Section-based Monitoring of Breeding Birds within the Shortgrass Prairie Bird Conservation Region (BCR 18)

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Prepared by:
David J. Hanni and Megan McLachlan
Rocky Mountain Bird Observatory
14500 Lark Bunting Lane
Brighton, CO 80603
Ph. (303) 659-4348
david.hanni@rmbo.org
megan.mclachlan@rmbo.org

In cooperation with:
Colorado Division of Wildlife
Kansas Department of Wildlife and Parks
Nebraska Game and Parks Commission
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Executive Summary

In 2003, Rocky Mountain Bird Observatory (RMBO) implemented a grassland bird monitoring program within the shortgrass prairie regions of five western states (Nebraska, Colorado, Kansas, New Mexico, and Oklahoma) and three National Grasslands (Comanche, Kiowa, and Rita Blanca). The objective of this program is to monitor population trends and distributions of grassland birds within the Shortgrass Prairie Bird Conservation Region (BCR 18) using section-based surveys. A section ($1mi^2$) is the basic land management unit of the prairie. The section-based survey was determined to be the most efficient and effective method for surveying and monitoring grassland birds (Hanni 2002).

RMBO surveyed 2,992 sections within BCR 18, 16 May – 3 July 2003. Sections were stratified by habitat then randomly selected for survey in proportion to habitat acreage on the landscape – 2,309 sections of native prairie habitat, 614 of dryland agriculture habitat, and 69 of land in CRP. We observed 133 bird species. Included are 40 species of concern, as recognized by Partners In Flight (2004) and/or the participating state and federal agencies. We calculated density estimates for 46 species, stratified by management unit, habitat type, and percent shrub cover. Included among these monitored species are 23 species of concern, as recognized by Partners In Flight (2004) and/or the participating state and federal agencies. Of the 46, 37 species' highest densities occurred in native prairie habitat, 10 in dryland agriculture habitat, and 1 in land in CRP. We present distribution and index of abundance maps for 71 species.

Introduction

The shortgrass prairie is a unique ecosystem that is increasingly a topic of conservation discussion. Grassland birds have experienced steeper, more consistent, and geographically more widespread declines than any other guild of North American avian species (Sampson and Knopf 1996). Several species found in this ecosystem are endemic (found nowhere else) or are closely associated with the Great Plains grasslands (Mengel 1970).

Some managers have relied on data derived from the Breeding Bird Survey (BBS), currently the most extensive bird-monitoring program in the U.S., to monitor bird populations (Robbins et al. 1989, Sauer 1993). The BBS, operational in the Great Plains since 1967, uses volunteers to conduct roadside surveys of birds across North America and produces indices of population abundance at the continental scale for many common bird species (Robbins et al. 1989). BBS data and analyses are relatively inexpensive and have proven to be a valuable source of information on bird population trends. BBS data can be used to produce continental-scale relative abundance maps. These maps provide a reasonably good indication of the relative abundances of species that are well sampled by the BBS. However, many species and habitats are inadequately sampled by the BBS (Robbins et al. 1993, Sauer 1993), and BBS data do not reliably predict population trends at small geographic scales such as a National Grassland, states, or even larger ecoregions (i.e., BCRs) (Sauer 2000). According to the Partners In Flight, 85% of upland species breeding in the Shortgrass Prairie Bird Conservation Region (BCR 18) lack sufficient data to address current population trends (2004). For these and other reasons, BBS data are generally insufficient to guide local and regional management decisions.

In response to this need, RMBO, in cooperation with the Colorado Division of Wildlife (CDOW), assessed field techniques in 2001 to determine which was most efficient for monitoring shortgrass prairie birds. We evaluated four techniques that were randomly allocated across the shortgrass prairie of Colorado: 1) section-based point counts, conducted at the section level from roads (n = 1,237 sections); 2) interior line transects, conducted at the section level away from roads (n = 48 sections); 3) Monitoring Colorado's Birds (MCB) point transects, conducted irrespective of sections and roads (n = 22 point transects); and 4) 30-mile driving line transects, conducted along roads, through all habitat types in Colorado (n = 87 line transects). We used program DISTANCE to estimate bird densities using each of the four techniques. The results suggested that the section-based point count technique was the most efficient in monitoring birds in the shortgrass prairie (Hanni 2002). Hereafter, we refer to this technique as section-based surveys.

The section-based survey technique was designed using the basic land management unit of the prairie, the $1mi^2$ section, hence the name 'section-based survey.' Section-based surveys provide data that can be used to: 1) monitor bird population trends and changes in distributions of individual species; 2) relate vegetation characteristics and management practices to bird communities; and 3) determine geographic areas in which to focus conservation efforts.

What makes section-based surveys unique from other bird monitoring techniques is its efficiency and effectiveness in data collection. Efficiency is achieved by conducting the fewest number of surveys per section needed to maximize the number of species detected (Hanni 2001). The efficiency, in turn, increases observer coverage of the study area and increases statistical power

of analysis, while maintaining the lowest possible cost. Effectiveness is achieved in its ability to potentially detect population trends for 46 upland breeding species in BCR 18 within 5 - 24 years (CV = 3%, 41%, respectively). Included among these monitored species are 23 species of concern, as recognized by Partners In Flight (2004) and/or the participating state and federal agencies. Other possible advantages of RMBO's grassland bird monitoring program include: 1) sections are stratified by habitat type and surveyed in proportion to their acreage on the landscape; 2) sections are surveyed irrespective of landownership; and 3) data can be analyzed at a variety of scales such as county, state, National Grassland, or BCR.

The results of the 2003 section-based surveys are reported in this document. Results are presented for BCR 18 as well as each management unit participating the RMBO's grassland bird monitoring program including five states (Nebraska, Colorado, Kansas, New Mexico, and Oklahoma) and three National Grasslands (Comanche, Kiowa, and Rita Blanca). This report is intended to provide natural resource managers with information on grassland bird populations on both local and regional scales. Such knowledge can assist managers in making effective land management decisions regarding conservation of grassland birds and their habitat. Participating agencies include Nebraska Parks and Wildlife, Colorado Division of Wildlife, Kansas Department of Wildlife and Parks, New Mexico Department of Game and Fish, Oklahoma Wildlife Commission, and USDA US Forest Service.

Bird taxonomy and nomenclature in this report follow that of The American Ornithologists' Union (1998, 2002).

Methods

Study Area

We conducted section-based surveys within the BCR 18 portions of Nebraska, Colorado, Kansas, New Mexico, and Oklahoma and on Comanche, Kiowa, and Rita Blanca National Grasslands (Fig. 1). This arid region receives 300 - 500 mm of precipitation per year (Lauenroth 1992). Habitats surveyed include native shortgrass prairie, dryland agriculture, and land in the Conservation Reserve Program (CRP). Native shortgrass prairie habitat is characterized by two dominant grass species, buffalo grass (*Buchloe dactyloides*) and blue grama (*Bouteloua gracilis*). Dryland agriculture habitat includes non-irrigated field crops such as wheat, hay, and sorghum, or fallow fields. Land in CRP was once in agricultural production but now is planted with cover, native or non-native, to improve water quality and wildlife habitat, and control soil erosion.

Section Selection

The Public Land Survey System (PLSS) defines sections as 1-mi^2 parcels of land. Prior to the commencement of the project, we used GIS to randomly select homogenous sections (600 - 700 acres) of native prairie and dryland agriculture that lie adjacent to at least one road. Sections of were then randomly selected for survey in proportion to habitat acreage in the BCR 18 region of each state. Additional native prairie sections were randomly selected for survey on the National Grasslands to ensure adequate sample size. If during the field season, a section was determined not to be a designated habitat type, then it was replaced with the closest qualifying section in a randomly selected direction. A GIS layer of CRP coverage is not available in most counties with

the exception of Weld County, Colorado, so most CRP sections were identified on the ground and surveyed in replacement of non-qualifying sections or sections that were incorrectly identified as native prairie or dryland agriculture in the GIS layer. Subsequently, the majority of CRP sections in Colorado are located in Weld County. In 2003, we selected 2,992 sections for survey – 2,309 of native prairie habitat, 614 of dryland agriculture habitat, and 69 of land in CRP (Fig. 2).

Point Count Locations at each Section

At each surveyed section, three road-based point counts were conducted. Three point counts per section maximizes the number of species detected and the number of sections surveyed per day; four counts per section do not yield significantly more species detections per section (Hanni 2002). A point count data collection process, modified from Buckland et al. (1993) and Ralph et al. (1993), was used to establish road-based point count locations. Point count locations were distributed among the roads bordering each section based on the number of roads (Fig. 3). For example, at sections adjacent to only one road, three point counts were conducted from that road. On sections bordered by two roads, two point counts were conducted along one road, and one point count was conducted along the other; the road on which two counts were conducted was randomly selected using a random number table. On sections bordered by three roads, one point count was conducted along each road. Where four roads surrounded the section, one road was randomly selected and eliminated using a random number table, and the section was then treated as a three-road section. Point count locations along each road were determined using a random number table and were recorded using a Garmin *etrex* global positioning system (GPS) unit. All point count locations were at least 0.2 mi apart and 0.1 mi from the section corners.

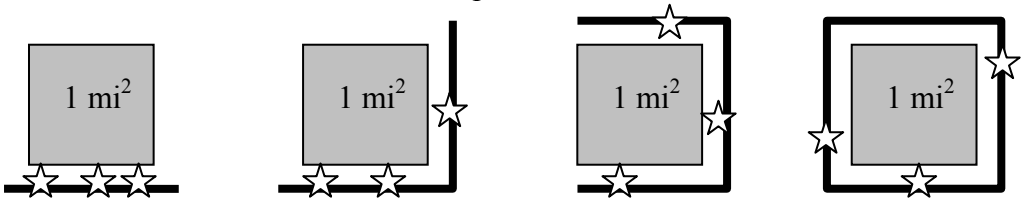

Figure 3. Examples of point count locations (stars) at a surveyed section (1-mi^2). The number of point count locations on each road (black lines) was based on the number of roads adjacent to the section. Locations of point counts along each road were determined using a random number table, spaced at least 0.2 mi apart and 0.1 mi from the section corners.

Data Collection

Observer training was provided by RMBO at the Central Plains Experimental Range near Pawnee National Grassland, Colorado. Observers were trained for three consecutive days via lecture and field practice. By the end of training, all observers were deemed proficient in grassland bird identification (visual and aural), distance estimation with rangefinders, GPS use, mapping skills, methodologies, vegetation identification and classification, and shrub cover estimation. Recordings of the songs and calls of grassland birds were provided to each observer for sharpening bird identification skills after the three-day training period. Observers were provided with a reference guide to percent shrub cover that illustrated examples of actual percent cover for each of the different shrub species to be encountered in the field.

