

# An Inventory of Burrowing Owls on Lands Managed by the Grand Junction Field Office of the Bureau of Land Management in Western Colorado



**December 2008**

**Rocky Mountain Bird Observatory**

PO Box 1232

Brighton, CO 80601-1232

303.659.4348

[www.rmbo.org](http://www.rmbo.org)

Tech. Report # M-BUOW-BLM-08-1



**In Cooperation With:**





# ROCKY MOUNTAIN BIRD OBSERVATORY

**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 shared responsibility.

**RMBO accomplishes its mission by:**

**Partnering** with state and federal natural resource agencies, private landowners, schools, and other nonprofits for conservation.

**Studying** bird responses to habitat conditions, ecological processes, and management actions to provide scientific information that guides bird conservation efforts.

**Monitoring** long-term trends in bird populations for our region.

**Providing** active, experiential, education programs that create an awareness and appreciation for birds.

**Sharing** the latest information in land management and bird conservation practices.

**Developing** voluntary, working partnerships with landowners to engage them in conservation.

**Working** across political and jurisdictional boundaries including, counties, states, regions, and national boundaries. Our conservation work emphasizes the Western United States, including the Great Plains, as well as Latin America.

**Creating** informed publics and building consensus for bird conservation needs.

## **Suggested Citation:**

**Jason P. Beason. 2008.** An Inventory of Burrowing Owls on Lands Managed by the Grand Junction Field Office of the Bureau of Land Management in Western Colorado. Tech Rep. M-BUOW-BLM-08-1. Rocky Mountain Bird Observatory, Brighton, Colorado. 17 pp.

## **Cover Photo:**

Burrowing Owl by Bill Schmoker

## **Contact Information:**

Jason Beason                      jason.beason@rmbo.org  
RMBO  
39405 Lund Road  
Paonia, CO 81428  
970.527.4625

## Executive Summary

Rocky Mountain Bird Observatory conducted surveys for Western Burrowing Owls (*Speotyto cunicularia hypugea*) in April, May and June of 2008. Surveys were accomplished by broadcasting Burrowing Owl calls at historical Burrowing Owl sites in Mesa County and at randomly selected prairie dog towns on lands managed by the Grand Junction Field Office of the Bureau of Land Management in western Colorado.

We conducted surveys at 40 historic Burrowing Owl sites and 59 prairie dog towns, for a total of 99 locations. We completed 445 call playback surveys during the course of the season, for a total of 4450 total survey minutes (74.2 hours).

We located Burrowing Owls at 27 sites on lands managed by the Bureau of Land Management and at seven locations which were privately owned. We recorded the following diurnal raptors during surveys: Northern Harrier (*Circus cyaneus*), Swainson's Hawk (*Buteo swainsoni*), Red-tailed Hawk (*Buteo jamaicensis*), Ferruginous Hawk (*Buteo regalis*), Golden Eagle (*Aquila chrysaetos*), and Prairie Falcon (*Falco mexicanus*). Other species of interest detected during surveys were Long-billed Curlew (*Numenius americanus*), Loggerhead Shrike (*Lanius ludovicianus*), Pinyon Jay (*Gymnorhinus cyanocephalus*), Common Raven (*Corvus corax*), Sage Sparrow (*Amphispiza belli*), and Scott's Oriole (*Icterus parisorum*). Two locations where Long-nosed Leopard Lizards (*Gambelia wislizenii*) were observed were also recorded.

## **Acknowledgements**

This project was funded by the Bureau of Land Management through an agreement with the Rocky Mountain Bird Observatory. This report constitutes the fulfillment of the requirements in our contract with the Bureau of Land Management (contract # CO-NOI08-0006).

I sincerely thank Heidi Plank of the Bureau of Land Management for making this project possible and for support during the project. I am extremely grateful to Bill Day for doing an incredible job conducting surveys. Much of the success of this project is due to Bill's hard work. I would like to thank Maria Hodkins for assisting with surveys. I am also appreciative of Rob Sparks for creating maps for this report and Jennifer Blakesley and Heidi Plank for their careful review of this report.

## Table of Contents

Executive Summary .....	i
Acknowledgements .....	ii
Table of Contents .....	iii
Introduction .....	1
Methods .....	3
Site Selection.....	3
Protocol .....	4
Results .....	5
Discussion and Recommendations .....	6
Literature Cited.....	7
Appendix A. List of Historic Burrowing Owl sites, location, ownership, and survey status in 2008. ....	8
Appendix B. List of randomly selected prairie dog town, number of points, stratum, location, and 2008 survey status. ....	10
Appendix C. Map showing all locations surveyed in 2008. ....	13
Appendix D. Number of adult and juvenile owls recorded, land ownership, dates and location information for survey locations with detections of Burrowing Owls, summer 2008.....	14
Appendix E. Location, date, and number of each species of interest recorded during Burrowing Owl surveys, summer 2008. ....	15

