

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



2013 FINAL TECHNICAL REPORT



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Cover Photo: McCown's Longspur (*Rhyncophanes mccownii*) female on a nest in Soapstone Prairie Natural Area. Photo taken by Denis Perez, 2013.

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EXECUTIVE SUMMARY

The Laramie foothills contain some of the last high quality, extensive shrubland and shortgrass prairie along the Colorado Front Range. 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. 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, Rocky Mountain Bird Observatory 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 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 2013.

This region supports 21 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, Lark and Brewer's Sparrow and Long-billed Curlew, in addition to other grassland species. Grassland birds have declined more steeply and consistently 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 2013 nesting season we conducted point count surveys at 507 stations. We surveyed approximately 3,110 acres of prairie dog colonies on Meadow Springs Ranch and Soapstone Prairie Natural Area, as well as roughly 2,338 acres of Saltbush (*Atriplex canescens*) shrubland on Round Butte Ranch, Bernard Ranch and the newly acquired Bowes Homestead property. At each station we also surveyed vegetation and recorded observations of other wildlife. During 45 survey days in 2013, we observed 7,589 individual birds of 70 species. We estimated densities of 26 common breeding bird species across the study area and post-stratified estimates by habitat type.

The most common birds within the 2013 study area were Horned Lark, McCown's Longspur, Lark Bunting, and Western Meadowlark, which together accounted for 76% of all individual birds observed. A comparison of annual densities of McCown's Longspur within the prairie dog colony habitat from 2006-2013 suggests that the population has declined steadily and rapidly, especially since 2009, resulting in a >50% reduction. Mountain Plover and Burrowing Owl densities have also declined by more than 50% since 2006, although these species declined more rapidly after the 2008 plague event, and Mountain Plovers have since recovered slightly, mainly in response to management activities (i.e. controlled burns, flea dusting). Continued monitoring and management efforts are warranted for these species.

The City of Fort Collins Natural Areas and Utilities Department lands in Northeast Larimer and Northwest Weld counties, Colorado offer an exceptional opportunity to protect and steward a signature landscape to sustain a disappearing ecosystem for unique wildlife. In order to maintain populations of these grassland-obligate species, managers should strive to conserve and augment prairie dog populations, maintain and restore native shortgrass prairie, minimize disturbance from natural resource development and recreation, and closely monitor populations of grassland birds to inform management priorities and actions.

ACKNOWLEDGEMENTS

This project was funded by the City of Fort Collins Natural Areas Program and the Neotropical Migratory Bird Conservation Act (NMBCA #4846 & #5152). The City of Fort Collins Natural Areas Department also provided valuable in-kind matching support for this project. Colorado Division of Parks and Wildlife partnered with RMBO to perform avian surveys on prairie dog colonies, and we thank their field biologists Reesa Conrey, Miranda Middleton, and Lani Stinson for aiding in data collection. We also thank RMBO field biologists Denis Perez Ordonez, Erin Strasser and Greg Levandoski.

TABLE OF CONTENTS

Executive Summary	i
Acknowledgements	2
Table of Contents	3
Introduction	3
Study Area & Methods	4
Avian Point Count Surveys	5
Analyses	6
Results	7
Avian Surveys	7
Vegetation	10
Literature Cited	16
Appendix (A): Map of Fort Collins Properties	17
Appendix (B): Species Detections in Prairie Dog Colony Habitat	18
Appendix (C): Species Detections in Shrubland Habitat	21
Appendix (D): Species Accounts	23

FIGURES

Figure 1: 2013 Survey area and point count stations on CFCNAP properties in the MTP region	5
Figure 2: McCown's Longspur density in Prairie Dog Colony Habitat (PDCH) in the Mountains to Plains (MTP) area from 2006-2013	8
Figure 3: Mountain Plover density in Prairie Dog Colony Habitat (PDCH) in the Mountains to Plains (MTP) area from 2006 – 2013	8
Figure 4 : Horned Lark density in Prairie Dog Colony Habitat (PDCH) in the Mountains to Plains (MTP) area from 2006 – 2013	9
Figure 5: Average ground cover types recorded at survey points in prairie dog colony habitat (PDCH) on City of Fort Collins Properties in the Mountains to Plains (MTP) area in 2013	10
Figure 6: Average ground cover types recorded at survey points in shrublands on City of Fort Collins Properties in the Mountains to Plains (MTP) area in 2013	11
Figure 7: Dominant grass species recorded at survey points compared by habitat type on City of Fort Collins Properties in the Mountains to Plains (MTP) area in 2013	11
Figure 8: Dominant Shrub species across survey points in the shrubland habitat on City of Fort Collins Properties in the MTP area in 2013	12
Figure 9: McCown's Longspur relative abundance from 2006-2012 (left) and population change from 1966-2012 (right) (from Sauer et al. 2012)	14

TABLES

Table 1: Density estimates in 2013 in Prairie Dog Colony Habitat	7
Table 2: Density estimates in 2013 in Shrubland Habitat	9

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, Rocky Mountain Bird Observatory (RMBO) has partnered with the City of Fort Collins Natural Areas Program (CFCNAP) 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 more than 21 high-priority grassland bird species.

The goal of this long-term project is to help managers conserve grassland bird species and their habitats on CFCNAP properties in northern Colorado by better understanding the abundance, distribution, trends and habitat requirements of breeding birds on the properties. The area is slowly recovering from an episode of sylvatic plague that significantly decreased the Black-tailed prairie dog (*Cynomys ludovicianus*) population in 2008. Successful efforts have been made by the CFCNAP and CPW to encourage re-colonization including prescribed burns, dusting treatments for fleas, and a pilot prairie dog vaccination program. The objectives are to monitor populations of grassland bird species, document the migratory and breeding bird use of the project area, which RMBO has had the unique opportunity to observe before, during and after the plague event, and to provide locations of sensitive bird species.

STUDY AREA & METHODS

Between April 22nd and July 12th of 2013, we conducted breeding grassland bird point count surveys on five City of Fort Collins Natural Areas Program (CFCNAP) properties in Larimer and Weld counties of northern Colorado (Appendix A): Soapstone Prairie Natural Area (SPNA), Meadow Springs Ranch (MSR), Round Butte Ranch (RBR), Bernard Ranch (BE), and the Bowes Homestead (BH). 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 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. Bernard ranch is dominated by Saltbush and Rabbitbrush (*Chrysothamnus* spp.), with steep and branching drainages running north to south where isolated patches of Cottonwood and Willow (*Salix* spp.) grow.

We limited our point counts on SPNA and MSR in 2013 to areas of prairie dog colony habitat (PDCH) using spatial data provided by CFCNAP of prairie dog colony habitat that was active in the preceding fall of 2012. A point was considered in PDCH if it was within 100m of an active burrow. In 2013 point count surveys were also conducted in the largest patches of foothills shrubland in SPNA, BE, RBR, and BH delineated using vegetation information from the CFCNAP, SW-REGAP GIS information and ground-truthing.

The acreage of PDCH has almost returned to its pre-plague size of 4,321 acres, with approximately 3,110 acres surveyed this year. The most notable expansion/ re-colonization has occurred in the prairie dog colony in south-eastern SPNA in the Jack Springs pasture where CFCNAP performed a prescribed burn in 2012, the eastern-most colony in Carr pasture, and a newly discovered colony in Upper Barton pasture. All other existing colonies show some degree of expansion.

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 507 point count stations in 2013 in the target habitats. There were 310 sampling stations in PDCH and 197 in foothills shrubland (Fig 1). Points in PDCH were surveyed earlier in the season between 22 April and 1 June 2013 to increase detectability of the early nesting species. Each point count station was surveyed twice, about 2-3 weeks apart.

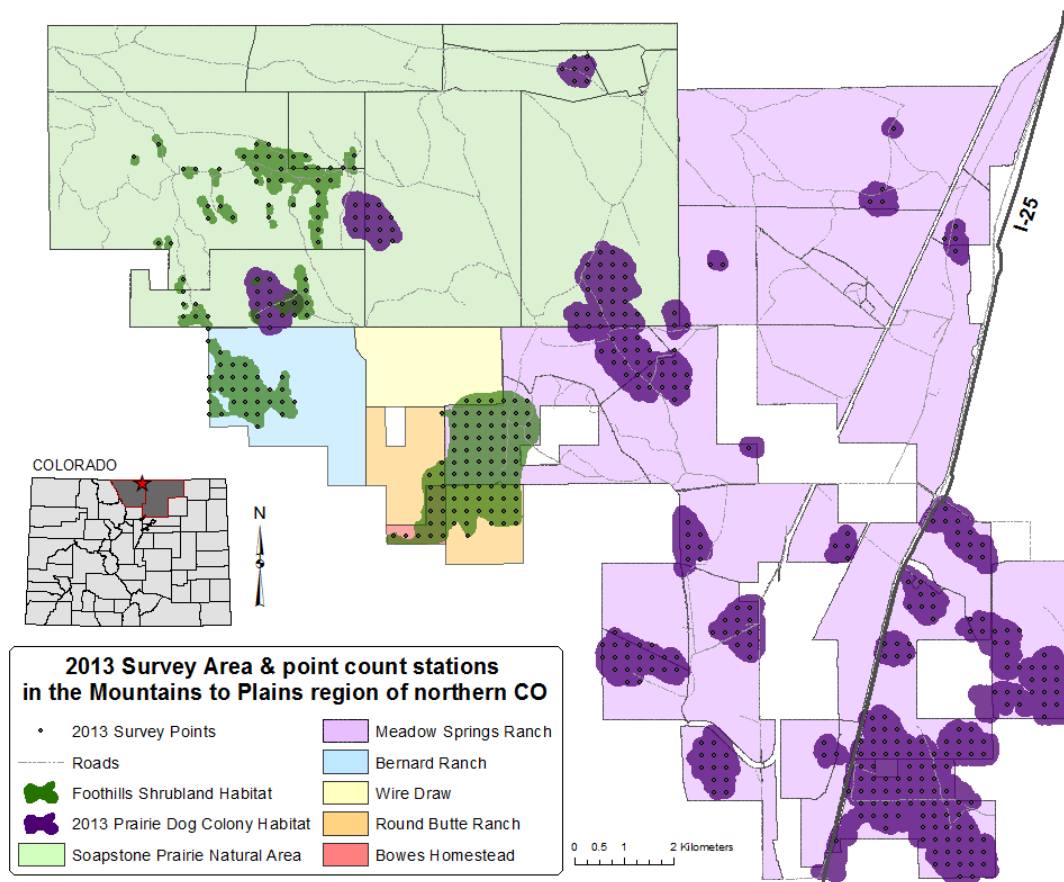


Figure 1: 2013 Survey area and point count stations on CFCNAP properties in the MTP region.

Point count surveys started one half-hour before sunrise and ended at 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 5-minute point count survey consisting of five 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 2013 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 2013 survey data to previous years' data (2006-2012) 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 2013 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 $n \geq 25$, 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 2013 we detected 7,589 birds during point count surveys, and observed 70 species within the study area (Appendix B & C). Long-billed Curlew and Sandhill Cranes were observed using the study area during migration.

Bird Densities in Prairie Dog Colony Habitat (PDCH)

In 2013 we detected 4,732 individual birds of 51 species within PDCH, including 13 species of conservation interest. We estimated density for 16 species, including 5 that were also found in shrublands. Horned Lark and McCown's Longspur were by far the most abundant bird species within PDCH grasslands (Table 1), but their densities in 2013 were considerably below their historic averages since RMBO monitoring began in 2006 (Youngberg et al. 2012). In particular, McCown's Longspur densities in PDCH appear to have declined by roughly 50% since 2006 (Fig. 2). Also of note, Mountain Plover densities have increased slightly since 2011, but show an overall significant decline since 2006 (Fig 3). Horned Lark populations, although variable through the years, have remained relatively stable since 2006 (Fig. 4).

