrier (*Circus cyaneus)*



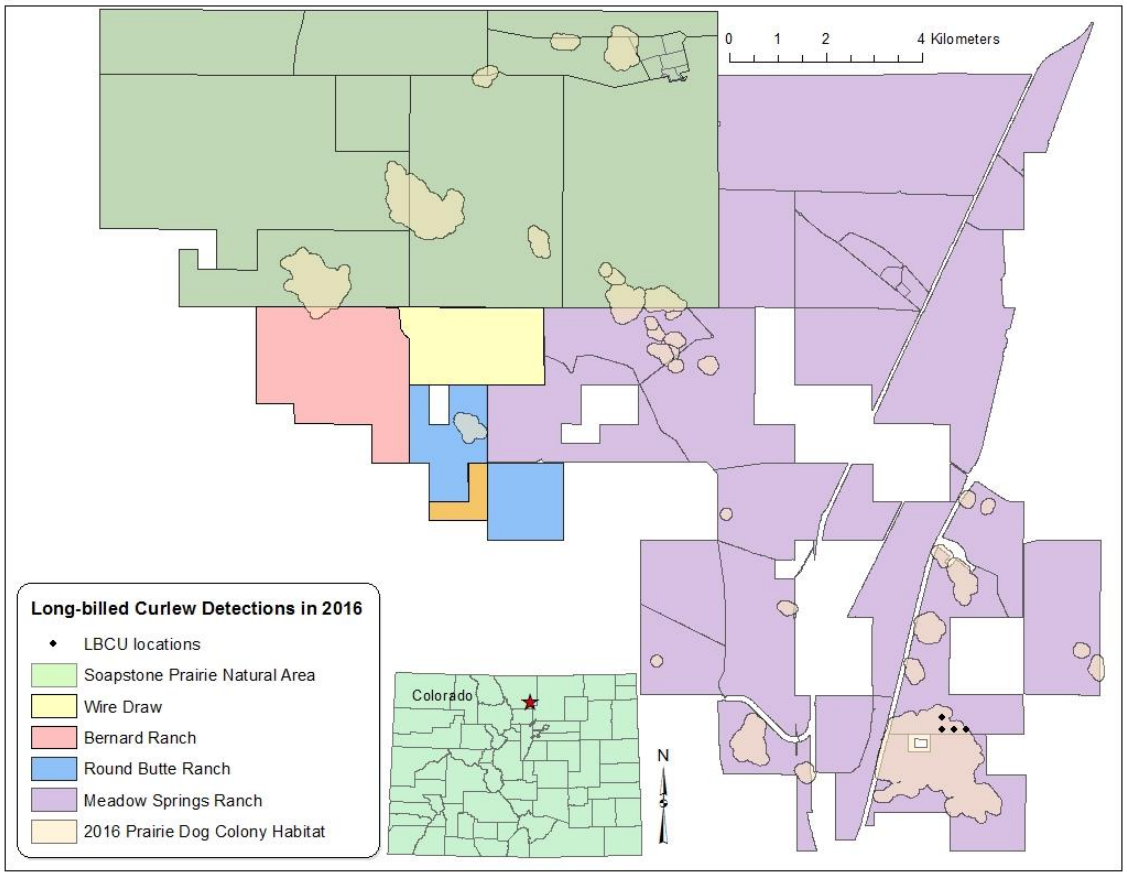
Ferruginous Hawk *(Buteo regalis)*