## Introduction

Western Burrowing Owls breed throughout most of western North America. To the north, they breed in the southern portions of the Canadian Prairie Provinces in the Great Plains and near the Canadian border in the Columbia River Basin. To the south, their breeding range extends to the Sonoran and Chihuahuan Deserts in Mexico. In Colorado, Burrowing Owls breed on the shortgrass prairie on the eastern slope and in low-elevation valleys and basins within the Colorado Plateau and Wyoming Basin regions on the western slope. Burrowing owls have probably never been common in western Colorado and were estimated to represent less than 2% of the state's total population in a 1998 survey (VerCauteren et al. 2001). A survey conducted in 1975 for the Grand Junction Field Office (GJFO) of the Bureau of Land Management (BLM) detected 95 owls (the number of adults and juveniles was not specified, but the ratio of adult to juveniles "was almost 1:1"), and a follow-up survey in 1977 detected 34 adults and 12 juveniles (Galyean 1977). In 2002, the Rocky Mountain Bird Observatory (RMBO) conducted an inventory for Burrowing Owls throughout the western slope of Colorado and discovered eight occupied locations on lands managed by the GJFO (Levad and Potter 2002).

Burrowing Owls prefer open areas that are level to gently sloping. Breeding areas are typically characterized by sparse vegetation and bare ground (Haug and Oliphant 1987, Stockrahm 1995). In western Colorado, appropriate conditions are found in desert grasslands, semi-desert shrublands, and pasture lands. Burrowing owls nest primarily in the burrows of prairie dogs. Although they have been found in relatively inactive colonies (MacCracken et al. 1984), they experience lower rates of depredation and have higher rates of nesting success in larger, well-populated colonies (Butts 1982, Desmond and Savidge 1996, Toombs 1997). Burrows rapidly deteriorate and dense vegetation encroaches on colonies following removal of prairie dogs (Grant 1965, Butts 1973), and colonies become unsuitable for Burrowing Owls 1-3 years after abandonment (Butts 1973). Burrows may require structural maintenance by prairie dogs to remain suitable for owls (MacCracken et al. 1985, Desmond 1991, Desmond and Savidge 1999). On occasion, they will nest in burrows provided by other mammals, especially badgers (Haug and Oliphant 1990, Desmond and Savidge 1996).

Burrowing Owl populations are declining throughout much of western North America. They are listed as an endangered species in Canada and a threatened species in Mexico. They are considered a species of interest in nearly all states in which they occur in the United States and the United States Fish and Wildlife Service (USFWS) lists them as a migratory species of concern for the Southern Rockies/Colorado Plateau region. The state of Colorado lists Burrowing Owls as a threatened species.

It is believed that Burrowing Owls have declined since 1998 on lands managed by the GJFO (Levad and Potter 2002). Because it is anticipated that areas occupied historically by Burrowing Owls in this area are likely to experience an increase in recreation use and energy development, the GJFO requested that RMBO conduct an inventory of Burrowing Owls within their management district in 2008. Understanding

which areas provide habitat for burrowing owls will assist with future decisions regarding management of this area. This inventory should provide an excellent baseline for the BLM and other conservation partners to monitor the effects of human activities and population levels of this species of concern.



## Methods

### Site Selection

Sites we chose to survey included all known historic Burrowing Owl locations, including those on private land, in the RMBO special species database (Appendix A; n=74) and a random selection of prairie dog towns (Appendix B; n=100) on BLM lands in the GJFO management area. Prior to the field season, RMBO acquired a Geographic Information System (GIS) layer from the Colorado Division of Wildlife which showed 274 prairie dog towns on lands managed by the GJFO. We stratified the prairie dog towns by size (0.5-39, 40-299, and >300 square kilometers) and assigned a random identification number within each stratum. All of the prairie dog towns greater than 300 square kilometers (n=40), 42% of the intermediate-sized towns (n=38), and 15% (n=22) of the smallest towns were chosen to be surveyed. This weighted effort toward the larger prairie-dog towns which were most likely to host Burrowing Owls. If during the initial visit determined that burrows did not exist in a given area, the area was eliminated from further surveys. We conducted surveys at historic Burrowing Owls sites and selected prairie dog towns as long as there were burrows present (it was possible for an owl to enter the burrows far enough that they could not be seen). We attempted to complete three visits to all sites, even if owls were detected, to better estimate their numbers and breeding status.

We assigned all survey locations a unique identification number. Historic Burrowing Owl locations begin with the letter M (i.e., M26). Selected prairie dog town were also assigned an identification number. If all burrows present in one survey location could not be seen from the first point, additional point(s) were placed at the location until all burrows in the area could be viewed during a call playback survey. If this occurred, a letter was added to the end of the survey location identification number (i.e., 38A, 38B, etc.) so that each point at a given location had a unique number.