Table 1: Density estimates in 2013 in Prairie Dog Colony Habitat (n = truncated # detections, D = # of birds/ km²) with 95% lower (LCL) and upper (UCL) confidence limits.

Species	n	D	LCL	UCL
2013 (pooled)				
Horned Lark	1569 (5871)	103.42	53.535	199.78
McCown's Longspur*	584 (3102)	36.45	24.91	53.35
Lark Bunting*	321 (618)	11.31	8.74	14.64
Western Meadowlark	472 (2723)	5.25	3.93	7.02
Vesper Sparrow*	70 (185)	2.36	1.68	3.33
Brewer's Sparrow*	26 (94)	2.29	1.63	3.21
Red-winged Blackbird	30 (93)	0.82	0.57	1.16
Chestnut-collared Longspur*	8 (56)	0.76	0.21	2.70
Mountain Plover*	24 (130)	0.64	0.34	1.21
Burrowing Owl*	13 (105)	0.20	0.09	0.47
Common Nighthawk*	2 (8)	0.04	0.02	0.07
Swainson's Hawk*	6 (29)	0.03	0.01	0.11
Northern Harrier*	5 (24)	0.02	0.00	2.88
Ferruginous Hawk*	4 (22)	0.02	0.00	0.18
Prairie Falcon*	1 (17)	0.01	0.00	145.25
Long-billed Curlew*	2 (29)	0.01	0.00	84.62

* = Species of special concern

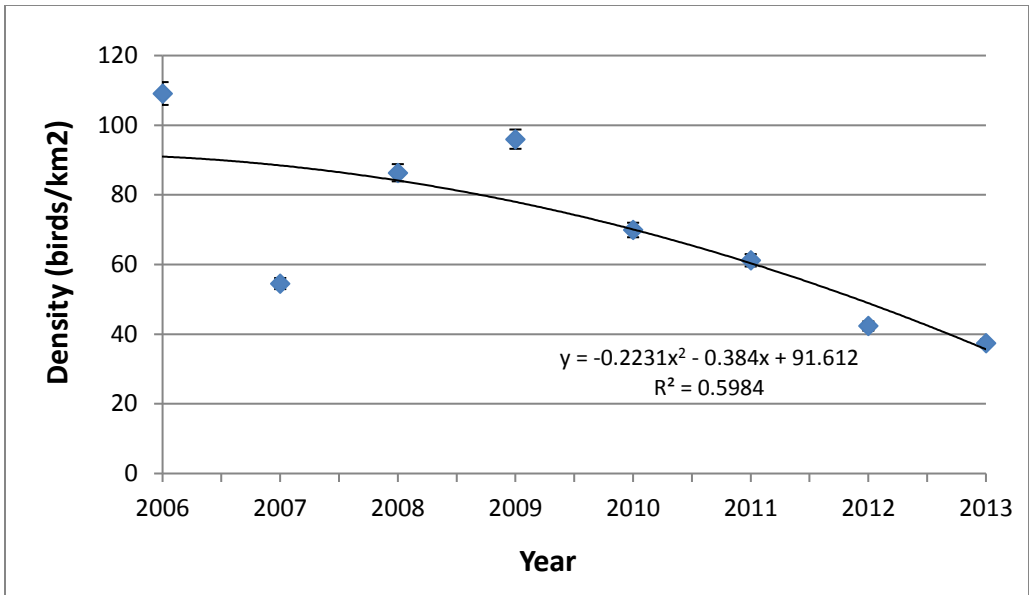


Figure 2: McCown's Longspur density in Prairie Dog Colony Habitat (PDCH) in the Mountains to Plains (MTP) area from 2006-2013.

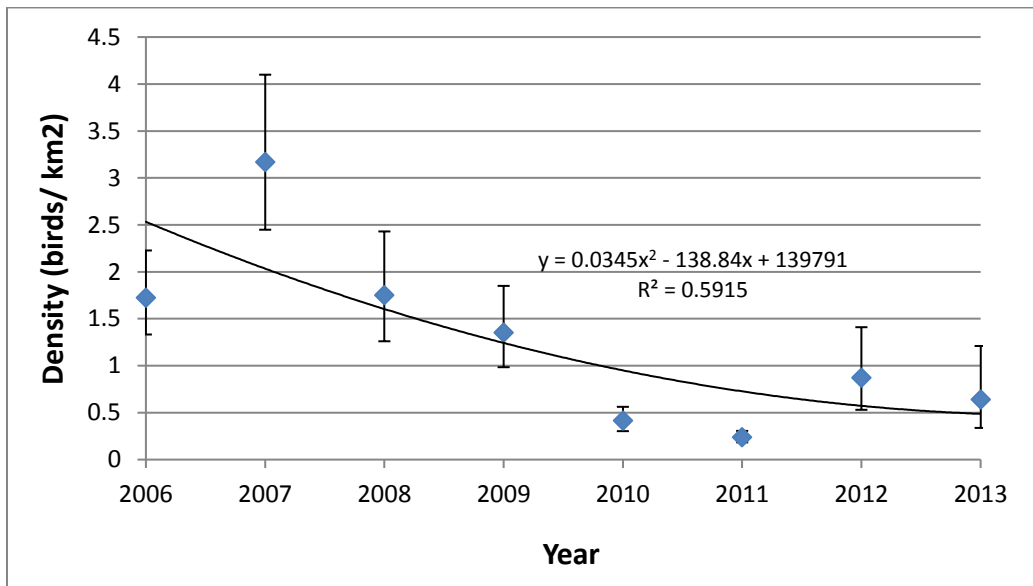


Figure 3: Mountain Plover density in Prairie Dog Colony Habitat (PDCH) in the Mountains to Plains (MTP) area from 2006 – 2013.

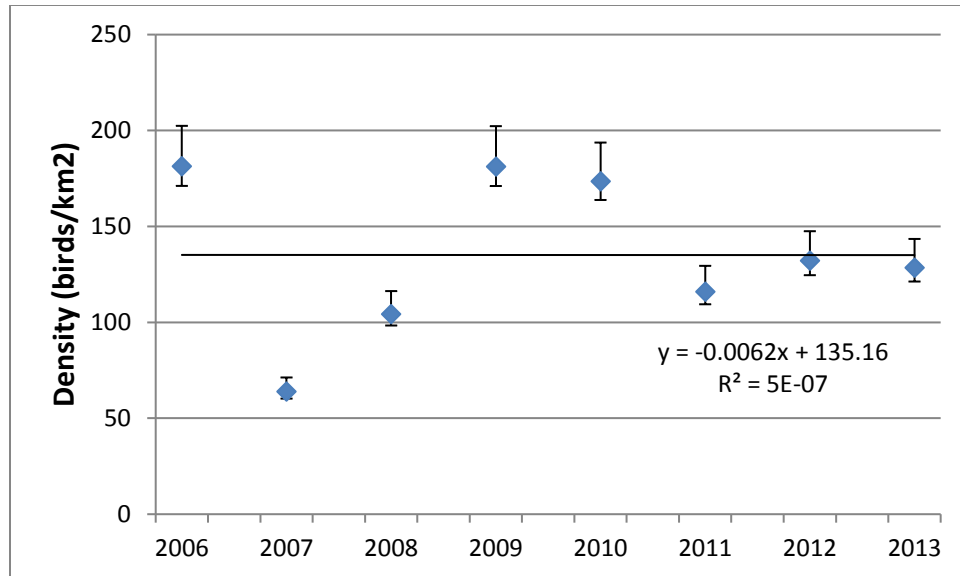


Figure 4 : Horned Lark density in Prairie Dog Colony Habitat (PDCH) in the Mountains to Plains (MTP) area from 2006 – 2013.

Bird Densities in Saltbush Shrublands

In 2013 we detected 2,883 individual birds of 41 species in the Saltbush shrubland habitat. Horned Lark, Lark Bunting, Brewer’s Blackbird and Brewer’s Sparrow were the most abundant species detected. In addition to Lark Bunting and Brewer’s Sparrow, several other species of conservation interest were also relatively abundant in these shrublands, including Vesper Sparrow, Cassin’s Sparrow and Loggerhead Shrike.

Table 2: Density estimates in 2013 in Shrubland Habitat (n = truncated # detections, D = # birds/ km²) with 95% lower (LCL) and upper (UCL) confidence limits.

Species	n	D	LCL	UCL
2013 (pooled)				
Horned Lark	418 (8166)	45.87	23.75	88.62
Lark Bunting*	479 (3477)	28.11	21.71	36.38
Brewer's Blackbird	79 (352)	27.17	20.35	36.29
Brewer's Sparrow*	181 (792)	26.55	18.94	37.22
Vesper Sparrow*	246 (1127)	13.84	9.84	19.47
Spotted Towhee	161 (923)	11.93	9.60	14.82
Brown-headed Cowbird	52 (445)	5.55	4.14	7.45
Lark Sparrow	49 (297)	5.40	4.07	7.16
Western Meadowlark	472 (2723)	5.25	3.93	7.02
Mourning Dove	61 (521)	2.51	1.83	3.45
Cassin's Sparrow*	61 (209)	2.14	1.66	2.75
Grasshopper Sparrow	8 (386)	1.83	0.65	5.13
Loggerhead Shrike*	33 (98)	1.27	0.83	1.94
Rock Wren	28 (233)	1.17	0.79	1.73
Green-tailed Towhee	32 (352)	1.13	0.75	1.71

* = Species of special concern

Vegetation

Grass was the dominant ground cover type in the 2013 study area, followed by bare ground (Figs 5 & 6). 'Other' cover consisted of litter, lichen, dead woody material, etc. Blue grama (*Bouteloua gracilis*) was dominant on 90.7% of the sites in PDCH, followed by 5.4% buffalograss (*Bouteloua dactyloides*) (Fig 5). Blue grama was dominant on 44.3% of the sites in shrubland habitat followed by 23.5% unknown grass spp. Higher grass species diversity was observed in the shrubland habitat than in the PDCH habitat, although a higher incidence of exotics such as cheatgrass was also observed (Fig 7).

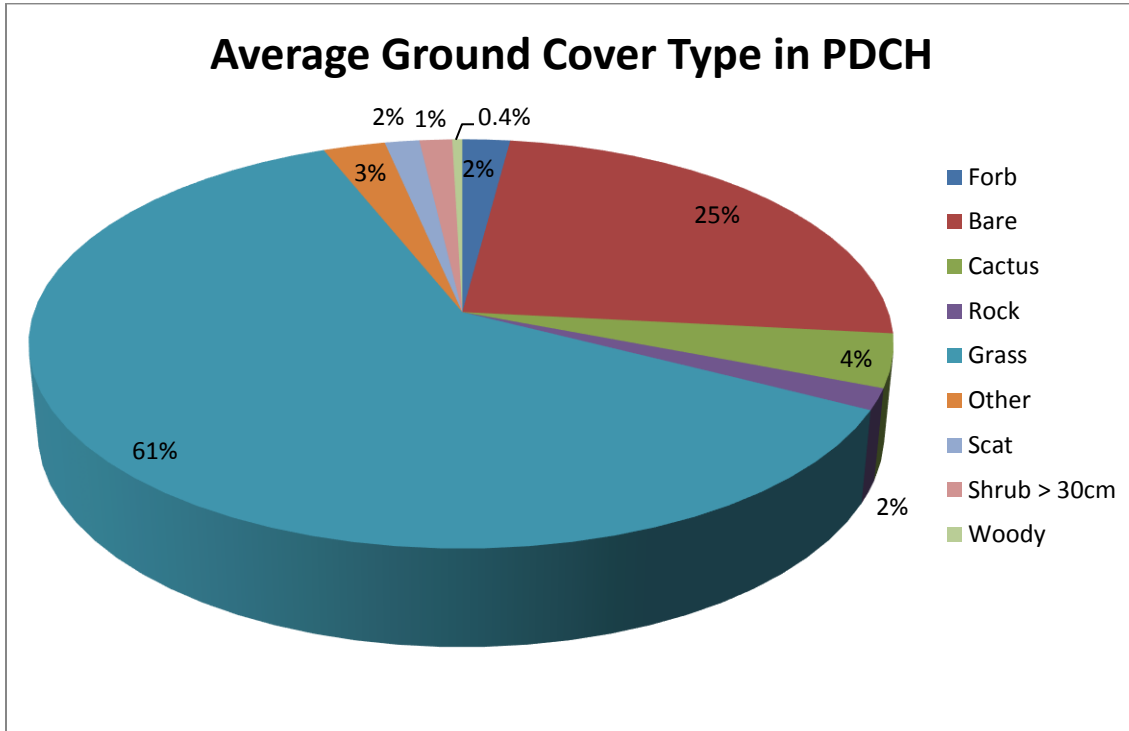


Figure 5: Average ground cover types recorded at survey points in prairie dog colony habitat (PDCH) on City of Fort Collins Properties in the Mountains to Plains (MTP) area in 2013.