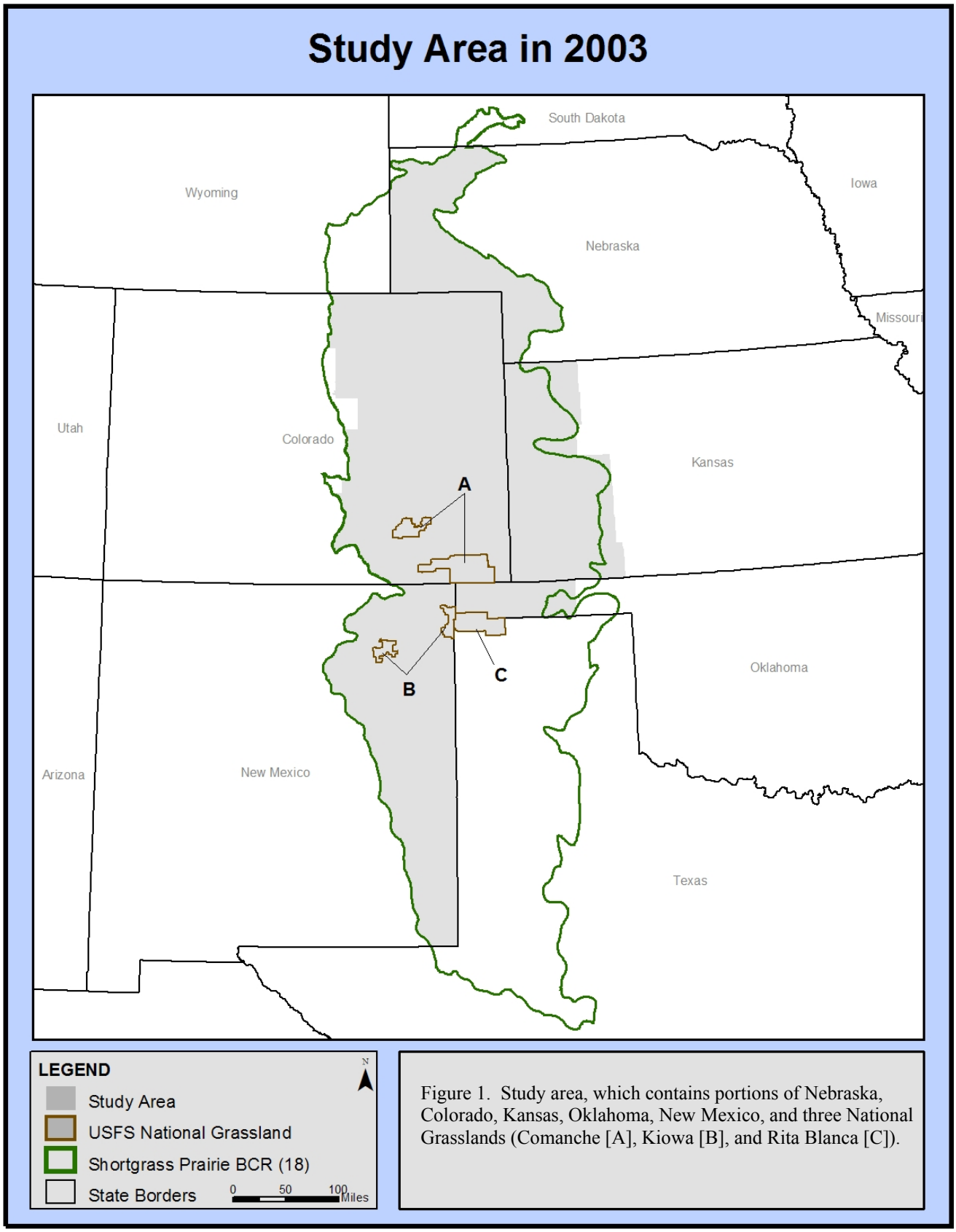

Figure 1. Study area, which contains portions of Nebraska, Colorado, Kansas, Oklahoma, New Mexico, and three National Grasslands (Comanche [A], Kiowa [B], and Rita Blanca [C]).

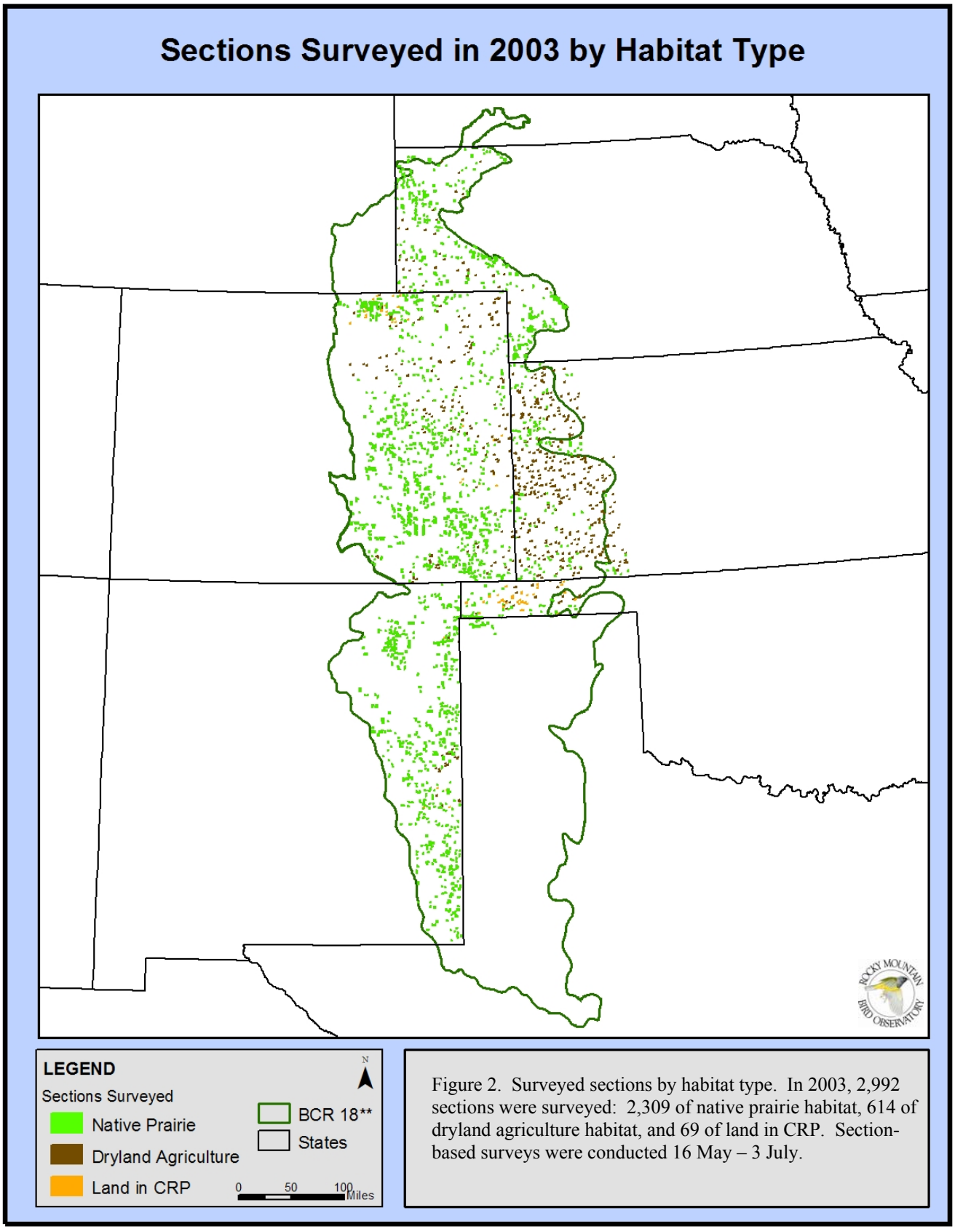

Figure 2. Surveyed sections by habitat type. In 2003, 2,992 sections were surveyed: 2,309 of native prairie habitat, 614 of dryland agriculture habitat, and 69 of land in CRP. Section-based surveys were conducted 16 May – 3 July.

Observers conducted section-based surveys between 16 May and 3 July 2003. We considered arrival and reproductive periods of early and late-breeding bird species in our assumption that the majority of the species were on their breeding territories during this period. All birds detected are not necessarily local breeders. Observers conducted section-based counts from sunrise until no later than 1100 hours when detectable activity typically lessened or ceased. We recorded survey "start" and "end" times. Surveys were not conducted during periods of rain or winds in excess of 18 mph. Observers recorded weather conditions, including cloud cover, wind speed, and temperature. Township, range, and section (TRS) of the surveyed sections were recorded.

For each surveyed section, the observer conducted three 5-minute point counts from the road looking 180° into the section. For each bird seen and/or heard within the section, the observer recorded: species, sex (if known), distance from observer to point of first detection, method of detection (e.g., visually or aurally), and associated habitat (e.g., shrub, ground, or fence). We determined distance using a Bushnell Yardage Pro 500 Rangefinder. Raptors soaring over a section and using the habitat were recorded; however, birds flying over a section were tallied separately.

From each point count location, the observer recorded vegetation characteristics within a 150 m radius semi-circle within the section. Characteristics recorded include grass height, percent shrub cover, shrub species, and dominant shrub species. Grass height was classified as <15 cm or >15 cm (~ankle height). Where both height classifications existed, the proportion of each was recorded. Shrub cover was classified as <1%, 1%-3%, >3%-10%, or >10

All Black-tailed Prairie Dog colonies and playas visible within the section were sketched by the observer onto a data sheet and a map. Colonies, whether occupied or abandoned by prairie dogs, and playas, wet or dry, were searched with binoculars for both Burrowing Owls and Mountain Plovers and their locations were noted on a data sheet. Raptor nests were documented by recording UTM coordinates and by marking the location on a map.

Data Analysis

We used program DISTANCE (Thomas 1998-99) to analyze the point count data. The notation, concepts, and analysis methods of DISTANCE were developed by Buckland et al. (1993). We calculated density estimates (D) for species that had a minimum of 25 observations or had a coefficient of variation (CV) of less than 50%, a level that indicates robust data. No flyover detections were used in the DISTANCE analysis except for raptors and swallows. During analyses, DISTANCE assigns a unique detection function to each species in each stratum, and thereby avoids some potential problems associated with traditional analyses of point count data (e.g., varying detectability among habitats, species, and different years). Analysis using DISTANCE assumes that; 1) all birds at distance zero are detected; 2) distances of the birds close to the points or line are measured accurately; and, 3) birds do not move in response to the observer's presence. We adjusted the sampling effort to 0.5 because birds were recorded in only 180˚of the point count circle, instead of 360˚.