## Protocol

RMBO employed a survey protocol recommended by the Colorado Division of Wildlife (available at [http://www.cde.state.co.us/artemis/nr1\\_2/nr12b942007internet.pdf](http://www.cde.state.co.us/artemis/nr1_2/nr12b942007internet.pdf)). This protocol involved a ten-minute call playback survey technique consisting of the following:

- 3 minutes of silence
- 30 second broadcast of primary call (*coo-coo*)
- 30 seconds of silence
- 30 second broadcast of primary call (*coo-coo*)
- 30 seconds of silence
- 30 second broadcast of alarm call (*quick-quick-quick*)
- 30 seconds of silence
- 4 minutes of silence

During the survey, we recorded geographic location information, an estimation of ground cover (shrubs, grass, and bare), shrub and grass height, the number of owls detected (and age class of each if possible), and information about habitat conditions. We estimated and recorded the number of prairie dogs and prairie dog burrows on a six point scale of abundance (0; 1-10; 10-25; 25-50; 50-100; >100). We also recorded types of disturbances and alterations of the area being surveyed (i.e., oil and gas development, off-road vehicle use, etc.). Because Burrowing Owls return to western Colorado in late March to early April, we waited until mid-April to begin surveys in order to minimize detections of owls migrating through the area.

We recorded observations of other species of interest, including Ferruginous Hawk, Long-billed Curlew and Loggerhead Shrike (as requested by the BLM) and a selection of Species of Greatest Conservation Need (as listed by the CDOW), such as Northern Harrier, Swainson's Hawk, Golden Eagle, Prairie Falcon, Pinyon Jay, and Sage Sparrow. All other diurnal raptors were recorded (except American Kestrel).

## Results

RMBO attempted to visit all historic Burrowing Owl locations and randomly chosen prairie dog towns in Mesa County. Many of these locations (n=34) there were no burrows available because the site had been developed, was inaccessible, or could not be located. Directions to several of the historic locations were inaccurate and, in some instances, this kept us from visiting these areas. We were able to survey 99 locations for Burrowing Owls between 14 April and 17 June. We conducted surveys at 40 of the 74 known historic Burrowing Owl locations and 59 of the 100 randomly chosen prairie dog towns. These 99 survey locations represent 153 survey points (57 at historic owl locations and 96 at chosen prairie dog towns). We conducted surveys at 119 points on lands managed by the GJFO and 34 points on private property in Mesa County (Appendix C). We completed three visits to 149 (97%) of the 153 surveys points, resulting in 445 tape-playback surveys conducted during the course of the season.

We detected Burrowing Owls at 34 locations during surveys (Appendix D). Twenty-seven of the locations with owls were on lands managed by the BLM and seven were on privately owned tracts. We observed fifty adult Burrowing Owls at these 34 locations and eleven juveniles at three of these locations (189, 357E. and M26). For comparison, in 2002 owls were found at eight locations in Mesa County and 25 adult and five juvenile Burrowing Owls were counted. Owls were detected during both 2002 and 2008 inventories at two locations, M1 and M33.

During surveys, we detected six species of diurnal raptors: Northern Harrier (n=24), Swainson's Hawk (n=2), Red-tailed Hawk (n=16), Ferruginous Hawk (n=1), Golden Eagle (n=31), and Prairie Falcon (n=4) (Appendix E). We also recorded detections of five species of special interest during surveys: Long-billed Curlew (n=3), Loggerhead Shrike (n=45), Pinyon Jay (n=6), Sage Sparrow (n=2), and Scott's Oriole (n=1) (Appendix E). Reports of Longnosed Leopard Lizards (n=2) were also recorded on lands managed by the GJFO (Appendix E).

## Discussion and Recommendations

The methodology used during this survey was effective at locating Burrowing Owls. Repeated visits to each site revealed that we detected owls at 47-79% of the 34 occupied sites each visit. If repeat visits had not been conducted, we would not have located Burrowing Owls at eleven (32%) of the occupied locations. We collected data using an occupancy modeling sampling design, but were unable to conduct rigorous analysis under this framework due to limited funding.

The success of the inventory this year suggests that the Burrowing Owl populations were especially low in 2002 (perhaps due to drought), that the population is undergoing an increasing trend, or that the birds were especially numerous this year. During the 2008 breeding season, RMBO received several incidental reports of Burrowing Owls from other counties (outside of the GJFO management area) in western Colorado which suggests that 2008 was an especially good year for the species in western Colorado. Little is known about the cyclic patterns of occupancy of Burrowing Owls in western Colorado. Repeating surveys annually (or at least biannually) would provide insight into this matter.

In order to conserve populations of Burrowing Owls on lands managed by the GJFO it will be necessary to preserve and manage some locations specifically for Burrowing Owls. We recommend setting aside all of the areas where owls were found in 2008 with a buffer zone around the occupied prairie dogs towns so that both species have an increased chance of survival. If this is not possible, then we feel that at least the two locations (M1 and M33) where owls were located during both 2002 and 2008 surveys should be preserved with buffer zones surrounding the active prairie dog towns being used by the owls. There is no established method for conserving white-tailed prairie dogs and one of the greatest threats that they face, disease, is out of the control of land managers. However, setting aside several areas where white-tailed prairie dogs are a protected species would provide habitat for Burrowing Owls.