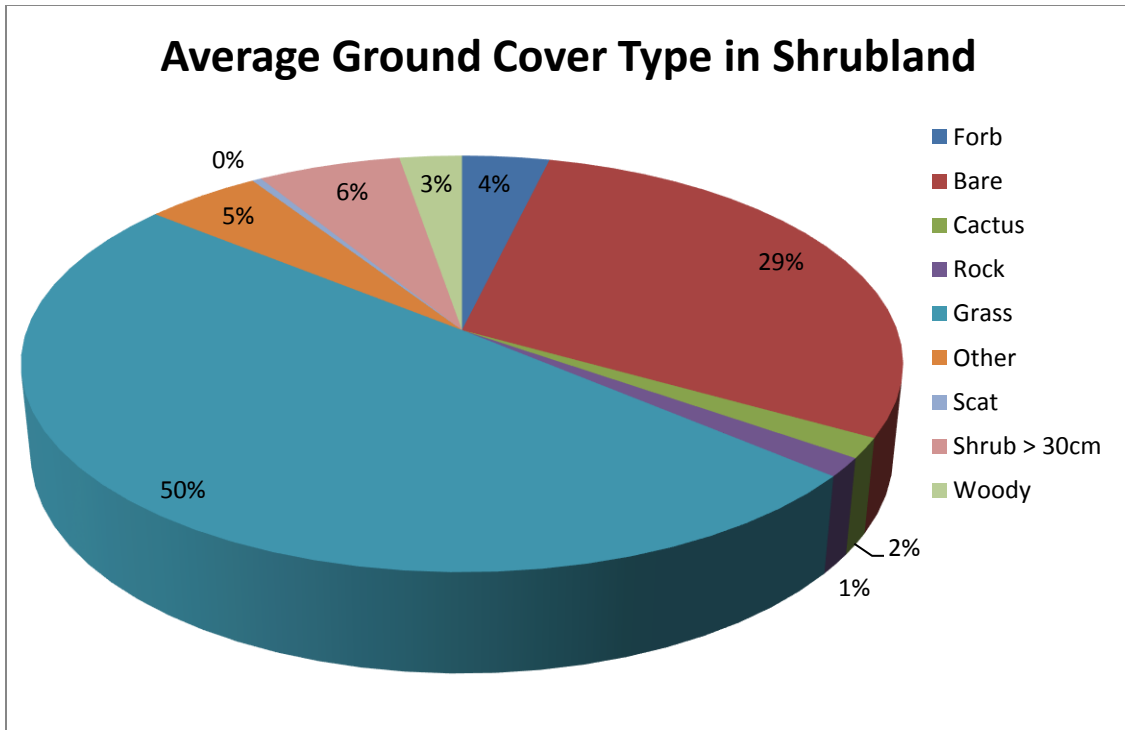


Figure 6: Average ground cover types recorded at survey points in shrublands on City of Fort Collins Properties in the Mountains to Plains (MTP) area in 2013.

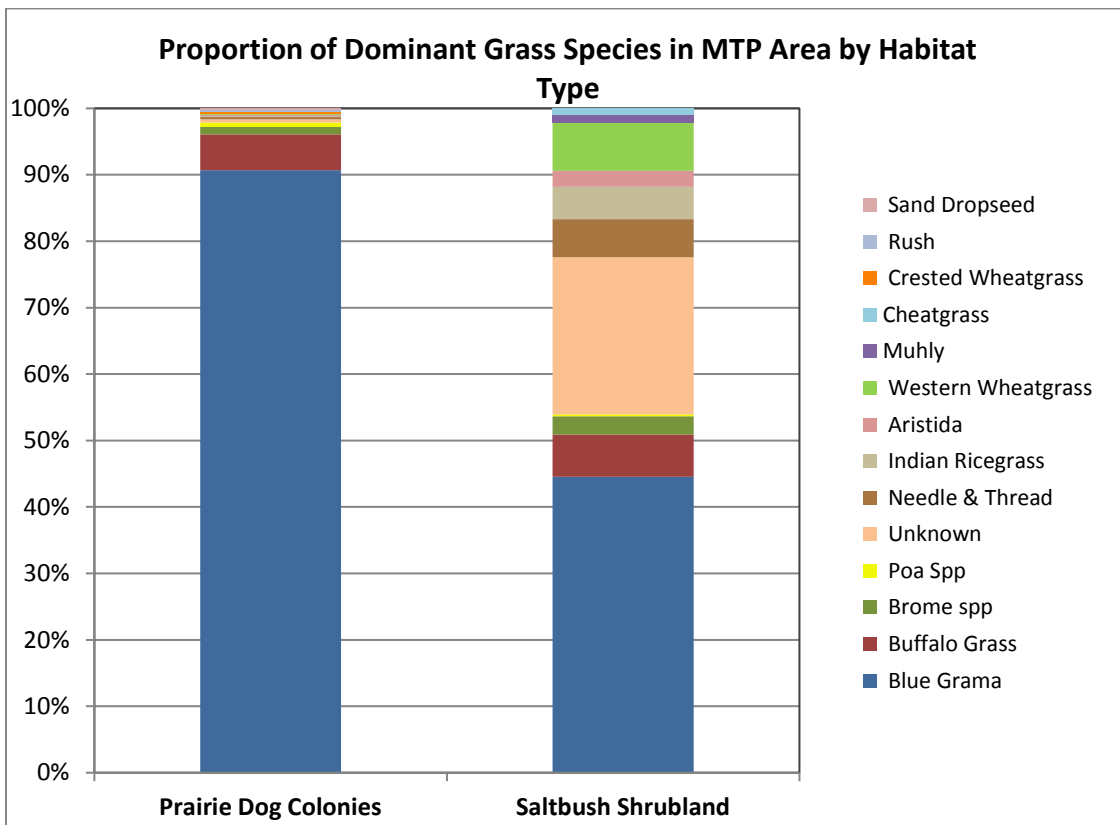


Figure 7: Dominant grass species recorded at survey points compared by habitat type on City of Fort Collins Properties in the Mountains to Plains (MTP) area in 2013.

The dominant shrub species in the shrubland habitat was Four-wing Saltbush, followed by Yucca and then Skunkbush (Fig 8). Saltbush and Rabbitbrush species were dominant in Bernard, Round Butte, and the Bowes Homestead on flatter terrain. Mountain Mahogany and Skunkbush occurred along the edges of hillsides and washes on Soapstone and the slopes of Round Butte. Yucca was interspersed throughout the properties in various patches or as individual plants. Other shrubs such as Gooseberry (*Ribes spp.*) and Snowberry (*Symphoricarpos spp.*) were found in the lower, wetter areas of Round Butte ranch.

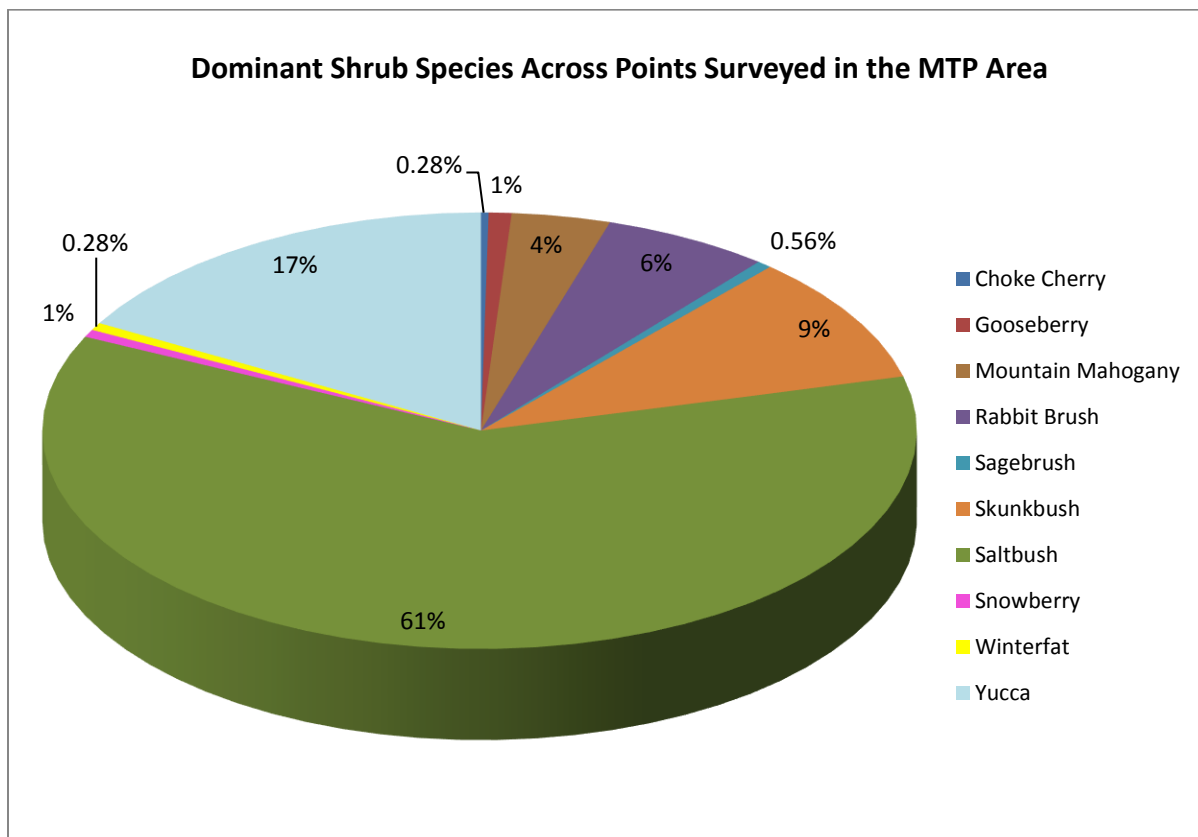


Figure 8: Dominant Shrub species across survey points in the shrubland habitat on City of Fort Collins Properties in the MTP area in 2013.

DISCUSSION AND MANAGEMENT RECOMMENDATIONS

RMBO has monitored grassland birds in the MTP area annually since 2006. Since the sylvatic plague event in 2008 (Panjabi and Beyer 2009), we have focused our survey effort on prairie dog colony habitat (PDCH) to monitor the impacts on the sensitive shortgrass prairie birds that prefer this habitat. Our data indicate that Mountain Plover densities in PDCH declined significantly from 1.72 birds/km² in 2008 to .41 birds/km² in 2010 (Youngberg et al. 2010), and have since increased only slightly to .64 birds/km², despite that prairie dogs have recovered 72% of the extent of former colonies. Burrowing Owl density dropped from .96 birds/km² in 2008 to .56 birds/km² in 2010 and then .2 birds/km² in 2013. Thus it is clear these species have not yet recovered from the effects of the plague-driven loss of suitable PDCH, and remain at historic low population levels in the MTP area.