We calculated the index of relative abundance used in the distribution maps using data collected by section-based surveys. The index of abundance, represented by graded map symbols, reflects the average number of birds per point count for each section and was calculated by dividing the

total number of individuals for each species detected on the section by the number of point counts conducted on that section. The index of abundance was created to adjust for effort among years (2001 - 2003). In 2001, observers conducted one to four point counts per section compared to 2002 and 2003 when three point counts were conducted on all sections.

Results

BCR 18

In 2003, we observed a total of 133 bird species (Appendix A) through section-based monitoring conducted in the BCR 18 portions of Nebraska, Colorado, Kansas, New Mexico, and Oklahoma and on Comanche, Kiowa, and Rita Blanca National Grasslands (Fig. 2).

Habitat

We documented 117 species in native prairie habitats, of which 46 (39%) were only found in native habitats. We were able to obtain a sufficient number of observations to estimate density calculate density estimates for 46 species in this habitat type (Table 1). Highest densities for 37 species were found in native prairie habitats when compared to other habitats within BCR 18 (Table 1). We documented 78 species in dryland agriculture habitats. Of those species, 16 had a sufficient number of observations to estimate density across the habitat (Table 2). Highest densities for 10 species (*) occurred in dryland agriculture habitats when compared to other habitats within BCR 18 (Table 2). We documented 43 species on land in CRP. Of those species, seven had a sufficient number of observations to estimate density across the habitat (Table 3). The highest density estimate for one species (*) occurred in CRP when compared to other habitats within BCR 18 (Table 3).

Table 1. Estimated densities for species detected in native prairie habitats within BCR 18.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Ring-necked Pheasant	0.32	0.24	0.44	16%	96	
Scaled Quail*	2.96	2.29	3.84	13%	209	X
Northern Bobwhite*	0.75	0.51	1.11	20%	131	X
Turkey Vulture*	0.14	0.07	0.27	34%	22	
Red-tailed Hawk*	0.17	0.10	0.28	26%	26	
Swainson's Hawk*	0.41	0.30	0.46	17%	160	X
Ferruginous Hawk*	0.07	0.04	0.12	30%	28	X
American Kestrel*	0.23	0.11	0.45	36%	20	
Killdeer	1.95	1.53	2.49	12%	152	
Upland Sandpiper*	0.10	0.04	0.21	41%	17	X
Long-billed Curlew*	0.66	0.41	1.06	25%	57	X
Mourning Dove	24.74	22.43	27.29	5%	1683	
Burrowing Owl*	1.17	0.82	1.67	18%	123	X
Common Nighthawk*	0.78	0.51	1.17	21%	46	
Say's Phoebe*	0.63	0.45	0.88	17%	67	X
Ash-throated Flycatcher*	2.52	1.49	4.25	27%	33	
Cassin's Kingbird*	1.09	0.60	1.97	31%	43	X
Western Kingbird*	19.03	16.85	21.49	6%	1183	
Eastern Kingbird*	1.14	0.82	1.59	17%	79	
Scissor-tailed Flycatcher*	1.38	0.86	2.22	24%	60	X

Species (cont.)	D	D LCL	D UCL	D CV	*n*	Species of Concern
Loggerhead Shrike*	2.79	2.07	3.75	15%	158	X
Chihuahuan Raven*	0.87	0.64	1.18	15%	178	X
Horned Lark	113.63	106.12	121.67	3%	5999	X
Cliff Swallow*	16.17	11.90	21.97	16%	884	
Barn Swallow*	8.76	6.70	11.47	14%	233	
Cactus Wren*	0.24	0.14	0.41	27%	26	
American Robin*	0.49	0.33	0.73	20%	31	
Northern Mockingbird*	4.18	3.53	4.94	9%	921	
Curve-billed Thrasher*	0.41	0.22	0.76	32%	26	
Cassin's Sparrow*	25.12	23.30	27.08	4%	2435	X
Brewer's Sparrow*	0.27	0.17	0.42	23%	30	X
Vesper Sparrow*	0.84	0.57	1.23	20%	54	
Lark Sparrow*	23.51	21.35	25.89	5%	1108	X
Lark Bunting*	39.70	36.88	42.74	4%	3137	X
Grasshopper Sparrow	24.52	21.36	28.16	7%	716	X
McCown's Longspur*	1.26	0.80	1.98	23%	49	X
Blue Grosbeak*	1.04	0.53	2.07	36%	31	
Dickcissel	1.07	0.62	1.83	28%	39	X
Red-winged Blackbird	2.62	1.98	3.46	14%	254	
Eastern Meadowlark*	0.86	0.62	1.20	17%	103	X
Western Meadowlark	52.57	48.70	56.75	4%	6564	X
Brewer's Blackbird*	0.43	0.21	0.88	38%	19	
Brown-headed Cowbird*	5.60	4.09	7.66	16%	176	
Orchard Oriole*	0.60	0.32	1.13	33%	23	
Bullock's Oriole*	2.01	1.51	2.67	15%	118	X
House Sparrow	0.85	0.50	1.46	28%	65	

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (2004) and/or participating state and federal agencies.

Table 2. Estimated densities for species detected in dryland agriculture habitats within BCR 18.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Ring-necked Pheasant*	3.46	2.93	4.09	9%	285	
Northern Bobwhite	0.53	0.32	0.88	27%	20	X
Swainson's Hawk	0.23	0.05	0.14	33%	29	X
Killdeer*	3.74	2.61	5.35	18%	64	
Mourning Dove*	41.95	31.71	55.49	14%	593	
Western Kingbird	8.09	5.28	12.40	22%	99	
Horned Lark*	140.24	125.79	156.36	6%	1668	X
Cassin's Sparrow	3.56	2.60	4.87	16%	66	X
Lark Sparrow	17.63	14.28	21.78	11%	185	X
Lark Bunting	36.93	31.53	43.26	8%	806	X
Grasshopper Sparrow*	36.43	29.22	45.42	11%	484	X
Dickcissel*	10.90	7.84	15.15	17%	98	X
Red-winged Blackbird*	23.60	19.98	27.87	9%	549	
Western Meadowlark*	53.82	49.42	58.61	4%	1522	X
Common Grackle*	3.13	1.80	5.44	29%	107	

Species (cont.)	D	D LCL	D UCL	D CV	*n*	Species of Concern
House Sparrow*	1.83	0.85	3.91	40%	47	

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (2004) and/or participating state and federal agencies.

Table 3. Estimated densities for species detected in CRP habitats within BCR 18.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Mourning Dove	16.27	10.64	24.87	22%	71	
Horned Lark	112.11	76.51	164.27	20%	130	X
Cassin's Sparrow	16.69	10.40	26.77	24%	47	X
Lark Bunting*	73.64	57.62	94.11	13%	139	X
Grasshopper Sparrow	28.04	19.33	40.68	19%	67	X
Red-winged Blackbird	2.28	1.29	4.03	29%	28	
Western Meadowlark	40.49	31.88	51.42	12%	167	X

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (2004) and/or participating state and federal agencies.

Shrub Cover Categories

We documented 106 species in habitat categorized as <1% shrub cover. Of those species, 29 had a sufficient number of observations to estimate density across the habitat (Table 4). Highest densities for nine species (*) occurred in native habitat with <1% shrub cover when compared to other shrub cover categories (Table 4). We documented 87 species in habitat categorized as 1-3% shrub cover. Of those species, 26 had a sufficient number of observations to estimate density across the habitat (Table 5). Highest densities for 11, species occurred in native habitat with 1-3% shrub cover when compared to other shrub cover categories. We documented 77 species in habitat categorized as >3-10% shrub cover. Of those species, 21 had a sufficient number of observations to estimate density across the habitat (Table 6). Highest densities for two species were found in native habitat with 3-10% shrub cover when compared to other shrub cover categories. We documented 62 species in habitat categorized as >10% shrub cover. Of those species, 14 had a sufficient number of observations to estimate density across the habitat (Table 7). Highest densities for six species were found in native habitat with >10% shrub cover when compared to other shrub cover categories

Table 4. Estimated densities for species detected in habitat categorized as <1% shrub cover within BCR 18.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Ring-necked Pheasant*	0.32	0.23	0.45	18%	52	
Scaled Quail	1.12	0.61	2.06	32%	28	X
Turkey Vulture	0.04	0.02	0.07	34%	23	
Red-tailed Hawk	0.17	0.08	0.35	37%	13	
Swainson's Hawk*	0.41	0.37	0.66	18%	52	X
Killdeer	2.47	1.81	3.37	16%	62	
Long-billed Curlew	0.80	0.43	1.46	32%	34	X
Mourning Dove	21.93	19.12	25.14	7%	707	
Burrowing Owl	0.60	0.43	0.84	17%	120	X
Common Nighthawk	0.32	0.18	0.55	29%	21	

Species (cont.)	D	D LCL	D UCL	D CV	*n*	Species of Concern
Cassin's Kingbird*	0.75	0.35	1.59	40%	15	X
Western Kingbird	17.13	13.81	21.25	11%	454	
Eastern Kingbird	1.17	0.73	1.88	24%	45	
Loggerhead Shrike	0.97	0.65	1.46	21%	35	X
Chihuahuan Raven	0.47	0.32	0.69	20%	204	X
Horned Lark*	134.30	123.42	146.13	4%	2859	X
Northern Mockingbird	1.68	1.21	2.34	17%	63	
Cassin's Sparrow	12.28	10.73	14.06	7%	379	X
Vesper Sparrow	0.95	0.60	1.51	24%	32	
Lark Sparrow	14.32	11.96	17.14	9%	330	X
Lark Bunting*	45.30	40.67	50.45	6%	1651	X
Grasshopper Sparrow	26.87	23.40	30.84	7%	500	X
McCown's Longspur*	2.12	1.29	3.48	26%	39	X
Dickcissel*	1.24	0.58	2.62	40%	26	X
Red-winged Blackbird*	2.30	1.73	3.05	14%	140	
Eastern Meadowlark	0.41	0.20	0.82	37%	22	X
Western Meadowlark*	62.89	57.09	69.28	5%	3296	X
Brown-headed Cowbird	3.73	2.26	6.16	26%	49	
Bullock's Oriole	0.62	0.37	1.04	27%	24	X

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (2004) and/or participating state and federal agencies.