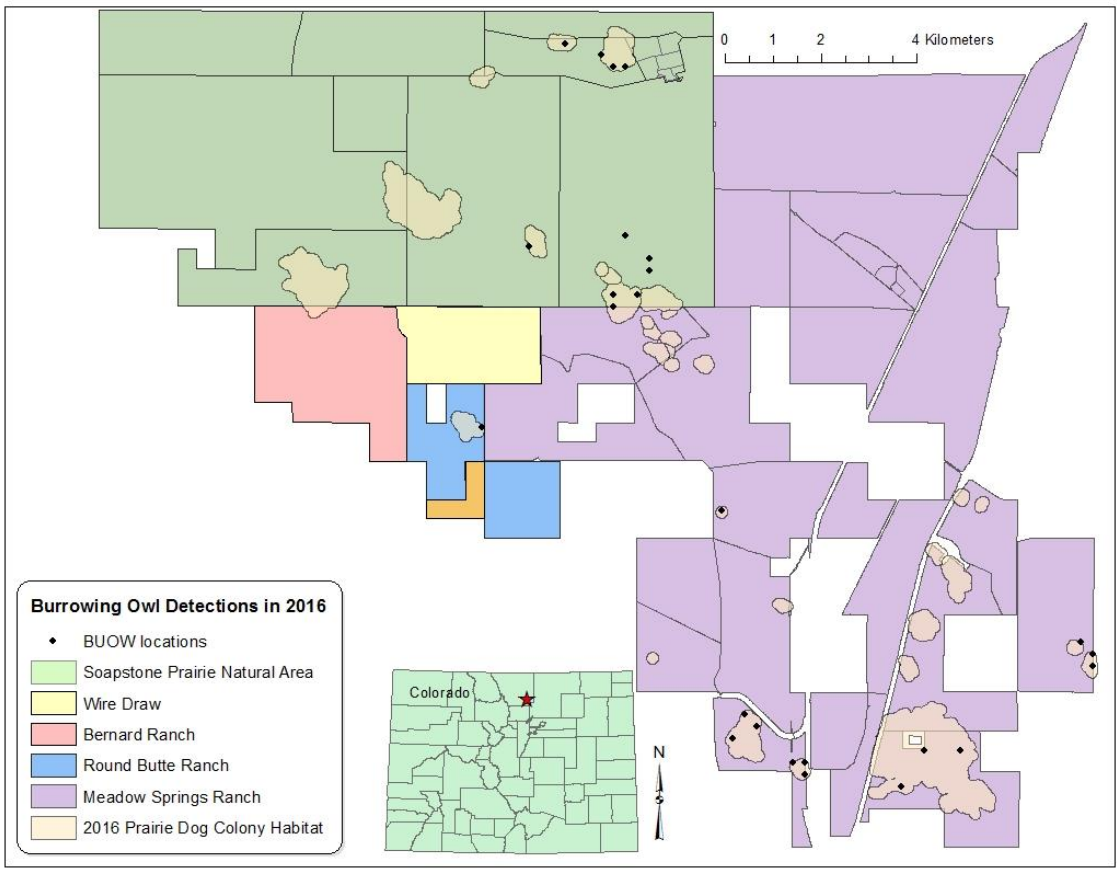
Prairie Falcon *(Falco mexicanus)*



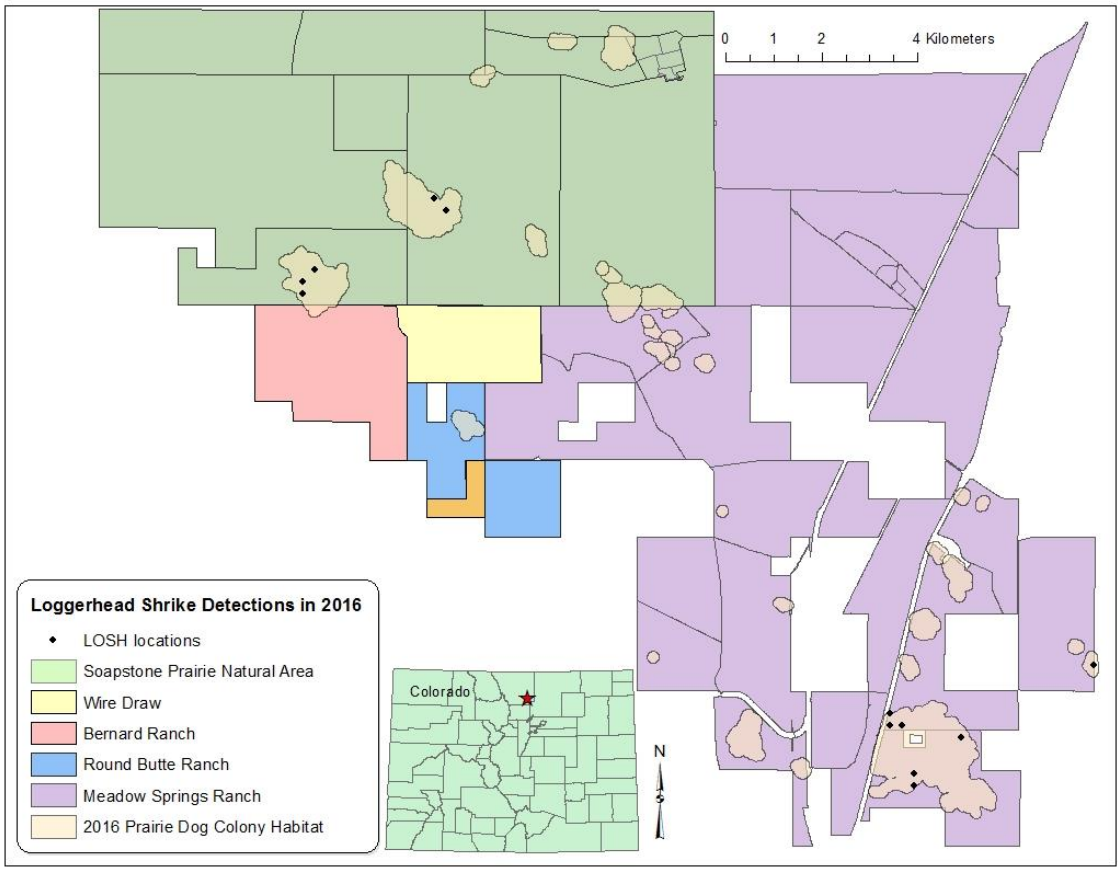