The prescribed burn conducted in Jack Springs pasture of Soapstone Prairie Natural Area (SPNA) has been successful in accelerating the recolonization of this area by prairie dogs and restoring at least two pairs of Mountain Plover to the area. Jack Springs pasture had one of the highest densities of Mountain Plovers (2.4 birds/km²) in 2008 and 2009 (Panjabi and Beyer 2009), but zero plovers by 2010 (Youngberg et al. 2010). 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 is testament to the importance of targeted and well-timed management efforts by City of Fort Collins Natural Areas Program staff in response to the loss of prairie dogs and the collapse of Mountain Plover populations, especially since the plovers do not appear to be recolonizing other expanding prairie dog colonies elsewhere in the MTP region. However, Mountain Plover populations in the Jack Springs pasture area of Soapstone Prairie have still not recovered to 2008 levels. Since the 2008 plague event, the PDCH around the USFWS ferret center has hosted the largest and most stable population of Mountain Plovers within the MTP area.

Of more recent concern however is the significant decline in McCown's Longspur density in PDCH since 2006. McCown's Longspur is an endemic breeder in the dry shortgrass prairies of the western Great Plains, from southern Alberta and Saskatchewan to northern Colorado. According to the North American Breeding Bird Survey (Sauer et al. 2012) its population has declined by 5.3% annually, resulting in a loss of 91% of its global population since 1966. It is recognized as a species of conservation concern by the U.S. Fish and Wildlife Service, U.S. Forest Service, Partners in Flight, the state of Colorado and other wildlife conservation organizations. In contrast to the overall distribution and trend, northern Colorado and southeast Wyoming support one of the densest and most stable populations of McCown's Longspur in the world (Fig. 9). Although the decline in McCown's Longspur density within PDCH in the MTP area seems indisputable, it is not known whether this species is declining only within areas of PDCH or across the entire MTP area. However, McCown's Longspur density was significantly higher in PDCH than in other grasslands on SPNA, MSR and RBR in 2008-2009 (Panjabi and Beyer 2009), and therefore PDCH may represent the most important habitat for the species in the MTP area. It is not clear whether the McCown's Longspur population decline in PDCH is related to the plague event of 2008, but if so the response is not similar to that of Mountain Plover or Burrowing Owl, which crashed shortly after the event and have since been slowly recovering. According to our data, McCown's Longspurs declined annually in PDCH from 2009-2013, with no recovery. McCown's Longspurs prefer areas of extensive and well-cropped blue grama and buffalograss turf. Because of their requirement for relatively short grass, they can be sensitive to grazing management. Given the significant and ongoing declines in this species and the importance of the MTP area for this and other shortgrass prairie obligates, City of Fort Collins managers should evaluate current management practices in the MTP area, particularly within areas of prairie dog colonies, to determine whether changes in management since 2006 may be contributing to this decline. Changes in grazing pressure, prairie dog population dynamics and consequent vegetation structure, or increased human activity/disturbance in PDCH areas are a few possible factors that should be considered. Continued monitoring of the population and incorporation of research questions into a monitoring design could allow managers to identify conservation concerns and their drivers, and respond in a time-sensitive manner that would increase the probability of success in conserving this highly vulnerable species in the MTP area.

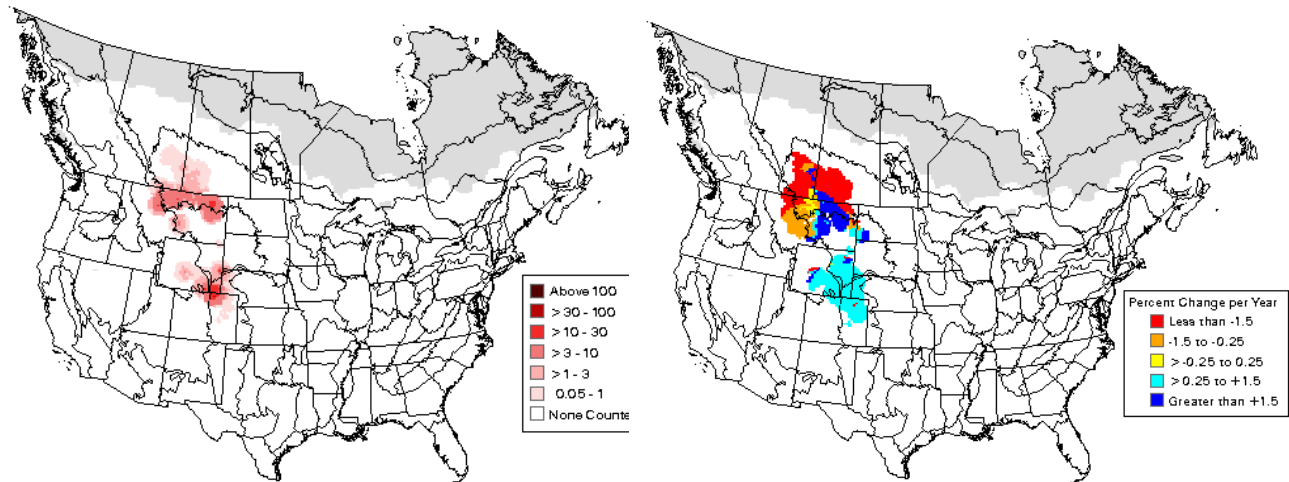


Figure 9: McCown's Longspur relative abundance from 2006-2012 (left) and population change from 1966-2012 (right) (from Sauer et al. 2012).

This is the second year we have conducted surveys in the Saltbush shrublands in the MTP area. In 2013 we included the saltbush areas in the western portion of Soapstone Prairie Natural Area. Four-winged Saltbush is a drought-tolerant shrub that provides forage for deer and antelope, food and cover for rabbits and other small mammals, as well as breeding habitat & cover for many bird species (Mackie et al. 2006). Although we targeted our survey effort in Saltbush, some of the areas surveyed in Soapstone and Round Butte included Mountain Mahogany and Skunkbush along the south & east-facing hillsides. There we observed Spotted Towhees, Blue Grosbeaks, and Loggerhead Shrikes that prefer the taller, denser structure offered by those shrub species. In the Saltbush habitat we observed species of concern such as Brewer's, Vesper & Cassin's sparrows and Lark Buntings using the habitat for breeding. These four species are exhibiting significant population declines across their range and are Species of Greatest Conservation Need in the Colorado State Wildlife Action Plan. We have not surveyed Saltbush shrublands consistently enough over the years to estimate trends for any species in this habitat, thus these species' trends in the MTP area is unknown. Horned Larks, Lark Buntings, Western Meadowlark and Vesper sparrows frequented all shrub communities surveyed, including areas dominated by Yucca. An observed threat to the bird habitat in this area is the occurrence of invasive non-natives such as Dalmatian toadflax, Russian thistle and Cheatgrass. Elimination and/ or control of these invasive species can help safeguard the health of the Saltbush shrubland in the MTP area. Continued monitoring of the bird populations in the Saltbush shrublands would help determine population trends of several priority bird species restricted to this habitat, inform management and conservation decisions, and evaluate efficacy of management practices.



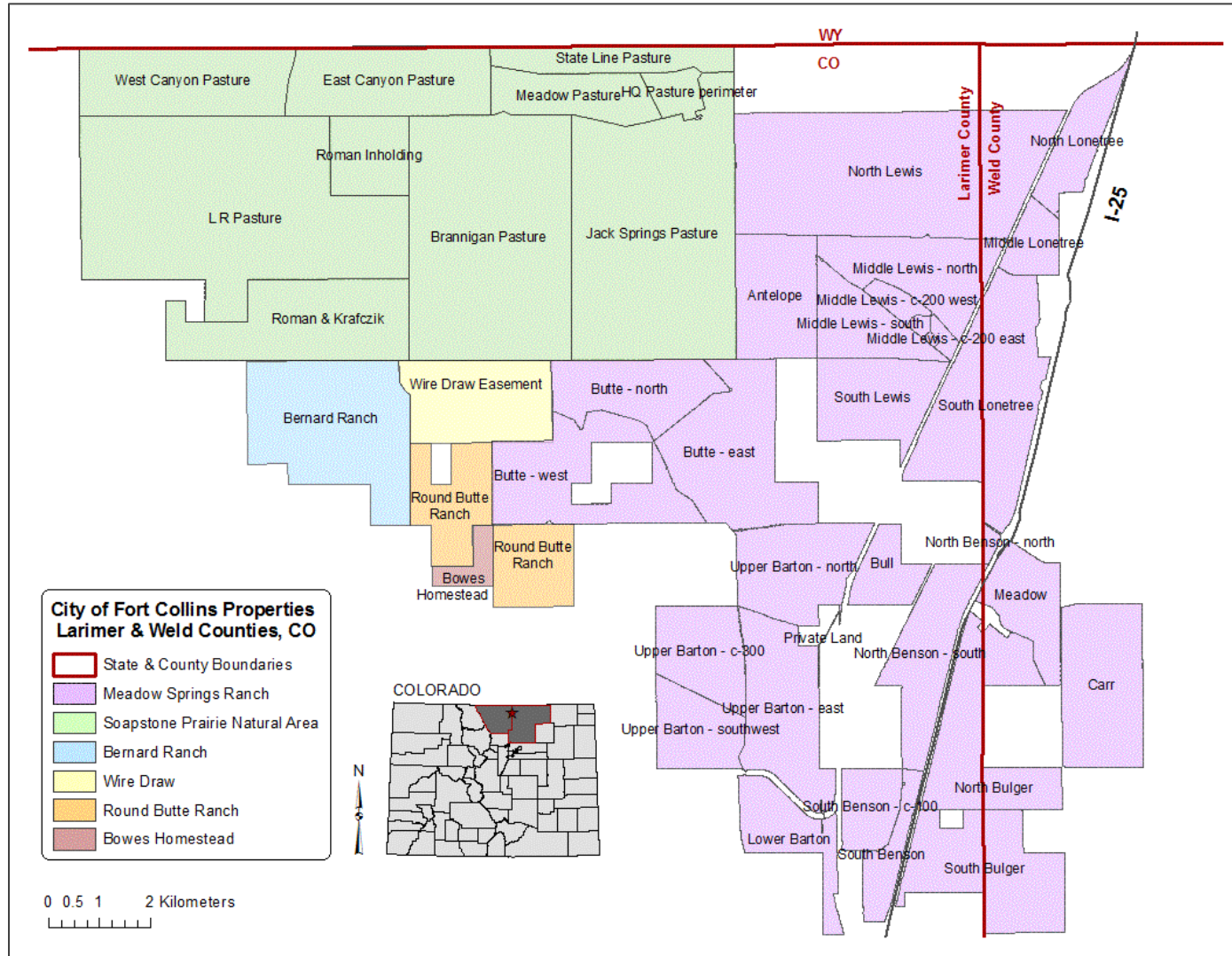
A shrubland area view featuring patches of Yucca, Saltbush, Skunkbush, and Mountain Mahogany in Soapstone Prairie Natural Area. Photo by E. Youngberg, 2013

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Appendix (A): Map of Fort Collins Properties

City of Fort Collins property map of 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 of all species detected during point counts in PDCH on Fort Collins Properties from 2006 – 2013.