Table 5. Estimated densities for species detected in habitat categorized as 1-3% shrub cover within BCR 18.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Scaled Quail*	3.95	2.71	5.74	19%	88	X
Northern Bobwhite	0.96	0.44	2.07	40%	14	X
Swainson's Hawk	0.72	0.44	1.17	25%	85	X
Northern Harrier	0.14	0.06	0.34	46%	15	X
Killdeer*	2.68	1.71	4.20	23%	42	
Long-billed Curlew*	0.83	0.33	2.07	49%	14	X
Mourning Dove	25.81	20.71	32.18	11%	408	
Burrowing Owl*	1.69	0.96	2.97	29%	38	X
Common Nighthawk*	0.93	0.46	1.88	37%	21	
Say's Phoebe*	0.86	0.48	1.55	30%	19	X
Western Kingbird	11.87	9.26	15.23	13%	306	
Eastern Kingbird*	1.35	0.67	2.71	36%	19	
Scissor-tailed Flycatcher*	10.38	5.03	21.42	38%	21	X
Loggerhead Shrike	3.86	2.20	6.77	29%	27	X
Chihuahuan Raven*	1.42	0.97	2.07	19%	107	X
Horned Lark	121.00	108.45	135.00	6%	1416	X
Northern Mockingbird	3.37	2.67	4.26	12%	165	
Cassin's Sparrow	25.32	21.78	29.44	8%	592	X
Lark Sparrow	27.76	23.19	33.24	9%	295	X
Lark Bunting	31.59	26.08	38.27	10%	591	X
Grasshopper Sparrow	15.17	11.22	20.51	15%	108	X

Species (cont.)	D	D LCL	D UCL	D CV	*n*	Species of Concern
Red-winged Blackbird	2.15	1.31	3.55	26%	44	
Eastern Meadowlark	0.60	0.26	1.38	44%	18	X
Western Meadowlark	45.95	40.79	51.75	6%	1379	X
Brown-headed Cowbird*	12.54	5.26	29.90	46%	39	
Bullock's Oriole*	2.94	1.80	4.80	25%	30	X

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (2004) and/or participating state and federal agencies.

Table 6. Estimated densities for species detected in habitat categorized as >3-10% shrub cover within BCR 18.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Scaled Quail	1.51	1.10	2.09	17%	76	X
Northern Bobwhite	1.10	0.64	1.91	28%	32	X
Swainson's Hawk	0.26	0.17	0.40	21%	47	X
Killdeer	0.95	0.59	1.51	24%	25	
Mourning Dove	29.53	23.50	37.12	12%	303	
Burrowing Owl	0.88	0.41	1.90	40%	23	X
Say's Phoebe	0.75	0.41	1.38	31%	18	X
Western Kingbird*	22.97	18.07	29.21	12%	200	
Scissor-tailed Flycatcher	0.79	0.35	1.77	42%	15	X
Loggerhead Shrike	3.02	1.49	6.12	36%	21	X
Horned Lark	64.29	56.76	72.81	6%	851	X
Northern Mockingbird	8.00	6.13	10.43	14%	391	
Cassin's Sparrow	33.67	29.69	38.19	6%	861	X
Lark Sparrow	33.62	25.31	44.67	15%	262	X
Lark Bunting	31.43	26.11	37.84	9%	525	X
Grasshopper Sparrow	15.30	9.97	23.48	22%	55	X
Red-winged Blackbird	2.04	1.09	3.82	33%	29	
Eastern Meadowlark	2.44	1.65	3.61	20%	43	X
Western Meadowlark*	57.64	51.43	64.60	6%	1072	X
Brown-headed Cowbird	3.98	2.47	6.39	24%	42	
Bullock's Oriole	2.38	1.51	3.75	24%	33	X

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (2004) and/or participating state and federal agencies.

Table 7. Estimated densities for species detected in habitat categorized as >10% shrub cover within BCR 18.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Scaled Quail	1.81	1.03	3.17	29%	23	X
Northern Bobwhite*	1.49	0.87	2.56	28%	31	X
Swainson’s Hawk	0.42	0.22	0.82	34%	18	X
Mourning Dove*	30.28	22.49	40.76	15%	158	
Western Kingbird	10.60	7.32	15.34	19%	83	
Loggerhead Shrike*	9.33	4.75	18.35	35%	22	X

Species (cont.)	D	D LCL	D UCL	D CV	*n*	Species of Concern
Horned Lark	28.60	21.55	37.96	14%	154	X
Northern Mockingbird*	16.94	12.95	22.16	14%	240	
Cassin's Sparrow*	52.20	44.19	61.66	9%	477	X
Lark Sparrow*	53.76	40.79	70.86	14%	149	X
Lark Bunting	16.72	11.92	23.45	17%	130	X
Eastern Meadowlark	3.81	2.13	6.80	30%	21	X
Western Meadowlark	47.03	39.05	56.65	10%	390	X
Bullock's Oriole	6.55	3.37	12.71	35%	16	X

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (2004) and/or participating state and federal agencies.

States

Nebraska

We observed 74 species in the BCR 18 portion of Nebraska (Appendix A). Of those species, 15 had a sufficient number of observations to estimate density in native prairie habitat (Table 8) and four had sufficient numbers in dryland agriculture (Table 9). In native prairie habitat (Table 8), the highest densities of two species (*) occurred in Nebraska when compared to other management units.

Table 8. Estimated densities for species detected in native prairie habitat within the BCR 18 portion of Nebraska.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Ring-necked Pheasant	0.49	0.33	0.73	21%	27	
Swainson's Hawk	0.09	0.04	0.18	39%	16	X, X
Mourning Dove	16.73	12.97	21.59	13%	311	
Western Kingbird	5.89	4.14	8.37	18%	97	
Eastern Kingbird*	2.47	1.65	3.70	21%	46	
Horned Lark	51.60	46.06	57.82	6%	1031	X
Cliff Swallow	14.63	9.28	23.04	23%	294	
Barn Swallow	4.03	2.40	6.79	27%	51	
Lark Sparrow	21.10	16.96	26.26	11%	228	X, X
Lark Bunting	28.69	24.55	33.53	8%	686	X, X
Grasshopper Sparrow	63.80	53.46	76.14	9%	360	X, X
Red-winged Blackbird	1.36	0.78	2.38	29%	57	
Western Meadowlark	54.21	49.87	58.94	4%	1318	X
Common Grackle	2.97	1.52	5.82	35%	80	
Brown-headed Cowbird*	5.79	3.61	9.28	24%	68	

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (X) or Nebraska Partnership for All Bird Conservation (X).

Table 9. Estimated densities for species detected in dryland agriculture habitat within the BCR 18 portion of Nebraska.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Mourning Dove	9.74	4.54	20.88	39%	21	
Horned Lark	102.68	76.12	138.50	15%	185	X
Lark Bunting	26.22	13.95	49.29	33%	34	X, X
Western Meadowlark	42.60	32.69	55.52	14%	96	X

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (X) or Nebraska Partnership for All Bird Conservation (X).

Colorado

We observed 74 species in the BCR 18 portion of Colorado (Appendix A). Of those species, 29 had a sufficient number of observations to estimate density in native prairie habitat (Table 10) and nine had sufficient numbers in dryland agriculture (Table 11). In native prairie habitat (Table 10), the highest densities of six species (*) and in dryland agriculture habitat (Table11), the highest densities of two species (*) occurred in Colorado when compared to other management units.

Table 10. Estimated densities for species detected in native prairie habitat within the BCR 18 portion of Colorado.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Ring-necked Pheasant	0.44	0.21	0.92	39%	16	
Scaled Quail	0.32	0.22	0.47	19%	45	X
Red-tailed Hawk*	0.09	0.05	0.19	36%	16	
Swainson's Hawk	0.29	0.19	0.44	21%	47	X
Killdeer	2.44	1.85	3.22	14%	99	
Mourning Dove	29.19	25.61	33.27	7%	840	
Burrowing Owl	0.54	0.37	0.80	20%	57	X, X
Common Nighthawk	0.52	0.34	0.80	22%	48	
Say's Phoebe	0.83	0.56	1.25	21%	29	X
Western Kingbird	24.89	19.36	32.01	13%	396	
Eastern Kingbird	1.80	0.97	3.34	32%	21	
Loggerhead Shrike	2.15	1.12	4.10	33%	21	X
Chihuahuan Raven	0.46	0.21	1.01	41%	22	X
Horned Lark*	155.77	144.03	168.46	4%	3369	X
Cliff Swallow	22.96	15.42	34.18	21%	250	
Barn Swallow	5.69	3.23	10.03	29%	71	
Northern Mockingbird	1.16	0.91	1.49	13%	135	
Cassin's Sparrow	19.23	17.28	21.39	5%	1007	X
Vesper Sparrow*	0.80	0.49	1.30	25%	27	
Lark Sparrow	29.00	22.05	38.14	14%	355	X
Lark Bunting	80.22	73.72	87.31	4%	2751	X
Grasshopper Sparrow	7.93	6.33	9.92	12%	161	X
McCown's Longspur*	3.18	2.10	4.82	21%	72	X
Red-winged Blackbird	3.17	2.36	4.25	15%	152	
Western Meadowlark	62.68	57.21	68.68	5%	2216	X
Common Grackle*	3.28	2.02	5.32	25%	62	
Brown-headed Cowbird	5.04	3.62	7.04	17%	66	

Species (cont.)	D	D LCL	D UCL	D CV	*n*	Species of Concern
Bullock's Oriole	1.33	0.77	2.31	28%	29	X
House Sparrow*	0.52	0.28	0.95	32%	40	

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (X) or Colorado Division of Wildlife (X).

Table 11. Estimated densities for species detected in dryland agriculture habitat within the BCR 18 portion of Colorado.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Ring-necked Pheasant	3.00	1.75	5.14	28%	15	
Mourning Dove	31.54	23.31	42.68	15%	130	
Western Kingbird*	31.16	15.72	61.76	36%	19	
Horned Lark	153.26	125.39	187.34	10%	440	X
Cassin's Sparrow	1.43	0.80	2.56	30%	20	X
Lark Sparrow	6.24	3.98	9.78	23%	31	X
Lark Bunting	37.87	29.32	48.91	13%	240	X
Grasshopper Sparrow	13.34	9.45	18.84	18%	47	X
Red-winged Blackbird	19.58	13.03	29.44	21%	87	
Western Meadowlark*	66.13	57.88	75.55	7%	288	X

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (X) or Colorado Division of Wildlife (X).

Kansas

We observed 77 species in the BCR 18 portion of Kansas (Appendix A). Of those species, 17 had a sufficient number of observations to estimate density in native prairie habitat (Table 12) and 15 had sufficient numbers in dryland agriculture (Table 13). In native prairie habitat (Table 12), the highest densities of nine species (*) and in dryland agriculture habitat (Table13), the highest densities of twelve species (*) occurred in Kansas when compared to other management units.