The BLM may also want to consider an artificial burrow project to provide potential breeding areas for Burrowing Owls. This technique has been demonstrated to work in other locations in the western United States. It is important to note that this project works well in locations where development has already taken place, such as many of the lands managed by the GJFO near the expanding city of Grand Junction (Clark 2001).

## Literature Cited

- Butts, K. O. 1982. The importance of prairie dog towns to Burrowing Owls in Oklahoma. *Proceedings of the Oklahoma Academy of Science* 62:46-52.
- Butts, K. O. 1973. Life history and habitat requirements of Burrowing Owls in western Oklahoma. M.S. thesis. Oklahoma State University, Stillwater, Oklahoma. 188 pages.
- Clark, G. 2001. Burrowing Owl Artificial Nest Box Project. [http://mirror-pole.com/burr\\_owl/bur\\_owl1.htm](http://mirror-pole.com/burr_owl/bur_owl1.htm).
- Desmond, M. J., and J. A. Savidge. 1996. Factors influencing Burrowing Owl (*Speotyto cunicularia*) nest densities and numbers in western Nebraska. *American Midland Naturalist* 136:143-148.
- Desmond, M. J., and J. A. Savidge. 1999. Satellite burrow use by Burrowing Owl chicks and its influence on nest fate. *In* P. D. Vickery and J. R. Herkert, *Ecology and conservation of grassland birds in the western hemisphere*. *Studies in Avian Biology* 19.
- Galyean K. C. 1977. Burrowing Owl Inventory. Unpublished Report. Bureau of Land Management, Grand Junction and Uncompahgre Basin Field Office.
- Grant, R. A. 1965. The Burrowing Owl in Minnesota. *Loon* 37:2-17.
- Haug, E., and L. W. Oliphant. 1990. Movements, activity patterns, and habitat use of Burrowing Owls in Saskatchewan. *Journal of Wildlife Management* 54:27-35.
- Jones, S. R. Burrowing Owl. 1998. *In* Colorado Breeding Bird Atlas. Kingery, H.E. ed. Colorado Bird Atlas Partnership.
- Levad, R. and K. Potter. 2002. An Inventory of Western Burrowing Owls (*Speotyto cunicularia hypugea*) in Western Colorado. Unpublished Report. Rocky Mountain Bird Observatory.
- MacCracken, J. G., D. W. Uresk, and R. M. Hansen. 1984. Burrowing Owl nesting habitat use in Conata Basin, South Dakota. Abstracts of the Society for Range Management 37<sup>th</sup> Annual Meeting, Rapid City, South Dakota.
- Stockrahm, D. M. B. 1995. Distribution of the Burrowing Owl (*Athene cunicularia*) in Billings County, North Dakota. Unpublished Report. Moorhead State University, Moorhead, Minnesota.
- Toombs, T. P. 1997. Burrowing Owl nest-site selection in relation to soil texture and prairie dog colony attributes. M.S. Thesis. Colorado State University, Fort Collins, Colorado. 73 pages.
- VerCauteren, T. L., S. W. Gillihan, and S. W. Hutchings. 2001. Distribution of Burrowing Owls on public and private lands in Colorado. *Journal of Raptor Research* 35(4):357-361.

Appendix A. List of Historic Burrowing Owl sites, location, ownership, and survey status in 2008.

Survey Site	Zone <sup>1</sup>	Easting	Northing	Ownership	Surveyed in 2008
M1	12	672266	4345767	Private	YES
M2	12	672430	4346000	BLM	No burrows present
M3	12	675750	4351000	BLM	YES
M4	12	676000	4360200	BLM	No burrows present
M5	12	676057	4353703	BLM	No burrows present
M6	12	676902	4346214	BLM	No burrows present
M7	12	680000	4343300	BLM	YES
M8	12	680200	4358900	BLM	No burrows present
M9	12	684915	4342081	Private	YES
M10	12	680850	4362250	BLM	YES
M11	12	685650	4348200	Private	YES
M12	12	682250	4357600	BLM	YES
M13	12	684250	4356000	BLM	YES
M14	12	686000	4349500	Private	YES
M15	12	687050	4343100	Private	YES
M16	12	696700	4339750	Private	YES
M17	12	687100	4342650	Private	No burrows present
M18	12	687700	4340350	Private	No burrows present
M19	12	687800	4357750	Private	YES
M20	12	688330	4348686	Private	YES
M21	12	688500	4343100	Private	No burrows present
M22	12	688950	4348350	Private	No burrows present
M23	12	689500	4340600	Private	No burrows present
M24	12	690085	4342000	Private	YES
M25	12	694050	4341750	Private	YES
M26	12	694600	4351400	Private	YES
M27	12	695950	4355800	Private	YES
M28	12	697140	4348506	BLM	YES
M29	12	697399	4346706	BLM	YES
M30	12	698150	4337600	Private	No burrows present
M31	12	699400	4346550	Private	YES
M32	12	701053	4351338	BLM	YES
M33	12	701167	4343128	BLM	No burrows present
M34	12	701200	4337300	Private	YES
M35	12	701750	4332700	Private	YES
M36	12	702950	4332200	Private	No burrows present
M37	12	697370	4338800	Private	No burrows present
M38	12	704500	4332000	Private	YES
M39	12	704900	4346700	BLM	YES
M40	12	704900	4345400	BLM	YES
M41	12	705100	4332500	Private	YES
M42	12	705400	4347400	BLM	No burrows present
M43	12	706100	4330300	Private	YES
M44	12	707800	4338450	BLM	YES
M45	12	708100	4339450	BLM	YES
M46	12	708275	4346980	BLM	YES