Common Name	Scientific Name	2006 (64 pts)	2007 (58 pts)	2008 (165 pts)*	2009 (307 pts)	2010 (296 pts)	2011 (482 pts)*	2012 (388 pts)*	2013 (611 pts)*	Total (1462)
Canada Goose	<i>Branta canadensis</i>					11				11
Mallard	<i>Anas platyrhynchos</i>				3	3	1		5	12
Double-crested Cormorant	<i>Phalacrocorax auritus</i>				7	6				13
Great Blue Heron	<i>Ardea herodias</i>				19	4				23
Turkey Vulture	<i>Cathartes aura</i>		1						1	2
Bald Eagle	<i>Haliaeetus leucocephalus</i>								1	1
Northern Harrier *	<i>Circus cyaneus</i>				8	7	2	4	5	26
Sharp-shinned Hawk	<i>Accipiter striatus</i>						1			1
Cooper's Hawk	<i>Accipiter cooperii</i>					2				2
Swainson's Hawk *	<i>Buteo swainsoni</i>		1		8	8	6	2	6	31
Red-tailed Hawk	<i>Buteo jamaicensis</i>				5		4	2	2	13
Ferruginous Hawk *	<i>Buteo regalis</i>	1			3	1	22	2	6	35
Golden Eagle *	<i>Aquila chrysaetos</i>				2	3	1	1		7
American Kestrel	<i>Falco sparverius</i>				17	12	25	6	11	71
Merlin	<i>Falco columbarius</i>				1					1
Peregrine Falcon	<i>Falco peregrinus</i>					1				1
Prairie Falcon *	<i>Falco mexicanus</i>	1			4	7	4	1	1	18
Sandhill Crane *	<i>Grus canadensis</i>					2			2	4
Killdeer	<i>Charadrius vociferus</i>				18	13	12	8	11	62
Mountain Plover *	<i>Charadrius montanus</i>	6	18		41	13	13	30	26	147
Greater Yellowlegs	<i>Tringa melanoleuca</i>				1					1
Long-billed Curlew *	<i>Numenius americanus</i>				9	3	56	11	2	81
Wilson's Snipe	<i>Gallinago delicata</i>	1			1		1	2	1	5
Wilson's Phalarope	<i>Phalaropus tricolor</i>					1				1
Rock Pigeon	<i>Columba livia</i>					3	9		6	18
Mourning Dove	<i>Zenaida macroura</i>	1			5	22	28	2	11	69
Burrowing Owl *	<i>Athene cunicularia</i>	3	2		19	10	43	30	17	124

Common Name	Scientific Name	2006 (64 pts)	2007 (58 pts)	2008 (165 pts)*	2009 (307 pts)	2010 (296 pts)	2011 (482 pts)*	2012 (388 pts)*	2013 (611 pts)*	Total (1462)
Common Nighthawk	<i>Chordeiles minor</i>	4	1				3		3	11
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>					1				1
Western Wood-Pewee	<i>Contopus sordidulus</i>								1	1
Say's Phoebe	<i>Sayornis saya</i>				11	3	15	6	7	42
Western Kingbird	<i>Tyrannus verticalis</i>		1		1	4	10	6	21	43
Eastern Kingbird	<i>Tyrannus tyrannus</i>					1				1
Loggerhead Shrike *	<i>Lanius ludovicianus</i>	1			6	1	14	3	14	39
Black-billed Magpie	<i>Pica hudsonia</i>								1	1
Common Raven	<i>Corvus corax</i>				3	7	9		16	35
Horned Lark	<i>Eremophila alpestris</i>	227	107	3	1714	1302	1812	1256	2155	8576
Tree Swallow	<i>Tachycineta bicolor</i>				3		1		2	6
Violet-green Swallow	<i>Tachycineta thalassina</i>	7			4					11
Northern Rough-winged Swallow	<i>Steligidopteryx serripennis</i>	1				4	2		3	10
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	3	1		3	12	47	2	3	71
Barn Swallow	<i>Hirundo rustica</i>	2			10	11	41	1	16	81
Rock Wren	<i>Salpinctes obsoletus</i>				7	10	8	2	12	39
Western Bluebird	<i>Sialia mexicana</i>				1				1	2
Swainson's Thrush	<i>Catharus ustulatus</i>						2			2
American Robin	<i>Turdus migratorius</i>					2			1	3
Northern Mockingbird	<i>Mimus polyglottos</i>				1					1
Sage Thrasher	<i>Oreoscoptes montanus</i>						1			1
European Starling	<i>Sturnus vulgaris</i>				2	11	13	1	1	28
Yellow Warbler	<i>Setophaga petechia</i>						1			1
Green-tailed Towhee	<i>Pipilo chlorurus</i>					2				2
Spotted Towhee	<i>Pipilo maculatus</i>								5	5
Cassin's Sparrow *	<i>Peucaea cassinii</i>			1			2			3
Chipping Sparrow	<i>Spizella passerina</i>				8	5	22		3	38
Clay-colored Sparrow	<i>Spizella pallida</i>				1	4	1		3	9
Brewer's Sparrow *	<i>Spizella breweri</i>				40	50	53	15	28	186
Vesper Sparrow *	<i>Poocetes gramineus</i>	6	1		46	49	81	31	94	308

Common Name	Scientific Name	2006 (64 pts)	2007 (58 pts)	2008 (165 pts)*	2009 (307 pts)	2010 (296 pts)	2011 (482 pts)*	2012 (388 pts)*	2013 (611 pts)*	Total (1462)
Lark Sparrow	<i>Chondestes grammacus</i>				2	3	46	3	15	69
Lark Bunting *	<i>Calamospiza melanocorys</i>	4	21	2	95	91	534	110	809	1666
Savannah Sparrow	<i>Passerculus sandwichensis</i>				7	2			1	10
Grasshopper Sparrow *	<i>Ammodramus savannarum</i>				1	23	18		4	46
McCown's Longspur *	<i>Rhyncophanes mccownii</i>	324	163		891	733	1037	480	757	4385
Chestnut-collared Longspur *	<i>Calcarius ornatus</i>	4			6	65	9	12	17	113
Bobolink *	<i>Dolichonyx oryzivorus</i>					2				2
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	1			30	20	32	15	51	149
Eastern Meadowlark	<i>Sturnella magna</i>					1		4		5
Western Meadowlark	<i>Sturnella neglecta</i>	182	9	5	357	631	1241	581	557	3563
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>				1					1
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	3			28	19	6	3	6	65
Common Grackle	<i>Quiscalus quiscula</i>				10		4		2	16
Great-tailed Grackle	<i>Quiscalus mexicanus</i>						43			43
Brown-headed Cowbird	<i>Molothrus ater</i>				14	7	5	2	7	35
House Finch	<i>Carpodacus mexicanus</i>				1				1	2
American Goldfinch	<i>Carduelis tristis</i>					1	1			2
House Sparrow	<i>Passer domesticus</i>				2		1		1	4
Totals	75 species	782	326	11	3477	3209	5343	2634	4732	20514

* 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 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 Detections in Shrubland Habitat

Number of individuals of all species detected during point counts in saltbush and shrubland habitat on Fort Collins Properties from 2006 – 2012. (2006, 2010, and 2011 are excluded due to inconsistent survey effort in adequate shrubland habitat).

Common Name	Scientific Name	2007 (88 pts)	2008 (64 pts)	2009 (141 pts)	2012 (216 pts)*	2013 (335 pts)	Total (844)
Mallard	<i>Anas platyrhynchos</i>			5			5
Great Blue Heron	<i>Ardea herodias</i>			2			2
Turkey Vulture	<i>Cathartes aura</i>	2		1		1	4
Swainson's Hawk *	<i>Buteo swainsoni</i>			1	2	1	4
Red-tailed Hawk	<i>Buteo jamaicensis</i>		2			2	4
Golden Eagle *	<i>Aquila chrysaetos</i>				1	2	3
American Kestrel	<i>Falco sparverius</i>	1	2		6		7
Prairie Falcon *	<i>Falco mexicanus</i>	2				1	3
Killdeer	<i>Charadrius vociferus</i>	5		3	1		9
Wilson's Snipe	<i>Gallinago delicata</i>			1		5	6
Rock Pigeon	<i>Columba livia</i>	2					2
Mourning Dove	<i>Zenaida macroura</i>	21	15	5	20	71	117
Barn Owl	<i>Tyto alba</i>	1					1
Burrowing Owl *	<i>Athene cunicularia</i>		4		3		3
Common Nighthawk	<i>Chordeiles minor</i>	2	8	1	8	16	27
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>	1					1
Northern Flicker	<i>Colaptes auratus</i>					1	1
Western Wood-Pewee	<i>Contopus sordidulus</i>					1	1
Say's Phoebe	<i>Sayornis saya</i>	4	2	6	4	8	22
Western Kingbird	<i>Tyrannus verticalis</i>		3	5	3	2	10
Eastern Kingbird	<i>Tyrannus tyrannus</i>		1	1			1
Loggerhead Shrike *	<i>Lanius ludovicianus</i>	5	2		20	35	60
Black-billed Magpie	<i>Pica hudsonia</i>	1			1	6	8
Common Raven	<i>Corvus corax</i>	3			5	7	15
Horned Lark	<i>Eremophila alpestris</i>	91	201	135	530	501	1257
Violet-green Swallow	<i>Tachycineta thalassina</i>	1					1
Northern Rough-winged Swallow	<i>Stelidopteryx serripennis</i>	3			4	11	18
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	2	17	4	10	8	24
Barn Swallow	<i>Hirundo rustica</i>			1	1		2
Rock Wren	<i>Salpinctes obsoletus</i>	10	16		11	32	53
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	6				5	11
American Robin	<i>Turdus migratorius</i>	1				1	2
Northern Mockingbird	<i>Mimus polyglottos</i>	2			3	23	28
Sage Thrasher	<i>Oreoscoptes montanus</i>		1		20	16	36
Brown Thrasher	<i>Toxostoma rufum</i>	3				13	16
European Starling	<i>Sturnus vulgaris</i>		4				4