Table 12. Estimated densities for species detected in native prairie habitat within the BCR 18 portion of Kansas.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Ring-necked Pheasant*	1.11	0.73	1.69	22%	41	
Northern Bobwhite*	3.52	2.15	5.79	26%	38	X
Swainson's Hawk	0.10	0.05	0.18	32%	12	X
Killdeer*	11.72	6.12	22.42	34%	11	
Mourning Dove	52.17	34.33	79.28	22%	150	
Western Kingbird	13.83	9.08	21.07	22%	38	
Horned Lark	70.02	56.51	86.76	11%	208	X
Cliff Swallow*	38.65	19.84	75.27	35%	40	
Barn Swallow	6.90	3.27	14.55	39%	27	
Cassin's Sparrow*	53.25	41.33	68.61	13%	185	X
Lark Sparrow*	34.06	26.12	44.42	14%	112	X
Lark Bunting	34.36	25.91	45.56	14%	195	X

Species (cont.)	D	D LCL	D UCL	D CV	*n*	Species of Concern
Grasshopper Sparrow	42.66	32.60	55.83	14%	120	X
Dickcissel*	14.54	7.38	28.68	35%	24	X
Red-winged Blackbird*	9.61	4.11	22.51	45%	23	
Western Meadowlark*	82.06	72.94	92.33	6%	460	X
Brown-headed Cowbird	7.20	3.35	15.49	40%	19	

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (X) or Kansas Department of Wildlife and Parks (X).

Table 13. Estimated densities for species detected in dryland agriculture habitat within the BCR 18 portion of Kansas.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Ring-necked Pheasant*	3.28	2.36	4.56	17%	230	
Northern Bobwhite*	0.70	0.38	1.27	31%	15	X
Killdeer*	5.66	3.84	8.35	20%	55	
Mourning Dove*	49.59	38.32	64.17	13%	339	
Western Kingbird	4.85	2.45	9.61	36%	46	
Horned Lark	150.76	130.54	174.10	7%	1018	X
Cassin's Sparrow*	4.20	2.31	7.65	31%	26	X
Lark Sparrow*	21.52	16.25	28.49	14%	159	X
Lark Bunting*	59.22	49.60	70.71	9%	538	X
Grasshopper Sparrow*	42.96	36.28	50.87	9%	220	X
Dickcissel*	17.69	10.75	29.12	26%	97	X
Red-winged Blackbird*	28.04	22.87	34.38	10%	360	
Western Meadowlark	49.32	43.99	55.28	6%	882	X
Common Grackle*	10.44	5.40	20.20	34%	28	
House Sparrow*	3.07	1.20	7.85	51%	20	

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (X) or Kansas Department of Wildlife and Parks (X).

New Mexico

We observed 75 species in the BCR 18 portion of New Mexico (Appendix A). Of those species, 30 had a sufficient number of observations to estimate density in native prairie habitat (Table 14) and three had sufficient numbers in dryland agriculture (Table 15). In native prairie habitat (Table 14), the highest densities of eighteen species (*) and in dryland agriculture habitat (Table15), the highest densities of one species (*) occurred in New Mexico when compared to other management units.

Table 14. Estimated densities for species detected in native prairie habitat within the BCR 18 portion of New Mexico.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Scaled Quail*	9.28	7.00	12.29	14%	139	X
Northern Bobwhite	2.17	1.49	3.17	19%	76	X
Swainson's Hawk*	0.56	0.76	1.65	16%	77	X
Long-billed Curlew*	1.14	0.57	2.31	37%	35	X

Species (cont.)	D	D LCL	D UCL	D CV	*n*	Species of Concern
Mourning Dove	16.34	12.66	21.08	13%	337	
Burrowing Owl*	2.55	1.56	4.18	26%	57	X
Common Nighthawk*	0.92	0.46	1.81	35%	13	
Say's Phoebe*	3.62	1.50	8.73	46%	10	X
Ash-throated Flycatcher*	8.84	5.25	14.90	27%	33	
Cassin's Kingbird*	3.50	2.14	5.74	26%	38	X
Western Kingbird	26.97	23.27	31.24	8%	381	
Scissor-tailed Flycatcher*	4.12	2.54	6.66	25%	41	X
Loggerhead Shrike*	5.75	4.05	8.16	18%	95	X, X
Chihuahuan Raven*	2.07	1.59	2.70	14%	323	X
Horned Lark	119.62	100.67	142.12	9%	1325	X
Cliff Swallow	28.55	18.15	44.91	23%	124	
Barn Swallow*	17.63	11.06	28.09	24%	109	
Cactus Wren*	0.81	0.44	1.48	31%	23	
Northern Mockingbird*	11.58	9.86	13.61	8%	742	
Curve-billed Thrasher*	1.48	0.80	2.74	32%	26	
Cassin's Sparrow	36.66	33.13	40.57	5%	1052	X
Lark Sparrow	30.93	24.72	38.70	11%	335	X
Lark Bunting	5.81	3.73	9.07	23%	63	X
Grasshopper Sparrow	11.16	5.91	21.09	33%	31	X
Blue Grosbeak*	3.92	1.62	9.47	46%	19	
Red-winged Blackbird	0.61	0.25	1.54	49%	13	
Eastern Meadowlark*	3.03	2.17	4.23	17%	109	X
Western Meadowlark	36.29	32.33	40.74	6%	1225	X
Great-tailed Grackle*	0.98	0.49	1.94	36%	31	
Bullock's Oriole*	4.25	2.90	6.21	20%	70	X

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (X) or New Mexico Department of Game and Fish (X).

Table 15. Estimated densities for species detected in dryland agriculture habitats within the BCR 18 portion of New Mexico.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Mourning Dove	34.58	18.39	65.01	33%	25	
Horned Lark*	239.13	171.89	332.68	17%	91	X
Western Meadowlark	161.00	104.36	248.39	22%	64	X

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (X) or New Mexico Department of Game and Fish (X).

Oklahoma

We observed 60 species in the BCR 18 portion of Nebraska (Appendix A). Of those species, seven had a sufficient number of observations to estimate density in native prairie habitat (Table 16). In native prairie habitat (Table 16), the highest densities of two species (*) occurred in Oklahoma when compared to other management units.

Table 16. Estimated densities for species detected in native prairie habitat within the BCR 18 portion of Oklahoma.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Western Kingbird	21.52	8.72	53.14	48%	18	
Horned Lark	78.85	51.30	121.19	22%	84	X
Cassin's Sparrow	29.00	20.60	40.81	17%	104	X
Lark Sparrow	18.29	10.98	30.46	26%	24	X
Lark Bunting*	39.89	22.94	69.37	29%	75	X
Grasshopper Sparrow*	54.28	30.99	95.05	29%	32	X
Western Meadowlark	41.02	32.00	52.57	13%	157	X

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (X) or Oklahoma Department of Wildlife Conservation (X).

United States Forest Service

We observed 72 species on Comanche, Kiowa, and Rita Blanca National Grasslands within BCR 18 (Appendix A). Of those species, 12 had a sufficient number of observations to estimate density in native prairie habitat (Table 17). In native prairie habitat (Table 17), the highest densities of two species (*) occurred in USFS land when compared to other management units.

Table 17. Estimated densities for species detected in native prairie habitat on USFS lands (Comanche, Kiowa and Rita Blanca National Grasslands) within BCR 18.

Species	D	D LCL	D UCL	D CV	*n*	Species of Concern
Long-billed Curlew	0.58	0.28	1.22	38%	16	X, X, X
Mourning Dove	38.37	28.01	52.56	16%	149	
Burrowing Owl	0.77	0.36	1.65	41%	19	X, X, X
Western Kingbird*	35.06	23.88	51.48	20%	39	
Horned Lark	209.53	177.20	247.74	9%	571	X
Cliff Swallow	19.65	9.80	39.40	37%	42	
Barn Swallow	14.92	7.46	29.81	36%	32	
Northern Mockingbird	4.87	2.84	8.36	28%	33	
Cassin's Sparrow	42.68	34.50	52.82	11%	306	X, X
Lark Sparrow*	52.01	35.75	75.67	19%	107	X
Lark Bunting	31.59	21.30	46.83	20%	106	X
Western Meadowlark	77.62	68.83	87.52	6%	669	X

D = density estimate expressed in birds/km^2, D LCL & D UCL = lower and upper 95% confidence limits of D, DCV = coefficient of variation for D, n = number of detections used to calculate D. Species of concern as recoginzed by Partners In Flight (X), USDA Forest Region 2 (X) or Region 3 (X).

Discussion and Recommendations

It is important that bird conservation efforts, including inventory and monitoring systems, are implemented consistently across regions that are spatially meaningful to migratory birds. The North American Bird Conservation initiative (NABCI) has developed a framework for this to occur, and has delineated ecologically based planning, implementation, and evaluation units called Bird Conservation Regions (BCR). The goal of this effort is for states, Joint Ventures, federal agencies, and conservation groups within these regions to develop "regionally-based, biologically driven partnerships." RMBO has been instrumental in creating these partnerships for the Shortgrass BCR by gaining the cooperation and financial support of Colorado Division of

Wildlife, Nebraska Game and Parks Commission, and Kansas Parks and Wildlife, New Mexico Department of Game and Fish, United States Forest Service and the Oklahoma Department of Wildlife Conservation, in implementing a region-wide inventory and monitoring system.

Cooperation at this scale has allowed us to collect valuable information on bird species within BCR 18 using the section-based survey monitoring technique. This technique can potentially provide statistically significant ($\alpha = .10$) population trends for 46 upland breeding species in BCR 18 within 5 - 20 years (CV = 3%, 41% respectively), based on a power analysis using program TRENDS (Gerrodette 1987, 1991 and 1993). Included in this list are 18 species of concern according to the Partners In Flight Species Assessment Database (2004), a comprehensive database that evaluates the biological status of North American birds and summarizes a vast amount of complex biological information into a limited set of simple scores. Seventeen species are recognized by states and federal agencies participating in this grassland bird monitoring program.

Data gathered using section-based surveys can also be used to delineate areas that are important to breeding prairie birds. Relative abundance and distribution layers for threatened species in the Shortgrass Prairie BCR, shown in the species accounts section (Appendix D), can be overlaid to form maps on which we can draw polygons around areas that have high relative abundances and species richness. These maps can be created for any species, or group of species, that are detected using this technique. Additional efforts in demographic research should be directed in these areas to determine if they support source or sink populations. With this demographic information in association with climate, precipitation, and habitat, we will be able to model breeding bird populations to determine which geographic areas would consistently hold viable populations of prairie birds.

Our grassland bird monitoring program also provides detailed species accounts that compare density estimates of individual species between management units, habitat types, and shrub cover categories. This information will allow us to identify variables or locations that should be considered to effectively conserve prairie bird species. For example, the Lark Sparrow occurred in high densities on native habitats (D = 25.12 birds/km^2, CV = 4%, n = 2435); highest densities occurred in habitats with >10% shrub cover (D = 53.76 birds/ km^2, CV = 14%, n = 149). This would indicate that management for this species should focus on conserving and/or creating native habitat with similar shrub cover. United States Forest Service lands exhibited these characteristics as indicated by the high densities (D = 52.01 birds/km2, CV = 19%, n = 107) of the Lark Sparrow. This is one example of a detailed species account that can be found in Appendix D. Armed with this information, local and regional land managers can enhance management for breeding shortgrass prairie bird species within BCR 18.