Survey Site	Zone <sup>1</sup>	Easting	Northing	Ownership	Surveyed in 2008
M47	12	708500	4346965	BLM	YES
M48	12	708840	4329770	Private	No burrows present
M49	12	710450	4340250	BLM	No burrows present
M50	12	710600	4340000	BLM	No burrows present
M51	12	711400	4341100	BLM	No burrows present
M52	12	711500	4343000	BLM	YES
M53	12	711500	4334850	BLM	No burrows present
M54	12	712000	4336700	BLM	No burrows present
M55	12	675687	4353718	BLM	No burrows present
M56	12	712350	4333750	Private	YES
M57	12	712789	4337011	BLM	No burrows present
M58	12	713900	4332740	Private	No burrows present
M59	12	714530	4339540	Private	YES
M60	12	714650	4329500	Private	No burrows present
M61	12	686000	4340000	BLM	No burrows present
M62	12	715310	4333800	BLM	YES
M63	12	715619	4333753	BLM	YES
M64	12	725301	4317396	Private	No burrows present
M65	12	729050	4307804	BLM	No burrows present
M66	12	729700	4306750	Private	YES
M67	12	730200	4329250	Private	No burrows present
M68	12	730918	4310790	BLM	No burrows present
M69	12	734500	4311500	BLM	No burrows present
M70	12	741968	4296194	BLM	No burrows present
M71	12	731950	4306800	Private	No burrows present
M72	12	715900	4321000	BLM	No burrows present
M73	12	723000	4319000	Private	No burrows present
M74	12	723300	4324000	Private	No burrows present

<sup>1</sup>All UTM coordinates are in NAD 83 projection

Appendix B. List of randomly selected prairie dog town, number of points, stratum, location, and 2008 survey status.

Survey Site	Number of Points	Stratum <sup>1</sup>	Zone <sup>2</sup>	Easting	Northing	Surveyed in 2008
24		2	12	727571	4314790	No burrows present
25		2	12	730131	4311255	No burrows present
27	1	2	12	676384	4346034	YES
32		1	12	717797	4320101	No burrows present
33		1	12	719169	4320063	No burrows present
34	1	1	12	690538	4351083	YES
35		1	12	729285	4308378	No burrows present
36	2	1	12	692234	4352727	YES
37		1	12	688666	4349648	No burrows present
38	3	1	12	690202	4354868	YES
39		1	12	699032	4294451	No burrows present
40	2	2	12	699569	4349312	YES
41	1	2	12	698788	4347563	YES
49	1	2	12	712077	4343386	YES
52		1	12	703291	4343352	No burrows present
56	1	3	12	679761	4343694	YES
60		3	12	738322	4308311	No burrows present
61		3	12	732410	4305156	No burrows present
63	1	2	12	728626	4308247	YES
65	1	1	12	731106	4305520	YES
66		1	12	732521	4304230	No burrows present
67		2	12	733701	4305186	No burrows present
69		1	12	734373	4305621	No burrows present
70		2	12	735250	4305594	No burrows present
74		2	12	733761	4304237	No burrows present
78		1	12	726381	4319628	No burrows present
81	1	1	12	689575	4355904	YES
82		1	12	732179	4308792	No burrows present
83	10	1	12	685727	4341114	YES
86	1	3	12	695997	4353533	YES
88	1	3	12	711454	4343550	YES
89		1	12	672382	4346839	No burrows present
98	1	2	12	675662	4353826	YES
161		3	12	732322	4306831	No burrows present
182	2	2	12	684230	4356912	YES
183	2	2	12	698553	4349908	YES
184	1	2	12	696723	4348766	YES
185		2	12	729466	4311252	No burrows present
186	2	2	12	706034	4343909	YES
187		2	12	724409	4319665	No burrows present
188		2	12	730037	4329840	No burrows present
189	1	2	12	696022	4352892	YES
190	3	2	12	707527	4340712	YES
191	1	2	12	730392	4304947	YES
192		1	12	688453	4356658	No burrows present
206		3	12	728812	4310849	No burrows present