Mountain Plover (*Charadrius montanus)*



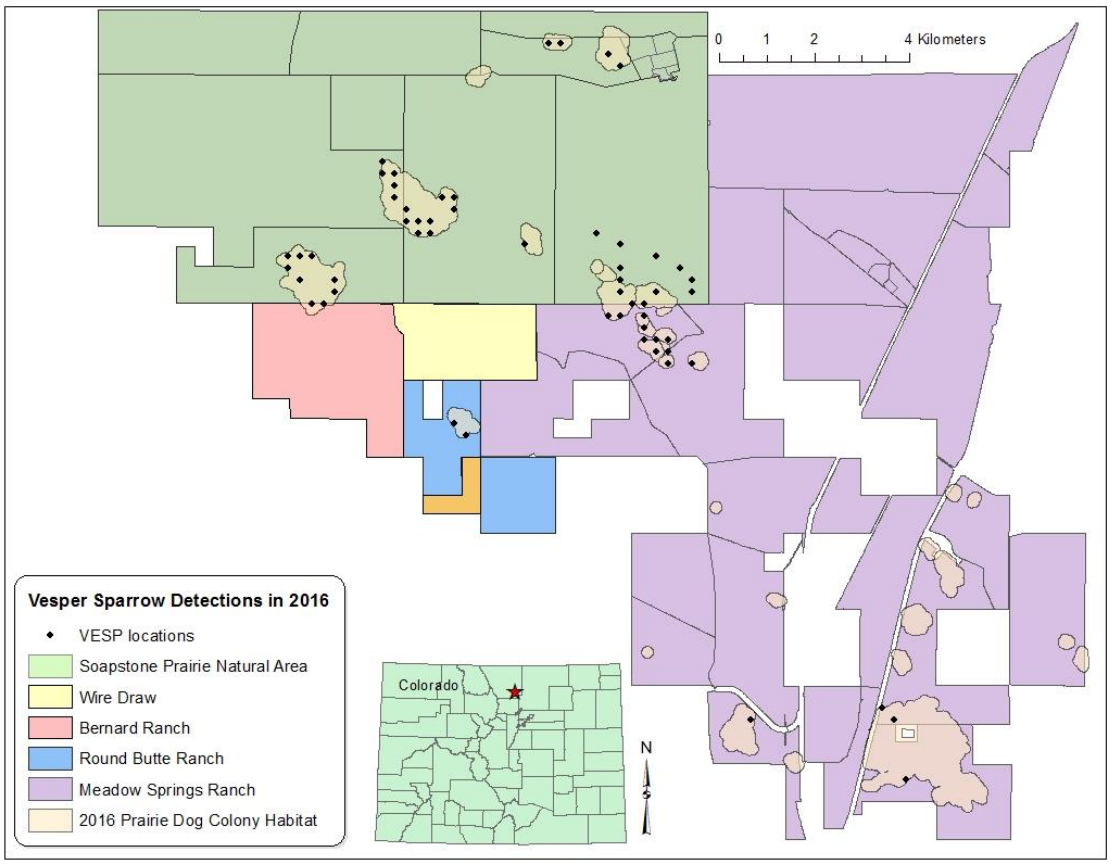
Long-billed Curlew *(Numenius americanus)*