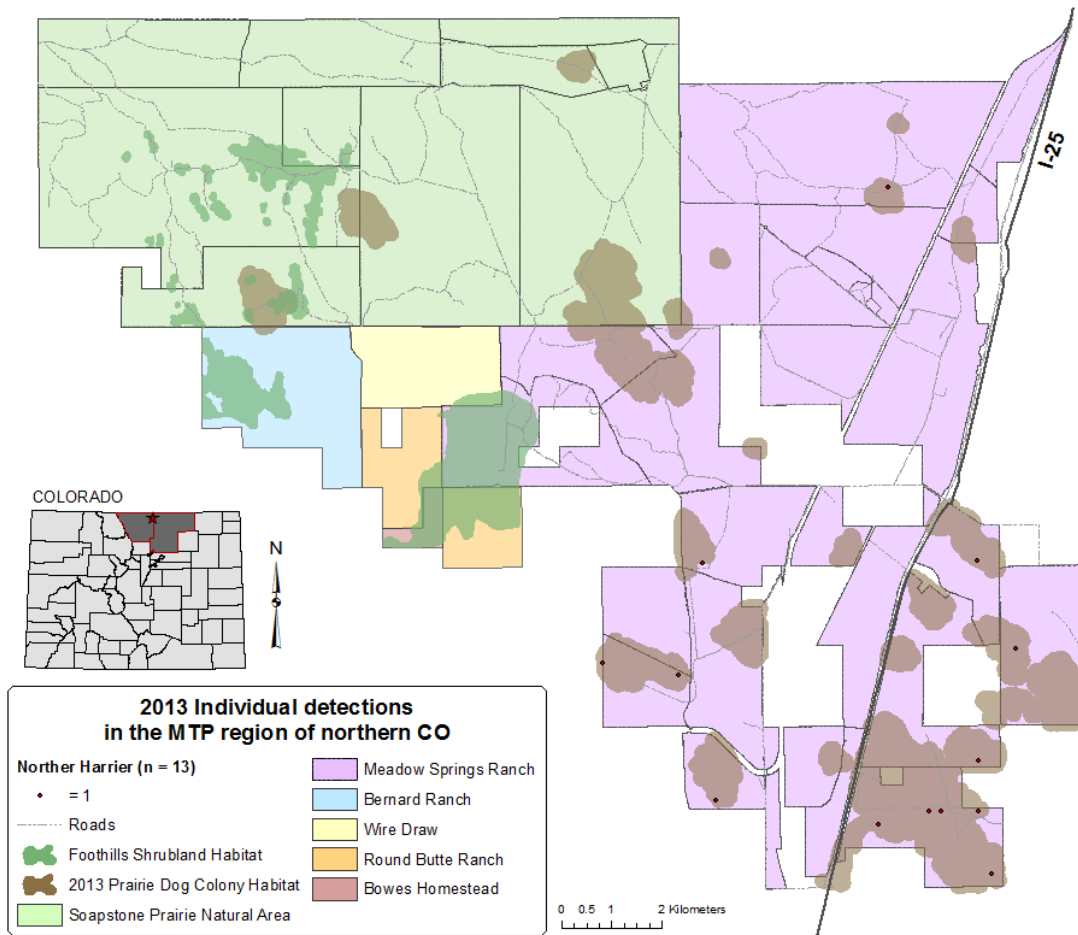
Common Name	Scientific Name	2007 (88 pts)	2008 (64 pts)	2009 (141 pts)	2012 (216 pts)⁺	2013 (335 pts)	Total (844)
Virginia's Warbler	<i>Oreothlypis virginiae</i>	1					1
Green-tailed Towhee	<i>Pipilo chlorurus</i>	24			1	25	50
Spotted Towhee	<i>Pipilo maculatus</i>	39				180	219
Cassin's Sparrow *	<i>Peucaea cassinii</i>		43	6		57	63
Chipping Sparrow	<i>Spizella passerina</i>			2			2
Clay-colored Sparrow	<i>Spizella pallida</i>			3			3
Brewer's Sparrow *	<i>Spizella breweri</i>	5	167	92	179	207	483
Vesper Sparrow *	<i>Pooecetes gramineus</i>	20	137	7	162	274	463
Lark Sparrow	<i>Chondestes grammacus</i>	15	12		30	55	100
Lark Bunting *	<i>Calamospiza melanocorys</i>	69	208	529	376	586	1560
Grasshopper Sparrow *	<i>Ammodramus savannarum</i>		4	6		9	15
McCown's Longspur *	<i>Rhynchophanes mccownii</i>	1	8	19	10		30
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	1					1
Blue Grosbeak	<i>Passerina caerulea</i>					15	15
Lazuli Bunting *	<i>Passerina amoena</i>	3					3
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	2		8	3	23	36
Eastern Meadowlark	<i>Sturnella magna</i>				2	5	7
Western Meadowlark	<i>Sturnella neglecta</i>	63	149	93	491	419	1066
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	46	1	3	6	167	222
Common Grackle	<i>Quiscalus quiscula</i>					16	16
Brown-headed Cowbird	<i>Molothrus ater</i>	49				46	95
Bullock's Oriole	<i>Icterus bullockii</i>	1	4		2	14	17
House Finch	<i>Carpodacus mexicanus</i>	2					2
Pine Siskin	<i>Carduelis pinus</i>	1					1
Lesser Goldfinch	<i>Carduelis psaltria</i>	1					1
American Goldfinch	<i>Carduelis tristis</i>	3			2	4	9
House Sparrow	<i>Passer domesticus</i>			1			1
Totals	64 Species	515	1011	940	1917	2883	6255

* Number of points used indicates survey effort in Saltbush each year (2012 & 2013 points were visited twice)

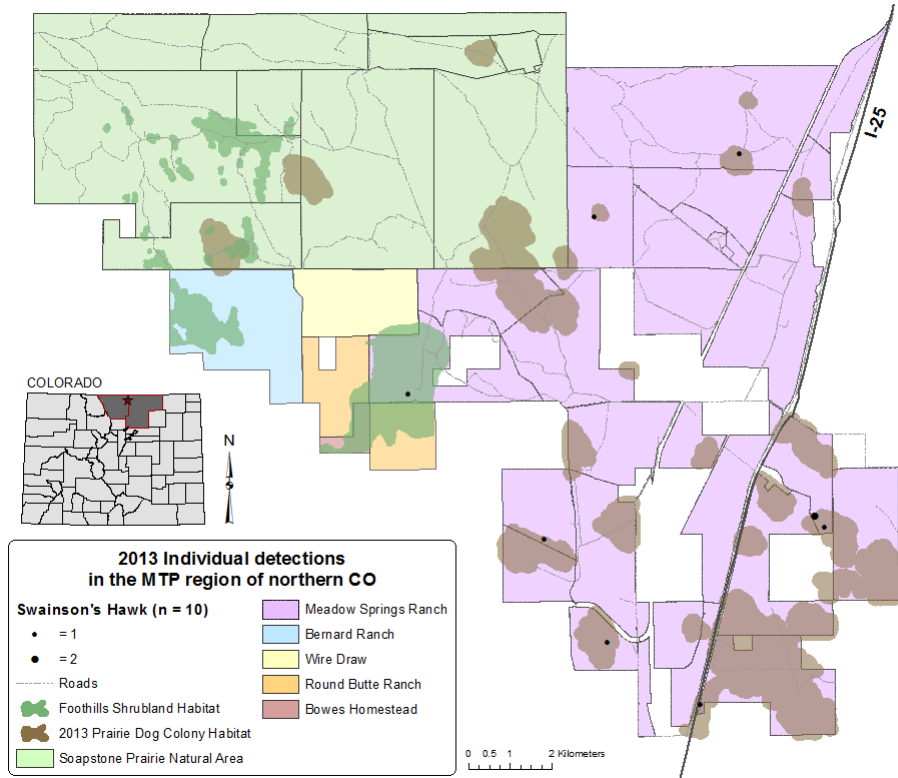
* indicates species of special concern and/or high conservation priority status in Canada and the U.S. as determined by Partners in Flight, the USFWS and Colorado Parks & Wildlife.

Appendix (D): Species Accounts

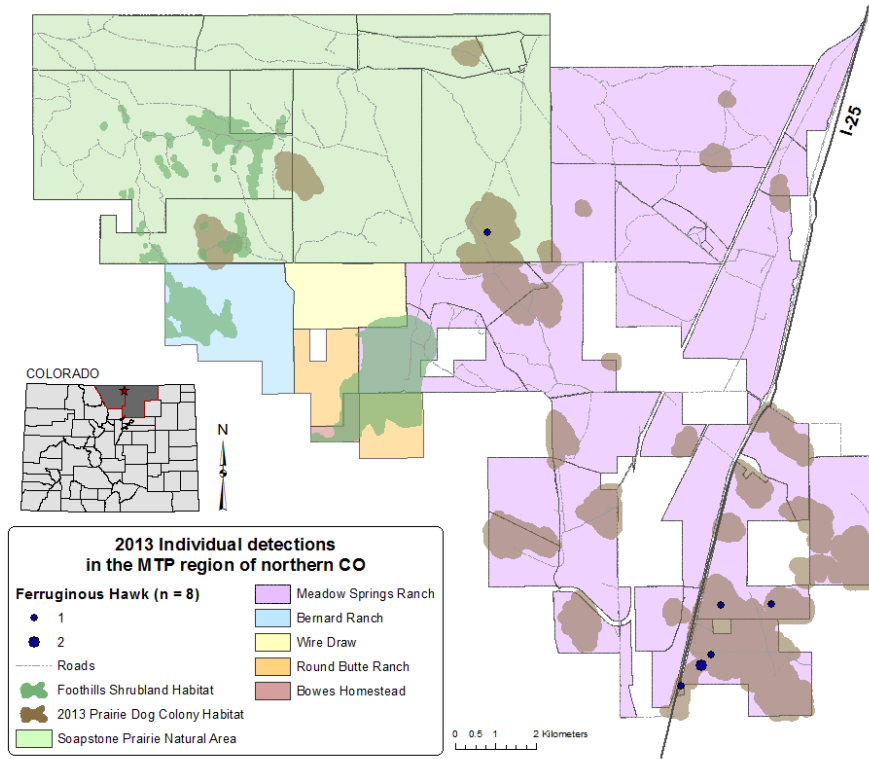
This section presents distribution maps for species of high priority conservation concern in the Mountains to Plains Area. Prairie dog colonies and foothills shrubland habitat were the only habitats surveyed in 2013. The map for each species indicates location and number of individual observations recorded during the point count surveys between 22 April, 2013 and 12 July, 2013.



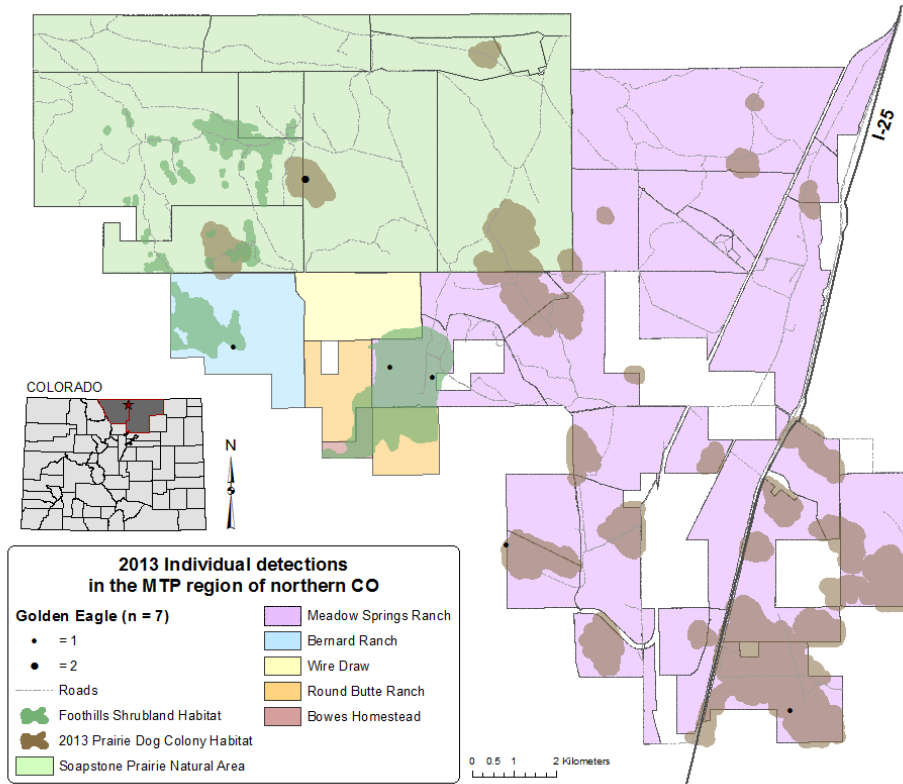
Northern Harrier (*Circus cyaneus*)



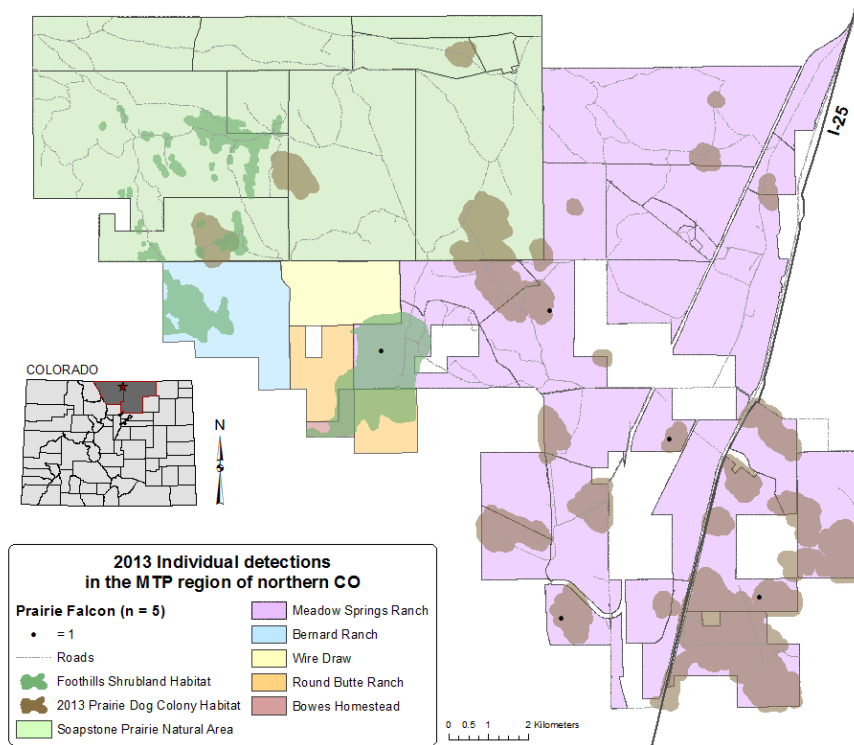
Swainson's Hawk (*Buteo swainsoni*)