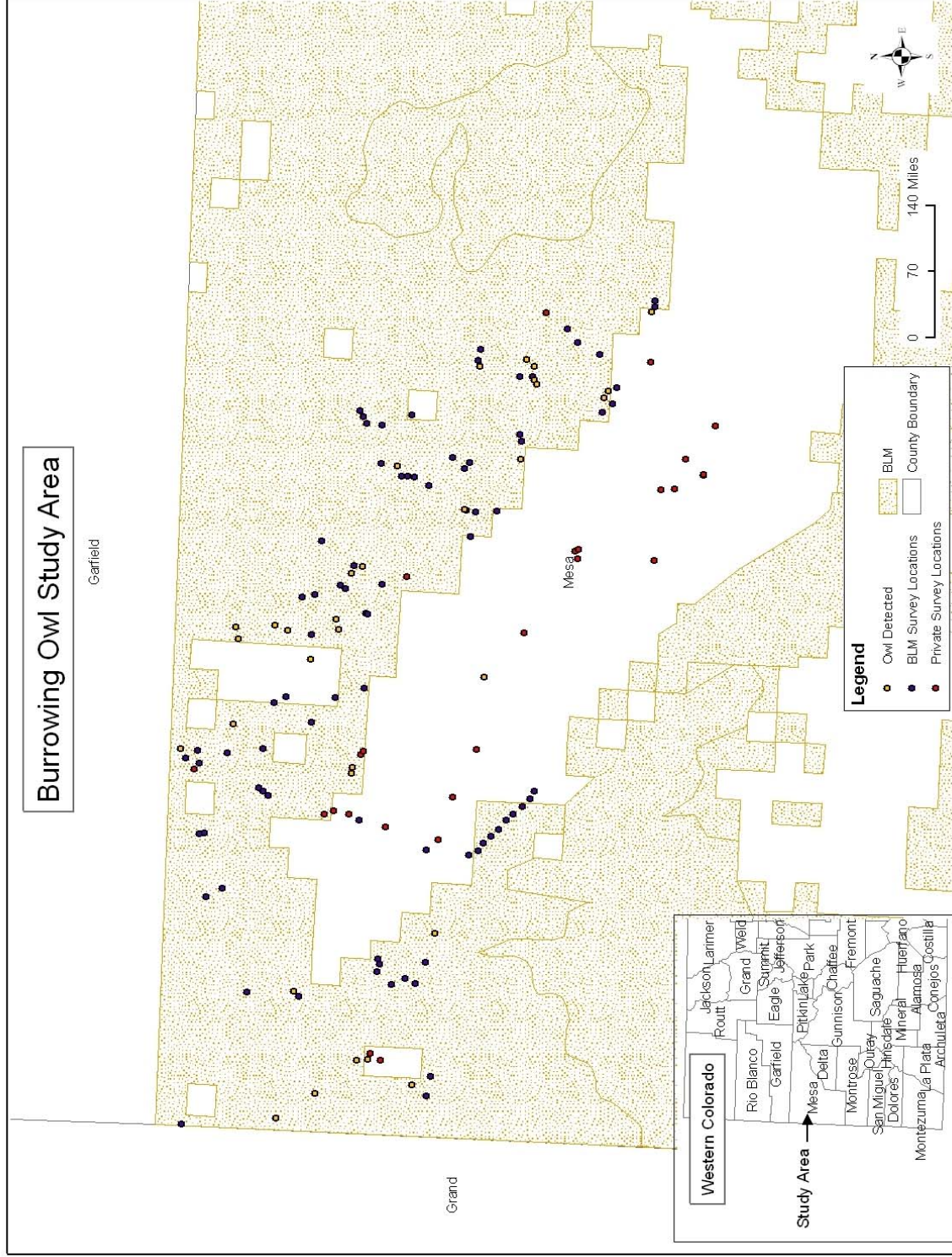
Survey Site	Number of Points	Stratum <sup>1</sup>	Zone <sup>2</sup>	Easting	Northing	Surveyed in 2008
208		2	12	736402	4305218	No burrows present
214	3	2	12	677207	4346774	YES
216	1	1	12	728264	4310249	YES
217	1	1	12	695246	4355718	YES
218		1	12	727960	4328543	No burrows present
219		1	12	732294	4317638	No burrows present
225	1	2	12	692590	4348506	YES
226	1	3	12	692480	4349944	YES
231	1	2	12	697854	4352134	YES
232	1	3	12	698060	4351838	YES
235	1	2	12	695975	4351903	YES
236	1	2	12	696287	4350265	YES
237	2	1	12	696716	4350219	YES
239	1	3	12	697998	4349429	YES
240		3	12	697869	4349042	No burrows present
246		2	12	699278	4350211	No burrows present
247	1	2	12	705495	4348305	YES
248	2	1	12	704901	4347084	YES
249	1	2	12	670221	4350189	YES
252	1	2	12	673622	4345658	YES
253	1	3	12	671101	4344238	YES
254	1	2	12	671446	4343741	YES
257	1	2	12	678351	4344037	YES
259	2	1	12	676669	4344886	YES
269	1	1	12	675970	4351401	YES
272	1	1	12	677698	4358996	YES
273	2	1	12	689141	4359057	YES
274	2	1	12	701810	4343050	YES
275	1	2	12	670397	4343036	YES
279	1	3	12	668829	4351713	YES
284	1	2	12	711249	4343272	YES
287		2	12	705450	4347820	No burrows present
292		3	12	700257	4350147	No burrows present
293		3	12	736470	4306445	No burrows present
327	1	3	12	668093	4356947	YES
328		3	12	730527	4311101	No burrows present
329	1	3	12	686947	4354150	YES
331		3	12	733462	4309503	No burrows present
333		3	12	698720	4350636	No burrows present
334	1	3	12	705705	4344533	YES
338		3	12	733830	4306788	No burrows present
345		1	12	730049	4329118	No burrows present
346		1	12	735610	4313471	No burrows present
347	2	1	12	686357	4353349	YES
348		1	12	695927	4355049	No burrows present
349		1	12	734818	4311209	No burrows present
351	2	1	12	688608	4357536	YES
353		2	12	733932	4306402	No burrows present
357	5	1	12	710626	4335438	YES
361	1	2	12	713753	4338622	YES