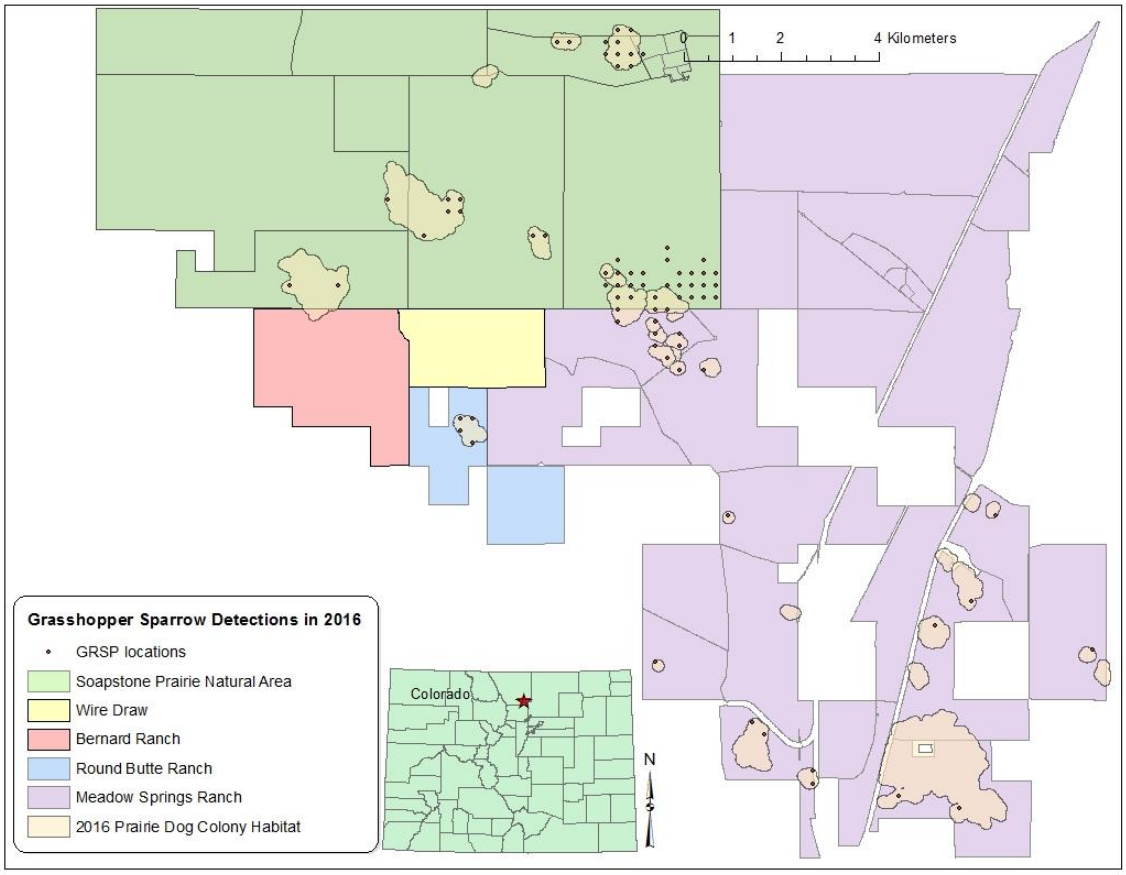
Burrowing Owl *(Athene cunicularia)*



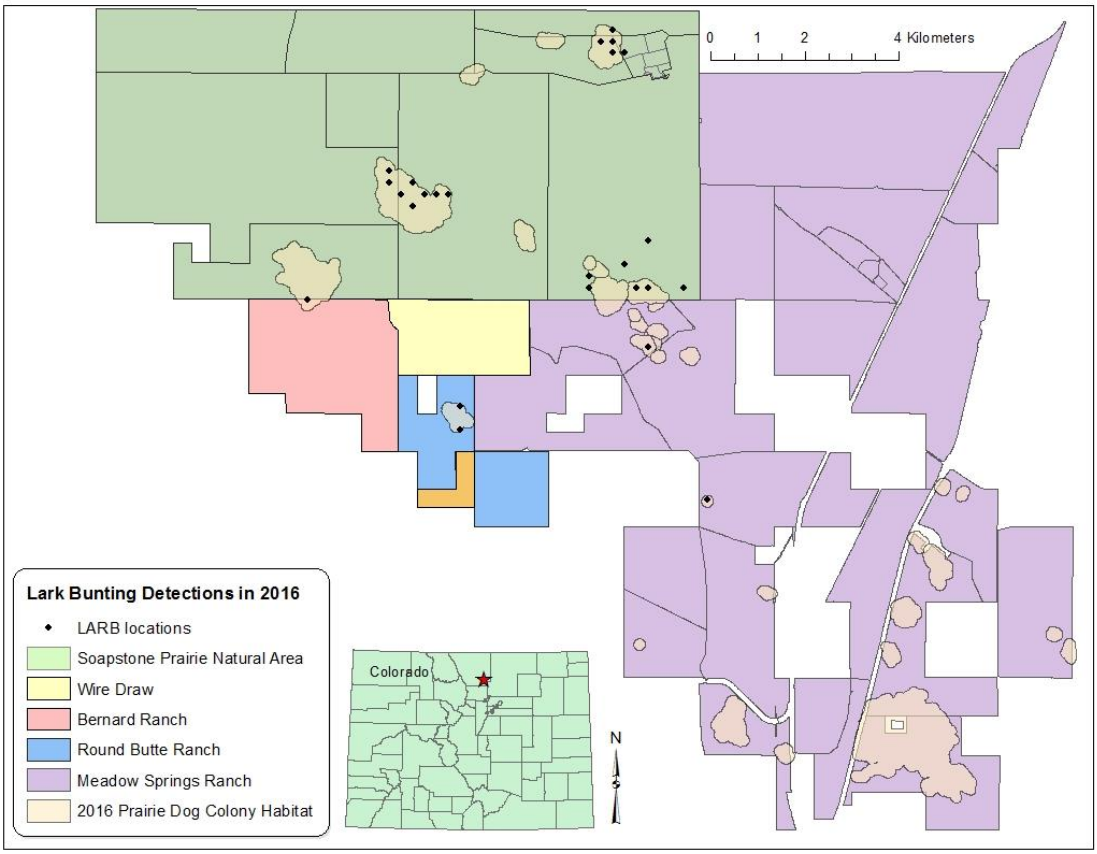
Loggerhead Shrike *(Lanius ludovicianus)*