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Appendix A

Below is a comprehensive list of bird species detected by section-based monitoring, 16 May – 3 July 2003. Presence (x) and absence (blank) is indicated for each management unit. Species are listed in taxonomic order.

Common Name	Scientific Name	NE	CO	KS	NM	OK	USFS
Canada Goose	*Branta canadensis*		x				
Mallard	*Anas platyrhynchos*	x	x	x	x	x	x
Blue-winged Teal	*Anas discors*		x				
Common Merganser	*Mergus merganser*				x		
Ring-necked Pheasant	*Phasianus colchicus*	x	x	x	x	x	x
Lesser Prairie-Chicken	*Tympanuchus pallidicinctus*			x			
Wild Turkey	*Meleagris gallopavo*	x					
Scaled Quail	*Callipepla squamata*	x	x	x	x	x	x
Northern Bobwhite	*Colinus virginianus*	x	x	x	x	x	x
Great Blue Heron	*Ardea herodias*	x	x	x	x		x
Black-crowned Night-Heron	*Nycticorax nycticorax*			x			
White-faced Ibis	*Plegadis chihi*					x	
Turkey Vulture	*Cathartes aura*	x	x	x	x	x	x
Mississippi Kite	*Ictinia mississippiensis*			x	x		
Northern Harrier	*Circus cyaneus*	x	x	x	x	x	x
Harris's Hawk	*Parabuteo unicinctus*				x		
Swainson's Hawk	*Buteo swainsoni*	x	x	x	x	x	x
Red-tailed Hawk	*Buteo jamaicensis*	x	x	x	x	x	x
Ferruginous Hawk	*Buteo regalis*	x	x	x	x	x	x
Golden Eagle	*Aquila chrysaetos*	x	x	x			
American Kestrel	*Falco sparverius*	x	x	x	x	x	x
Prairie Falcon	*Falco mexicanus*	x	x	x	x		
Killdeer	*Charadrius vociferus*	x	x	x	x	x	x
Mountain Plover	*Charadrius montanus*		x		x		
Black-necked Stilt	*Himantopus mexicanus*		x		x		
American Avocet	*Recurvirostra americana*		x		x	x	
Upland Sandpiper	*Bartramia longicauda*	x	x				
Long-billed Curlew	*Numenius americanus*	x	x	x	x	x	x
Marbled Godwit	*Limosa fedoa*		x				x
Least Tern	*Sterna antillarum*			x			
White-winged Dove	*Zenaida asiatica*				x		
Mourning Dove	*Zenaida macroura*	x	x	x	x	x	x
Yellow-billed Cuckoo	*Coccyzus americanus*			x			
Greater Roadrunner	*Geococcyx californianus*				x		
Great Horned Owl	*Bubo virginianus*	x	x	x		x	
Burrowing Owl	*Athene cunicularia*	x	x	x	x	x	x
Common Nighthawk	*Chordeiles minor*	x	x	x	x	x	x
Common Poorwill	*Phalaenoptilus nuttallii*	x					
Chimney Swift	*Chaetura pelagica*			x			
Belted Kingfisher	*Ceryle alcyon*	x		x			
Red-headed Woodpecker	*Melanerpes erythrocephalus*	x	x	x			

Common Name (cont.)	Scientific Name (cont.)	NE	CO	KS	NM	OK	USFS
Ladder-backed Woodpecker	*Picoides scalaris*				x		
Northern Flicker	*Colaptes auratus*	x		x			
Western Wood-Pewee	*Contopus sordidulus*		x		x		
Eastern Phoebe	*Sayornis phoebe*			x			
Say's Phoebe	*Sayornis saya*	x	x	x	x	x	x
Vermilion Flycatcher	*Pyrocephalus rubinus*		x				
Ash-throated Flycatcher	*Myiarchus cinerascens*				x		x
Great Crested Flycatcher	*Myiarchus crinitus*	x				x	
Cassin's Kingbird	*Tyrannus vociferans*			x	x	x	x
Western Kingbird	*Tyrannus verticalis*	x	x	x	x	x	x
Eastern Kingbird	*Tyrannus tyrannus*	x	x	x		x	
Scissor-tailed Flycatcher	*Tyrannus forficatus*			x	x	x	
Loggerhead Shrike	*Lanius ludovicianus*	x	x	x	x		x
Blue Jay	*Cyanocitta cristata*	x					
Black-billed Magpie	*Pica hudsonia*	x	x	x			
American Crow	*Corvus brachyrhynchos*	x	x	x	x		
Chihuahuan Raven	*Corvus cryptoleucus*		x	x	x	x	x
Common Raven	*Corvus corax*	x	x		x		x
Horned Lark	*Eremophila alpestris*	x	x	x	x	x	x
Purple Martin	*Progne subis*		x				
Tree Swallow	*Tachycineta bicolor*				x		x
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	x			x	x	
Bank Swallow	*Riparia riparia*	x	x	x	x		
Cliff Swallow	*Petrochelidon pyrrhonota*	x	x	x	x	x	x
Barn Swallow	*Hirundo rustica*	x	x	x	x	x	x
Cactus Wren	*Campylorhynchus brunneicapillus*				x		
Rock Wren	*Salpinctes obsoletus*	x			x		
Bewick's Wren	*Thryomanes bewickii*			x			
House Wren	*Troglodytes aedon*	x		x	x		
Eastern Bluebird	*Sialia sialis*			x			
Mountain Bluebird	*Sialia currucoides*				x		
American Robin	*Turdus migratorius*	x	x	x		x	
Northern Mockingbird	*Mimus polyglottos*	x	x	x	x	x	x
Sage Thrasher	*Oreoscoptes montanus*			x	x	x	
Brown Thrasher	*Toxostoma rufum*	x	x	x			
Curve-billed Thrasher	*Toxostoma curvirostre*				x		
European Starling	*Sturnus vulgaris*	x	x	x	x		x
Sprague's Pipit	*Anthus spragueii*					x	
Yellow Warbler	*Dendroica petechia*	x		x			
Common Yellowthroat	*Geothlypis trichas*	x	x				x
Western Tanager	*Piranga ludoviciana*	x					
Spotted Towhee	*Pipilo maculatus*	x					
Cassin's Sparrow	*Aimophila cassinii*	x	x	x	x	x	x
Rufous-crowned Sparrow	*Aimophila ruficeps*					x	
Chipping Sparrow	*Spizella passerina*	x	x				

Common Name (cont.)	Scientific Name (cont.)	NE	CO	KS	NM	OK	USFS
Clay-colored Sparrow	*Spizella pallida*		x				
Brewer's Sparrow	*Spizella breweri*		x	x	x	x	x
Field Sparrow	*Spizella pusilla*	x		x			
Vesper Sparrow	*Pooecetes gramineus*	x	x	x	x	x	x
Lark Sparrow	*Chondestes grammacus*	x	x	x	x	x	x
Black-throated Sparrow	*Amphispiza bilineata*		x		x		x
Lark Bunting	*Calamospiza melanocorys*	x	x	x	x	x	x
Savannah Sparrow	*Passerculus sandwichensis*		x	x	x		x
Grasshopper Sparrow	*Ammodramus savannarum*	x	x	x	x	x	x
White-throated Sparrow	*Zonotrichia albicollis*			x			
McCown's Longspur	*Calcarius mccownii*	x	x	x			
Chestnut-collared Longspur	*Calcarius ornatus*	x	x				
Pyrrhuloxia	*Cardinalis sinuatus*				x		
Blue Grosbeak	*Passerina caerulea*	x	x	x	x	x	
Lazuli Bunting	*Passerina amoena*					x	
Indigo Bunting	*Passerina cyanea*				x		x
Dickcissel	*Spiza americana*	x	x	x			
Bobolink	*Dolichonyx oryzivorus*	x					
Red-winged Blackbird	*Agelaius phoeniceus*	x	x	x	x	x	x
Eastern Meadowlark	*Sturnella magna*				x	x	
Western Meadowlark	*Sturnella neglecta*	x	x	x	x	x	x
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	x	x	x		x	
Brewer's Blackbird	*Euphagus cyanocephalus*	x	x	x	x		
Common Grackle	*Quiscalus quiscula*	x	x	x	x	x	x
Great-tailed Grackle	*Quiscalus mexicanus*		x	x	x	x	x
Brown-headed Cowbird	*Molothrus ater*	x	x	x	x	x	x
Orchard Oriole	*Icterus spurius*	x	x	x	x		
Bullock's Oriole	*Icterus bullockii*	x	x	x	x	x	x
Scott's Oriole	*Icterus parisorum*	x					
House Finch	*Carpodacus mexicanus*		x		x	x	
Lesser Goldfinch	*Carduelis psaltria*				x		
American Goldfinch	*Carduelis tristis*	x	x	x			
House Sparrow	*Passer domesticus*		x	x	x	x	

Appendix B

Below is a comprehensive list of species of concern detected by section-based monitoring, 16 May – 3 July 2003. Species designated as a conservation concern by management unit are indicated by an X. Species are listed in taxonomic order. See corresponding *Species Accounts* for detailed information on species status in each management unit.

Common Name	Scientific Name	NE	CO	KS	NM	OK	USFS R2	USFS R3
Lesser Prairie-Chicken	*Tympanuchus pallidicinctus*		X		X		X	X
Northern Bobwhite	*Colinus virginianus*	X						
White-faced Ibis	*Plegadis chihi*			X			X	X
Mississippi Kite	*Ictinia mississippiensis*	X						X
Northern Harrier	*Circus cyaneus*	X					X	
Swainson's Hawk	*Buteo swainsoni*	X				X		
Ferruginous Hawk	*Buteo regalis*	X	X	X		X	X	X
Golden Eagle	*Aquila chrysaetos*			X		X		
Prairie Falcon	*Falco mexicanus*					X		
Mountain Plover	*Charadrius montanus*	X	X	X	X	X	X	X
American Avocet	*Recurvirostra americana*	X						
Upland Sandpiper	*Bartramia longicauda*	X					X	
Long-billed Curlew	*Numenius americanus*	X	X	X		X	X	X
Least Tern	*Sterna antillarum*	X	X		X	X		
Yellow-billed Cuckoo	*Coccyzus americanus*	X	X		X		X	X
Burrowing Owl	*Athene cunicularia*	X	X			X	X	X
Chimney Swift	*Chaetura pelagica*	X						
Red-headed Woodpecker	*Melanerpes erythrocephalus*	X						
Ladder-backed Woodpecker	*Picoides scalaris*			X				
Great Crested Flycatcher	*Myiarchus crinitus*	X						
Cassin's Kingbird	*Tyrannus vociferans*	X						
Scissor-tailed Flycatcher	*Tyrannus forficatus*	X						
Loggerhead Shrike	*Lanius ludovicianus*	X			X	X	X	X
Chihuahuan Raven	*Corvus cryptoleucus*			X				
Purple Martin	*Progne subis*						X	
Sprague's Pipit	*Anthus spragueii*							
Brewer's Sparrow	*Spizella breweri*	X					X	
Lark Sparrow	*Chondestes grammacus*	X						
Lark Bunting	*Calamospiza melanocorys*	X						
Grasshopper Sparrow	*Ammodramus savannarum*	X					X	
McCown's Longspur	*Calcarius mccownii*	X					X	
Chestnut-collared Longspur	*Calcarius ornatus*	X					X	
Dickcissel	*Spiza americana*	X						
Bobolink	*Dolichonyx oryzivorus*	X		X				
Eastern Meadowlark	*Sturnella magna*	X						
Bullock's Oriole	*Icterus bullockii*	X						

Appendix C

Below is a list of priority upland species complied by RMBO from the Partners In Flight database within BCR 18. The species were reduced further by selecting species that use shortgrass prairie and shrubland habitats during the breeding season, and greater than 1% of the population breeds within BCR 18. The list includes the common name, the PIF priority level, % of the breeding population estimated to occur in BCR 18, the population trend (based on BBS data within BCR 18 1966-1999), and the associated P-value.