Survey Site	Number of Points	Stratum <sup>1</sup>	Zone <sup>2</sup>	Easting	Northing	Surveyed in 2008
362	5	1	12	710785	4340825	YES
365	1	1	12	715110	4333662	YES
367	2	1	12	711527	4340137	YES
368	2	1	12	712440	4336999	YES

<sup>1</sup>1=large prairie dog towns, 2=medium size prairie dog towns, and 3=small prairie dog towns

<sup>2</sup>All UTM coordinates are in NAD 83 projection

Appendix C. Map showing all locations surveyed in 2008.



Appendix D. Number of adult and juvenile owls recorded, land ownership, dates and location information for survey locations with detections of Burrowing Owls, summer 2008.

Survey Site <sup>1</sup>	Count:		Management:		Detection Recorded:			Zone <sup>3</sup>	Location:	
	Adults	Juveniles	BLM	Private	1st Visit	2nd Visit	3rd Visit		Easting	Northing
38D	2		X		11-May	20-May	10-Jun	12	690513	4355583
40A	2		X		25-Apr	17-May	4-Jun	12	699350	4349520
40B	1		X			26-May	4-Jun	12	699770	4348947
56	1		X			11-May	29-May	12	679612	4343568
86	2		X				9-Jun	12	696190	4353620
189	2	5	X				9-Jun	12	695954	4352890
190C	1		X		2-May	18-May	4-Jun	12	706335	4340555
217	1		X			27-May	9-Jun	12	695291	4355585
236	1		X		26-Apr			12	696170	4350038
237A	1		X			17-May		12	696716	4350219
249	1		X			10-May		12	670260	4349670
253	1		X			10-May	10-Jun	12	671130	4344263
269	2		X		4-May	28-May	13-Jun	12	675880	4351212
272	2		X		26-Apr	11-May	29-May	12	677948	4358870
273B	1		X				30-May	12	688950	4358415
274B	1		X			27-May	12-Jun	12	703333	4343480
279	1		X			10-May		12	668782	4351747
284	3		X		27-Apr	18-May	3-Jun	12	711305	4343137
357C	2		X		17-Apr	19-May	3-Jun	12	710016	4336135
357E	3	3	X		19-May	3-Jun	13-Jun	12	710410	4335916
362B	2		X		14-Apr	18-May	3-Jun	12	710780	4340080
362C	1		X				3-Jun	12	710540	4339906
365	2		X		8-May		2-Jun	12	714987	4333768
367A	1		X		28-Apr	18-May	3-Jun	12	711527	4340137
367B	1		X				3-Jun	12	711877	4340550
M1A	1			X	15-Apr	10-May	28-May	12	672382	4346839
M1D	1			X	14-Apr		28-May	12	672300	4347460
M20A	1			X			11-Jun	12	688227	4348815
M20B	1			X		19-May	11-Jun	12	688540	4348785
M25	1			X			11-Jun	12	694050	4341750
M26	2	3		X		20-May	9-Jun	12	694426	4351482
M27	2			X		27-May		12	695950	4355800
M33	1		X		4-May	X <sup>2</sup>	X <sup>2</sup>	12	701145	4340410
M42	2		X		19-Apr	5-May		12	705490	4347380

<sup>1</sup>Survey sites beginning with M are historic Burrowing Owl locations

<sup>2</sup>Site M33 was visited once

<sup>3</sup>All UTM coordinates are in NAD 83 projection

Appendix E. Location, date, and number of each species of interest recorded during Burrowing Owl surveys, summer 2008.