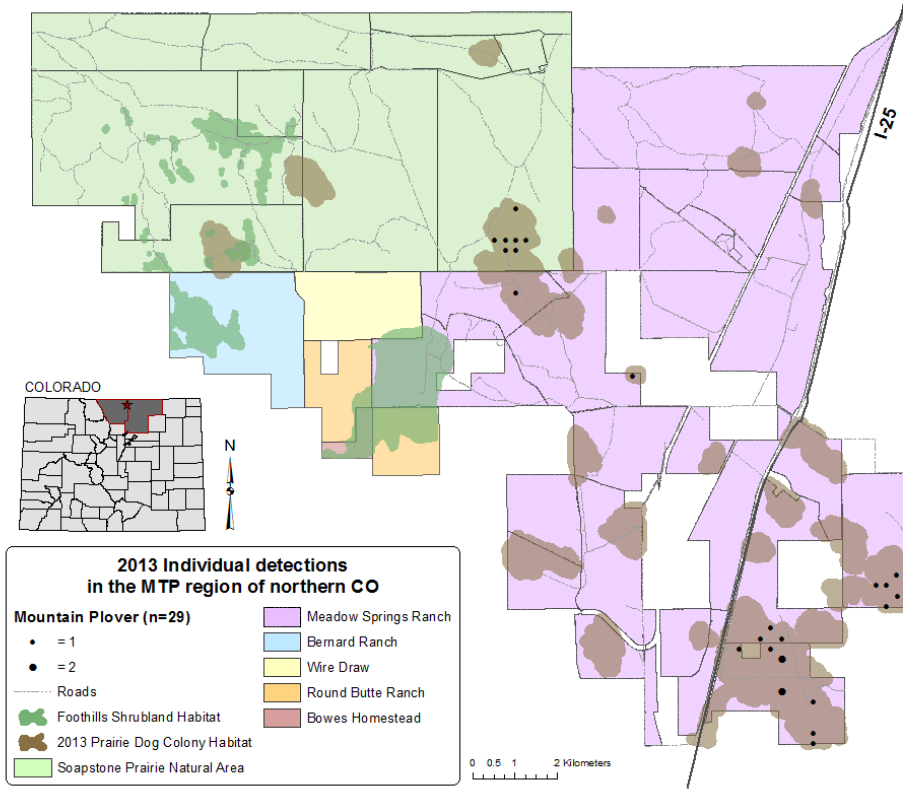
Ferruginous Hawk (*Buteo regalis*)



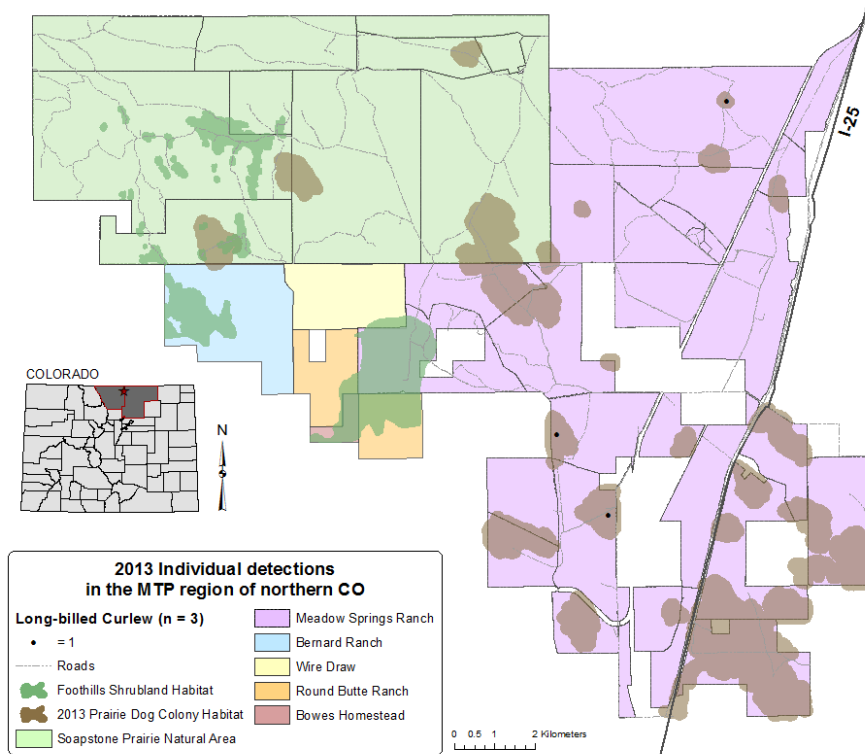
Golden Eagle (*Aquila chrysaetos*)



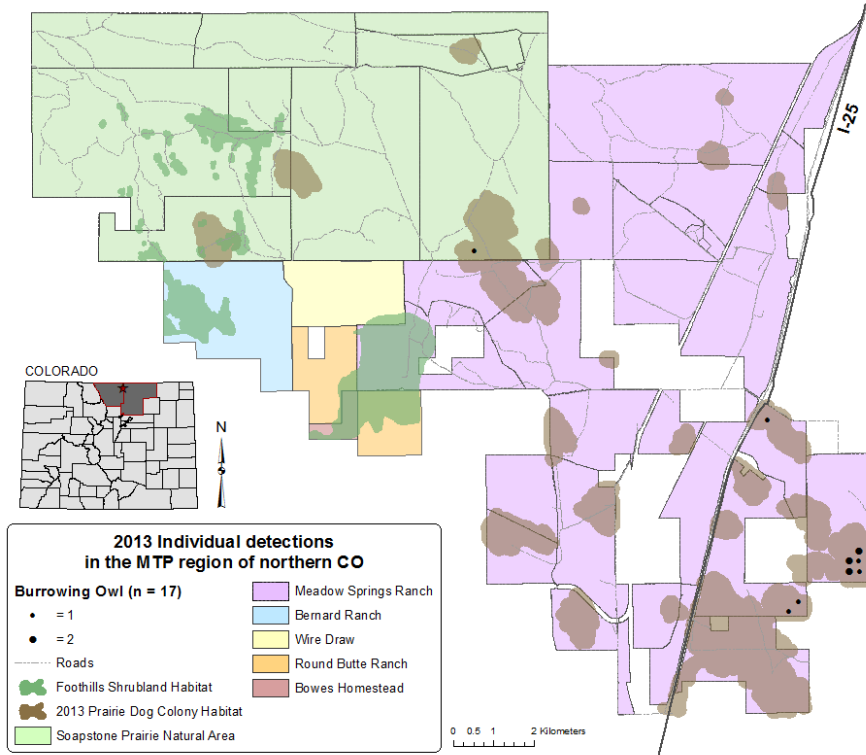
Prairie Falcon (*Falco mexicanus*)



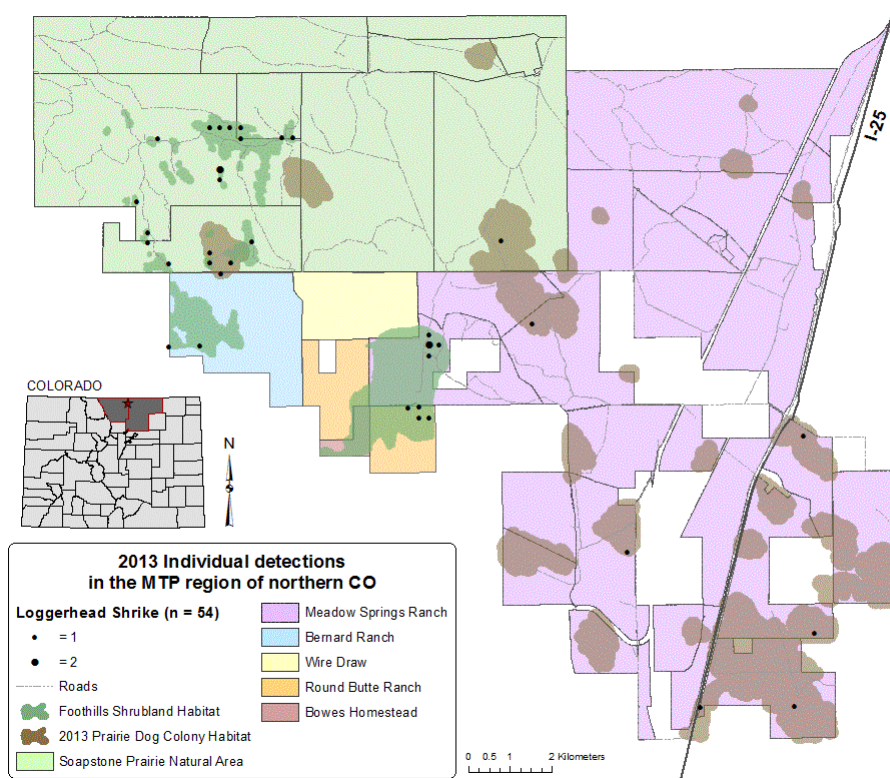
Mountain Plover (*Charadrius montanus*)



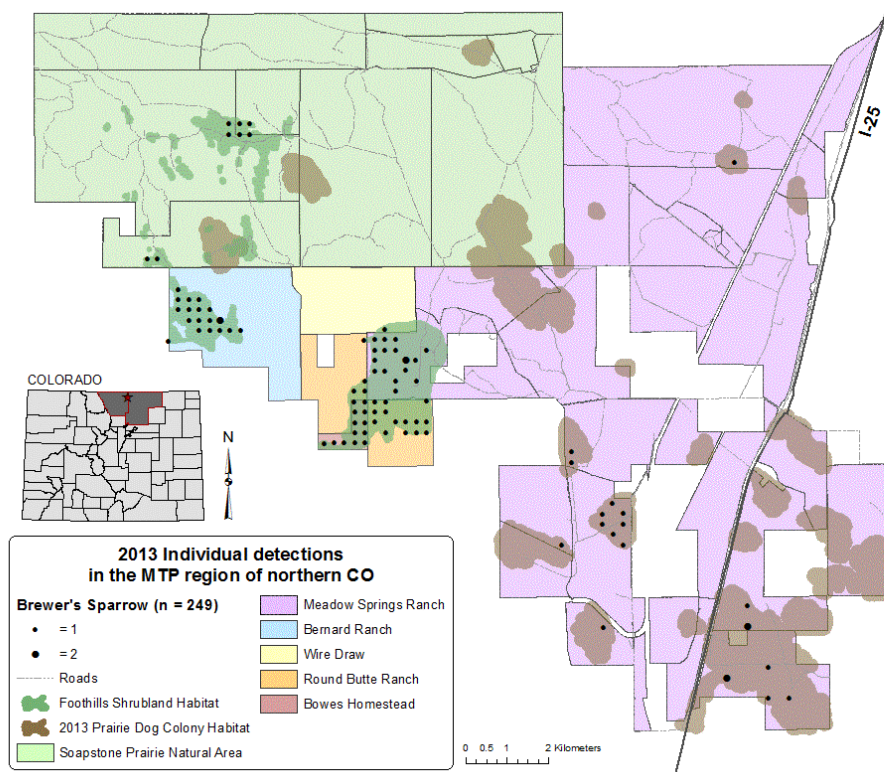
Long-billed Curlew (*Numenius americanus*)