Species	PIF priority level*	% of population in BCR	BCR Trend	P-value
Northern Harrier	II.	4.37	-2.8	0.25
Swainson's Hawk	I.	20.94	-0.7	0.69
Ferruginous Hawk	I.	21.11	1.46	0.37
Prairie Falcon	I.	10.17	5.72	0.08
Greater Prairie-Chicken	I.	7.58	54.96	0.16
Lesser Prairie-Chicken	I.	No Data	No Data	
Scaled Quail	I.	8.37	-2.95	0.05
Mountain Plover	I.	73.6	-1.06	0.78
Upland Sandpiper	II.	1.37	-5.46	0.22
Long-billed Curlew	I.	14.08	-3.32	0.15
Burrowing Owl	I.	34.95	-3.37	0.36
Say's Phoebe	II.	10.44	0.79	0.63
Chihuahuan Raven	II.	24.42	-1.33	0.26
Loggerhead Shrike		7.82	-0.18	0.93
Horned Lark	III.	21.49	-1.89	<0.01
Cassin's Sparrow	I.	38.55	-1.68	0.01
Brewer's Sparrow	III.	1.09	-5.99	0.12
Lark Sparrow	II.	17.73	-1.48	0.06
Lark Bunting	I.	36.44	-1.97	0.01
Grasshopper Sparrow	II.	19.65	-1.53	0.17
McCown's Longspur	I.	18.42	2.5	0.69
Chestnut-collared Longspur	I.	2.66	9.4	0.26
Dickcissel	II.	1.85	4.26	0.11
Western Meadowlark	III.	18.44	-0.64	0.06

* Tier I. High Overall Priority. This tier includes species that are typically of conservation concern throughout their range.
Tier II. High Regional Priority. This tier includes species that are of moderate overall priority, but are important to consider for conservation within a region.
Tier III. Additional Watch List Species. This tier includes species that are on the U.S. Watch List (see Pashley et al. 2000), but are not included in the above tiers.

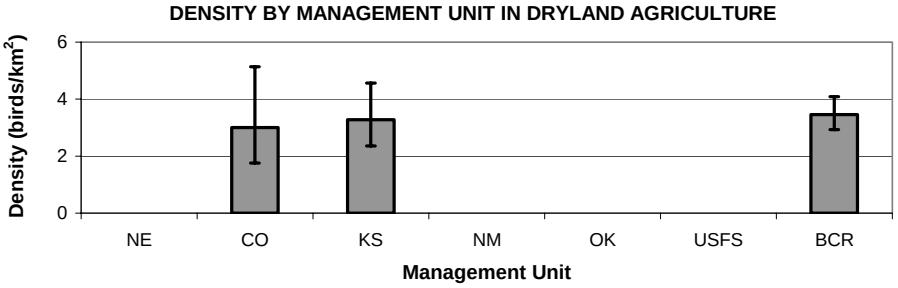
Appendix D

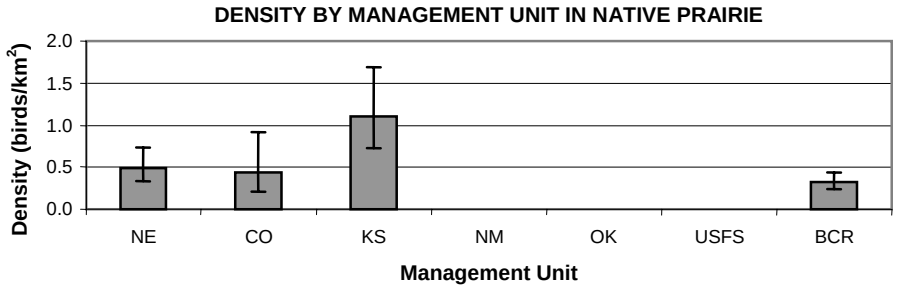
The following species accounts include species distribution maps and density estimates. Species distribution maps show observation locations and index of abundance at the section level. All bird locations do not necessarily represent local breeding for the individual species. Index of abundance, represented by graded dots, was defined as the total number of a species detected on the section divided by the number of point counts conducted on that section. The index of abundance was created to adjust for effort on each of the sections among years (2001 - 2003) and states. In 2001, during section-based monitoring in Colorado and Nebraska, one to four point counts per section were conducted compared to 2002 and 2003 when three point counts were conducted on all sections.

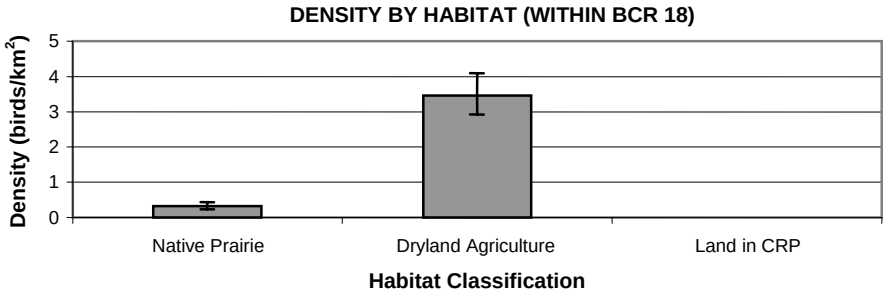
Density estimates were calculated for species with sufficient data (at least 25 observations or a CV < 50%). Density was estimated by: 1) management unit (states or National Grassland) for native prairie habitat and dryland agriculture habitat, 2) percent shrub cover within native prairie habitat, and 3) habitat type with BCR 18 (native prairie habitat, dryland agriculture habitat, and land in CRP). Density estimates (D) are based on 95% confidence. Error bars represent upper and lower confidence intervals. For density estimates presented in graphs, values of D and *n* can be found in the corresponding table in Results (p. 8).

Ring-necked Pheasant
(Phasianus colchicus)

During the 2003 field season, we detected 420 Ring-necked Pheasants on 265 (8%) of the surveyed sections. Ring-necked Pheasants were distributed throughout the study area. Density was higher in dryland agriculture habitat (D = 3.46 birds/km^2, CV = 9%, *n* = 285) than in native prairie habitat (D = 0.32 birds/km^2, CV = 16%, *n* = 96). Within native prairie habitat, highest density occurred in Kansas (D = 1.11 birds/km^2, CV = 22%, n = 41). Management of this introduced upland game bird should be focused in areas of agricultural and cultivated lands.

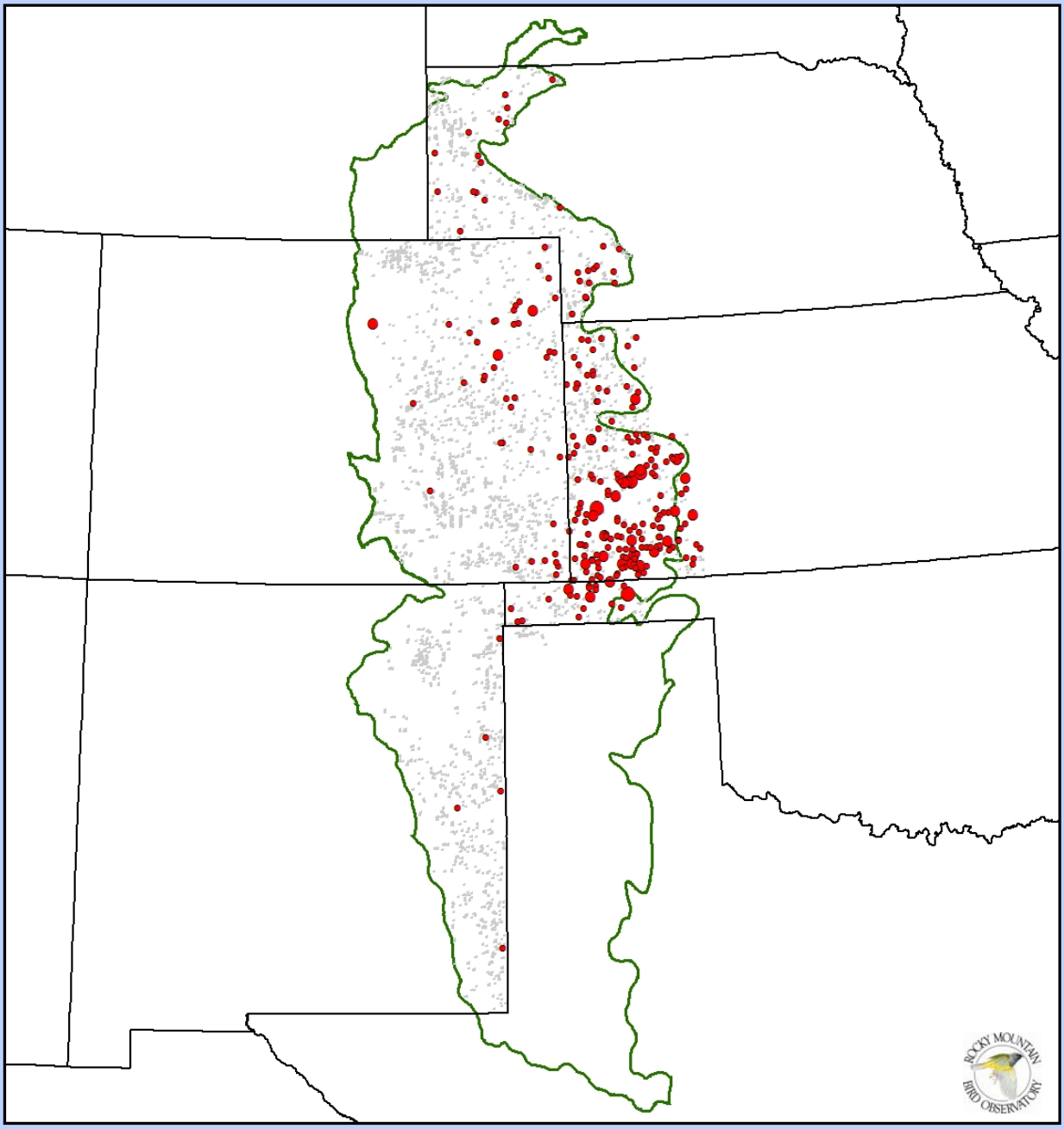






Ring-necked Pheasant

(Phasianus colchicus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Lesser Prairie Chicken

(Tympanuchus pallidicinctus)

In 2003, we detected one Lesser Prairie Chicken in Stevens County, Kansas. This species is of concern as follows:

- Partners In Flight – Tier I (high overall priority)
- US Fish and Wildlife Service – candidate species
- Colorado – state threatened
- New Mexico – wildlife of concern
- USFS R2 and R3 – sensitive species.