Birds:	Survey Site	Date	Number	Zone <sup>1</sup>	Easting	Northing
Northern Harrier	27	12-May	1	12	676633	4345796
	36B	3-May	1	12	691862	4353354
	38D	11-May	1	12	690513	4355583
	56	11-May	1	12	679612	4343568
	83D	14-Jun	1	12	685250	4340800
	83E	14-Jun	1	12	685660	4340390
	182A	29-May	1	12	684370	4356750
	182B	29-May	1	12	684278	4357040
	248B	17-May	1	12	704937	4347115
	236	9-Jun	1	12	696170	4350038
	252	29-May	1	12	623804	4345696
	252	29-May	1	12	623804	4345696
	272	11-May	1	12	677948	4358870
	274B	12-Jun	1	12	703333	4343480
	334	4-Jun	1	12	706157	4344334
	351B	30-May	1	12	688920	4357455
	362A	18-Apr	1	12	710950	4340167
	368A	8-May	1	12	713001	4337794
	M7	11-May	1	12	685650	4348200
	M40	12-Jun	1	12	704520	4345550
M40	12-Jun	1	12	704520	4345550	
Swainson's Hawk	34	8-May	1	12	690895	4351207
	235	17-May	1	12	695785	4351553
Red-tailed Hawk	38D	11-May	1	12	690513	4355583
	41	4-Jun	1	12	698846	4347807
	184	9-May	1	12	697162	4348562
	231	22-May	1	12	697814	4352208
	257	27-Apr	1	12	677988	4344001
	274B	27-May	1	12	703333	4343480
	M11	23-May	1	12	685382	4346685
	M13	29-May	1	12	684250	4344356
	M16	9-May	1	12	696657	4339691
	M38B	26-May	1	12	705233	4331851
	M43A	28-Apr	2	12	706100	4330300
	M43B	28-Apr	2	12	706123	4330278
Ferruginous Hawk	M14B	23-May	1	12	685936	4348773
Golden Eagle	81	11-May	1	12	688881	4355782
	86	26-Apr	1	12	696190	4353620
	182A	29-May	1	12	684370	4356750
	184	4-Jun	1	12	697162	4348562
	235	26-Apr	1	12	695785	4351553
	235	9-Jun	1	12	695785	4351553
	236	9-Jun	1	12	696170	4350038
	252	10-May	1	12	623804	4345696
	252	29-May	1	12	623804	4345696
	257	27-Apr	1	12	677988	4344001
	259A	27-Apr	1	12	677006	4345036

Birds:	Survey Site	Date	Number	Zone <sup>1</sup>	Easting	Northing
	259B	27-Apr	1	12	676747	4344490
	275	23-Apr	0	12	670534	4343438
	327	28-May	1	12	668096	4356947
	334	4-Jun	1	12	706157	4344334
	351A	30-May	1	12	688225	4357290
	351B	11-May	2	12	688920	4357455
	351B	30-May	1	12	688920	4357455
	361	8-May	1	12	713736	4338392
	M10A	13-Jun	1	12	680813	4356446
	M10B	4-May	1	12	681335	4355588
	M10B	28-May	1	12	681335	4355588
	M10B	13-Jun	1	12	681335	4355588
	M13	11-May	1	12	684250	4344356
Prairie Falcon	351B	11-May	2	12	688920	4357455
	357A	3-Jun	1	12	710626	4335438
	M62	28-Apr	1	12	715302	4333600
Long-billed Curlew	362B	14-Apr	1	12	710780	4340080
	M39	5-May	1	12	704935	4346750
Loggerhead Shrike	36B	20-May	1	12	691862	4353354
	38D	11-May	1	12	690513	4355583
	40A	25-Apr	1	12	699350	4349520
	40B	26-May	1	12	699770	4348947
	81	11-May	2	12	688881	4355782
	81	19-May	1	12	688881	4355782
	81	9-Jun	2	12	688881	4355782
	86	26-Apr	1	12	696190	4353620
	98	28-May	1	12	675662	4353826
	183A	8-Jun	1	12	698480	4349810
	183B	8-Jun	1	12	698655	4350116
	186A	3-May	1	12	705925	4343356
	186A	17-May	1	12	705925	4343356
	186B	3-May	1	12	705594	4343647
	190C	18-May	1	12	706335	4340555
	225	8-May	1	12	693015	4348406
	231	9-May	1	12	697814	4352208
	231	4-Jun	1	12	697814	4352208
	232	9-May	1	12	698029	4351491
	252	29-May	1	12	623804	4345696
	327	28-May	1	12	668096	4356947
	351A	30-May	1	12	688225	4357290
	M14C	23-May	1	12	685825	4350155
	M19	30-May	1	12	687877	4357550
	M27	24-Apr	1	12	695950	4355800
	M27	9-Jun	2	12	695950	4355800
	M31	4-Jun	1	12	699361	4346464
	M31	4-Jun	1	12	699361	4346464
	M40	12-Jun	1	12	704520	4345550
	M45B	2-May	2	12	708425	4349676
	M45C	18-May	2	12	707713	4349240
Pinyon Jay	83A	24-Apr	1	12	684090	4341980

Birds:	Survey Site	Date	Number	Zone <sup>1</sup>	Easting	Northing
	327	10-May	1	12	668096	4356947
	M12	11-May	1	12	682250	435786
	M45B	19-May	3	12	708425	4349676
Sage Sparrow	49	27-Apr	2	12	712295	4343185
Scott's Oriole	247	17-May	1	12	705580	4348303

Reptile:	Survey Site	Date	Number	Zone	Easting	Northing
Longnosed Leopard Lizard	N/A <sup>2</sup>	7-May	1	12	671133	4337545
	N/A <sup>2</sup>	8-May	1	12	671319	4338056

<sup>1</sup>All UTM coordinates are in NAD 83 projection

<sup>2</sup>Not found at survey sites