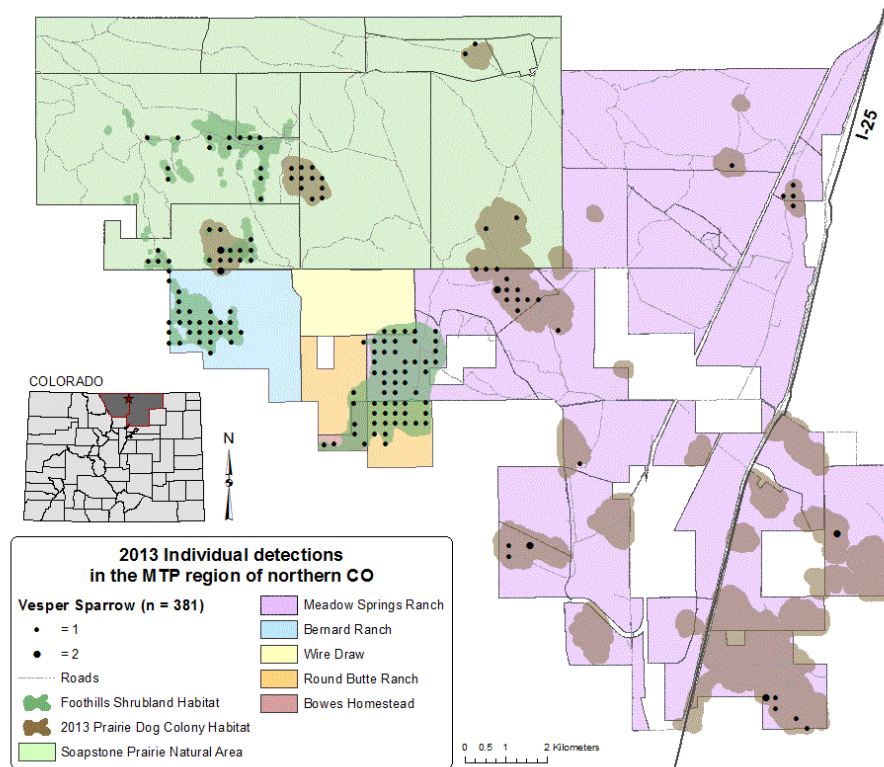
Burrowing Owl (*Athene cunicularia*)



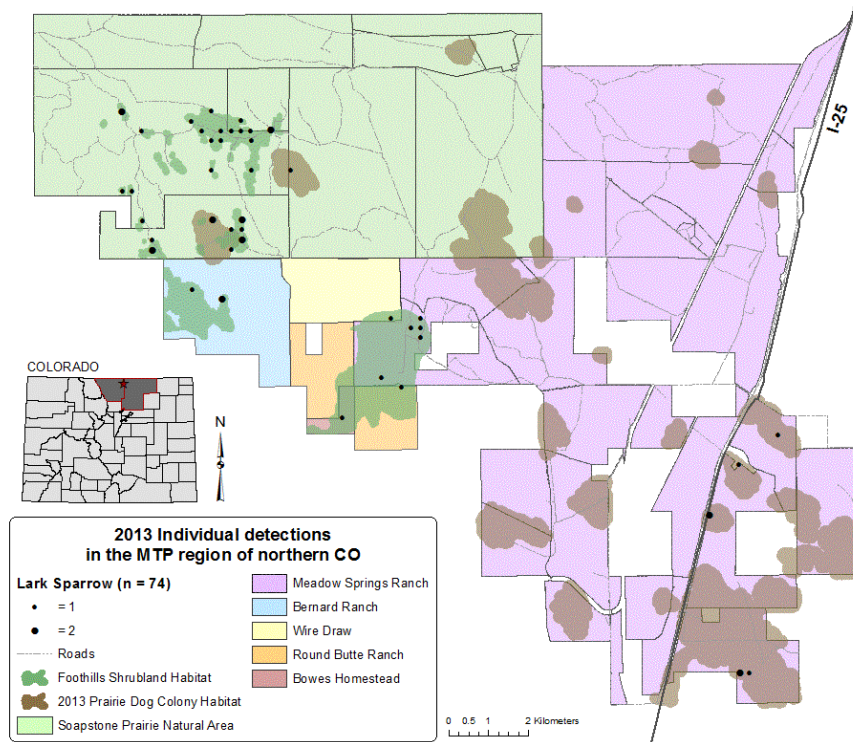
Loggerhead Shrike (*Lanius ludovicianus*)



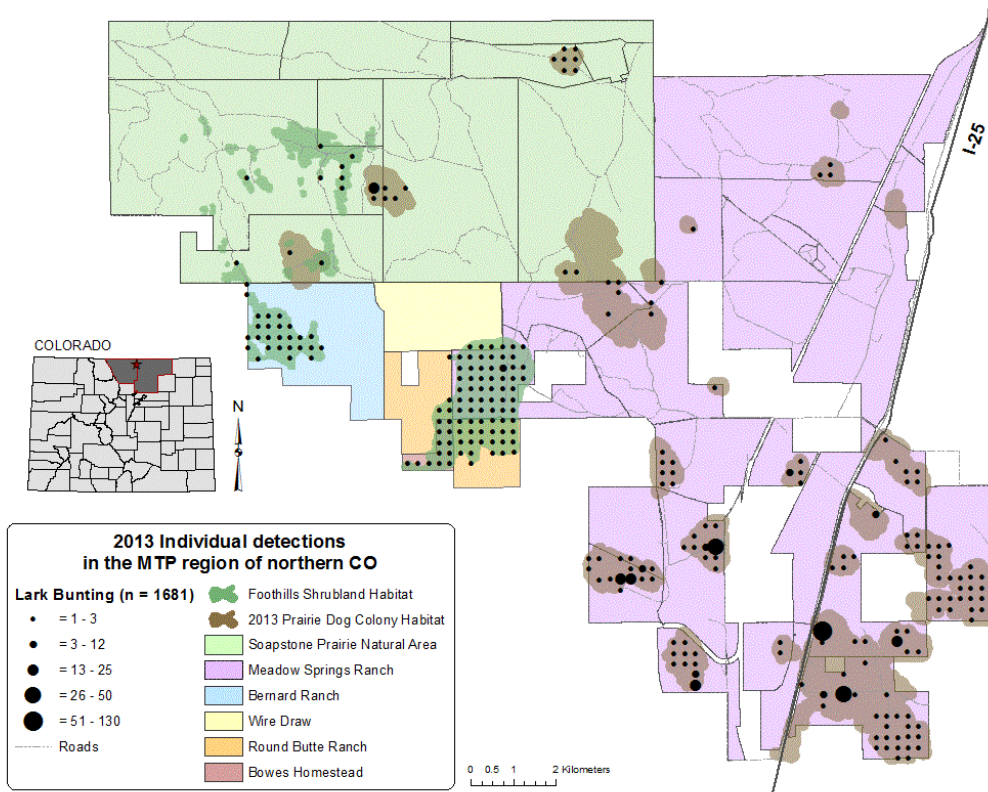
Brewer's Sparrow (*Spizella breweri*)



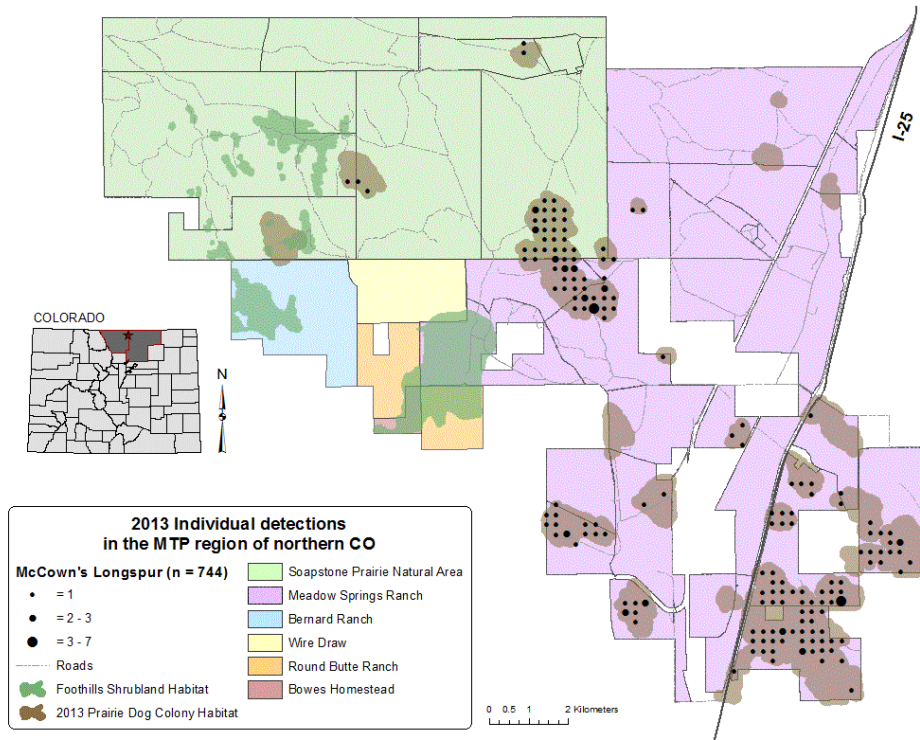
Vesper Sparrow (*Pooecetes gramineus*)



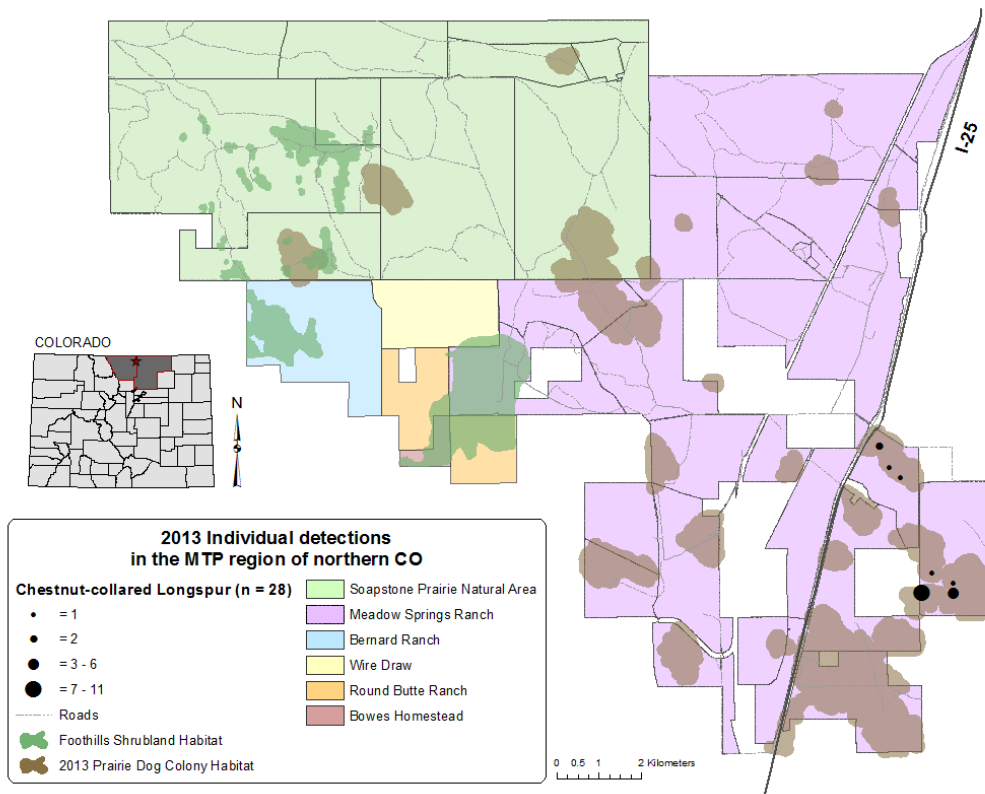
Lark Sparrow (*Chondestes grammacus*)



Lark Bunting (*Calamospiza melanocorys*)



McCown's Longspur (*Rhynchophanes mccownii*)



Chestnut-collared Longspur (*Calcarius ornatus*)