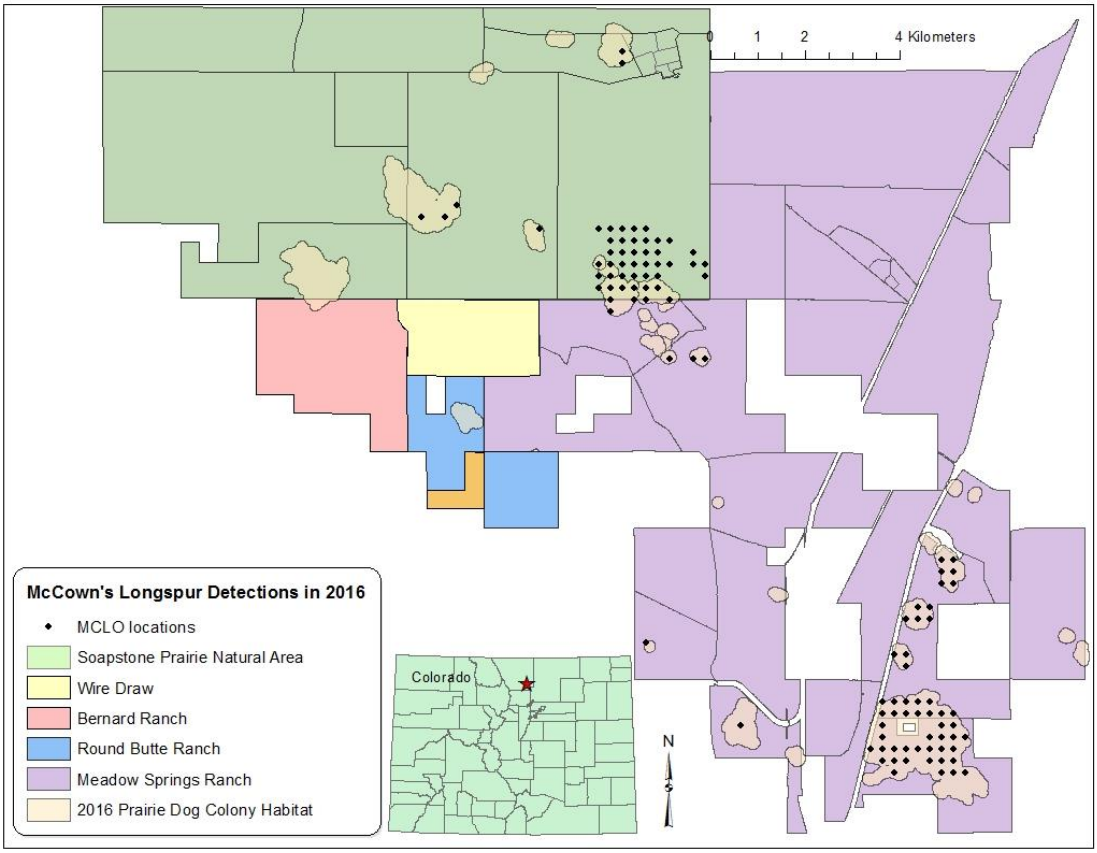
Vesper Sparrow *(Pooecetes gramineus)*



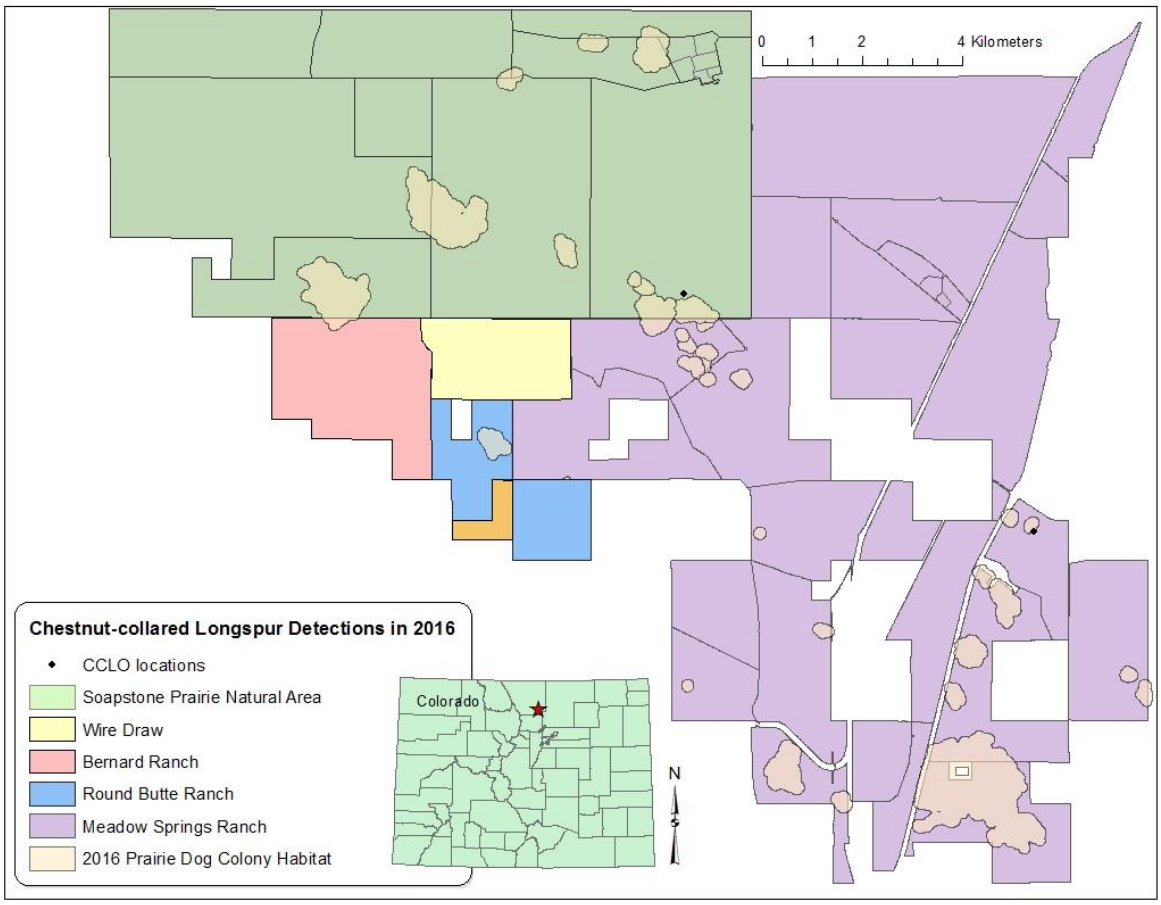
Grasshopper Sparrow (*Ammodramus savannarum*)



Lark Bunting *(Calamospiza melanocorys)*



McCown's Longspur *(Rhyncophanes mccownii)*



Chestnut-collared Longspur *(Calcarius ornatus)*