Lesser Prairie Chicken

(Tympanuchus pallidicinctus)

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

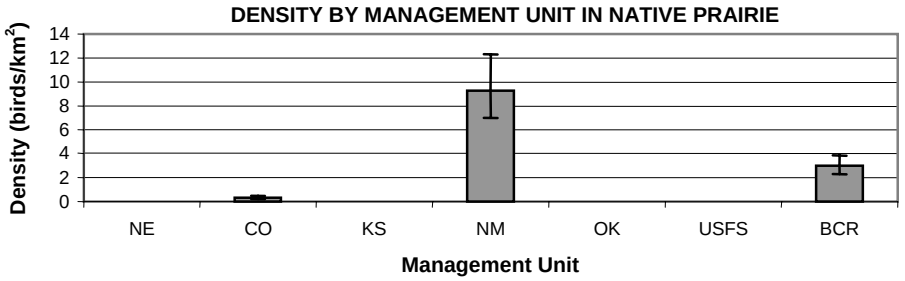
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

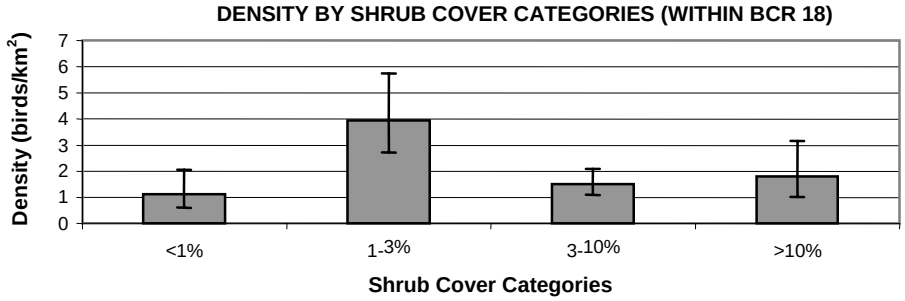
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Scaled Quail

(Callipepla squamata)

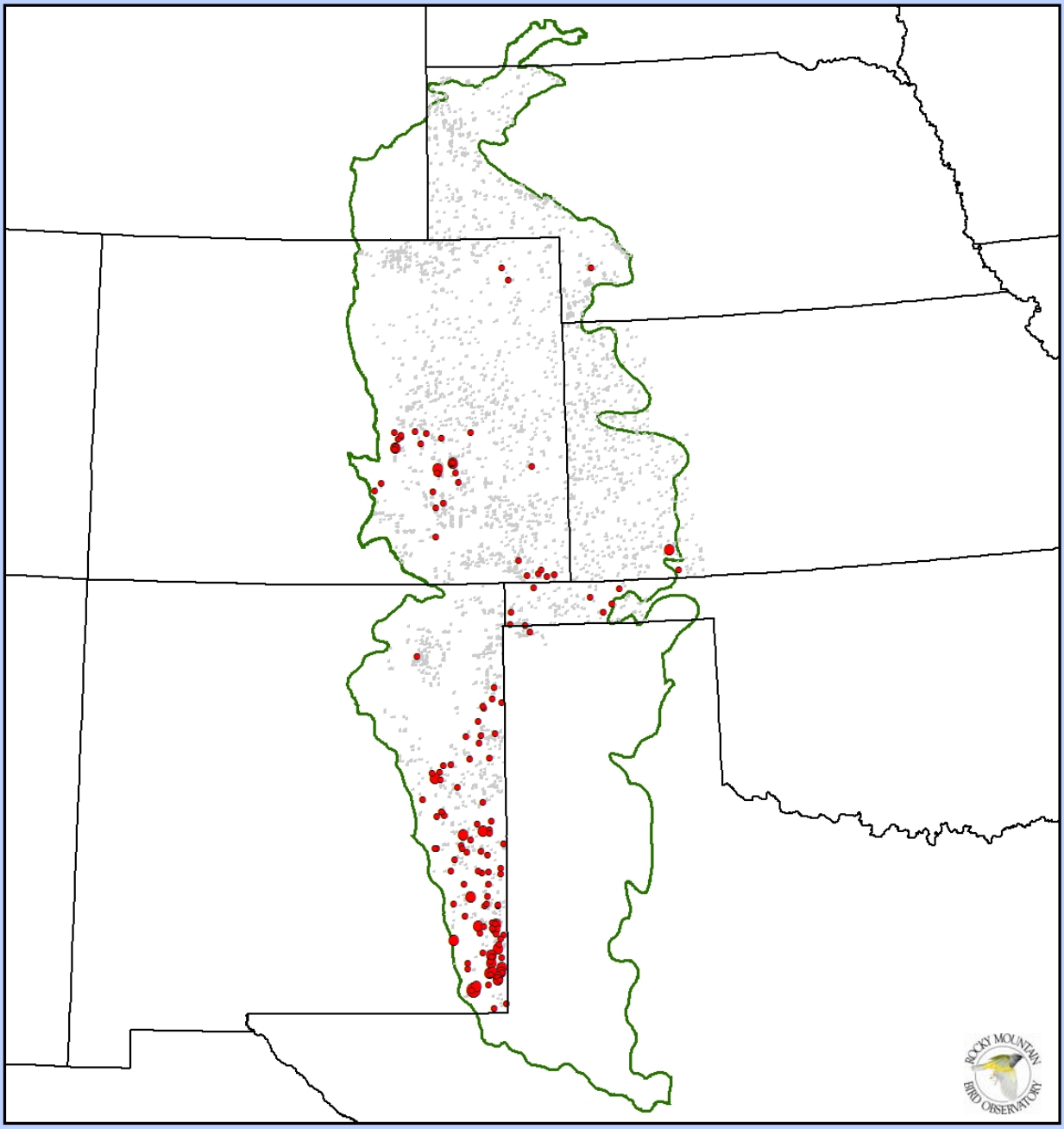
In 2003, we documented 247 Scaled Quail on146 (5%) of the surveyed sections. Observations were concentrated in southeast New Mexico (D = 9.28 birds/km^2, CV = 14%, *n* = 139) with scattered observations to the North. Within native prairie habitat, density was highest in areas of 1-3% shrub cover (D = 3.95 birds/km^2, CV = 19%, *n* = 88). Scaled Quail is a Tier I (high overall priority) species according to Partners In Flight (2004).





Scaled Quail

(Callipepla squamata)



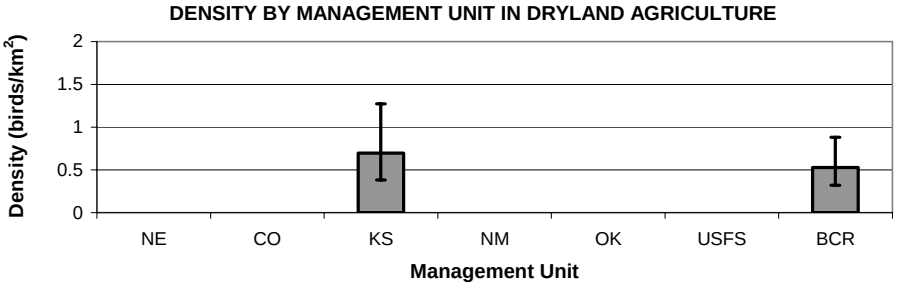
Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

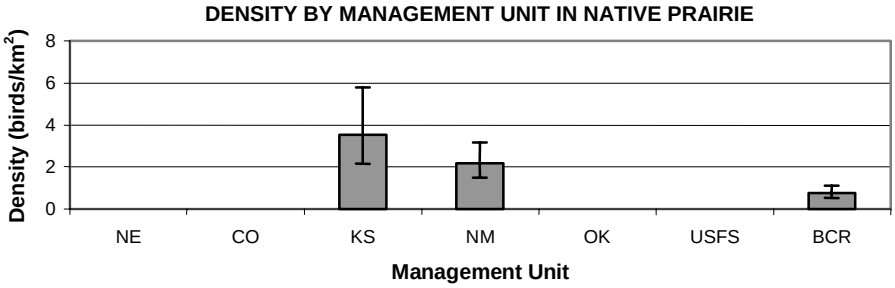
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

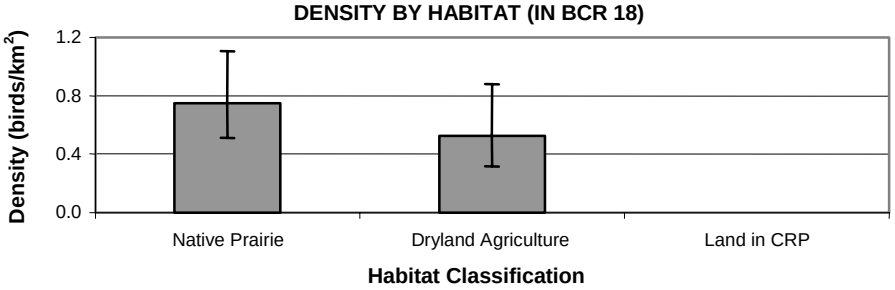
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Northern Bobwhite
(Colinus virginianus)

In 2003, we detected 173 Northern Bobwhites on 94 (3%) of the surveyed sections. This species was detected in all five states of the study area with high concentrations in southwest Kansas and eastern New Mexico. Density in native prairie habitat (D = 0.75 birds/km^2, CV = 20%, *n* = 131) was higher than in dryland agriculture habitat (D = 0.53 birds/km^2, CV = 27%, *n* = 20). Northern Bobwhite is a species of moderate concern in Nebraska.

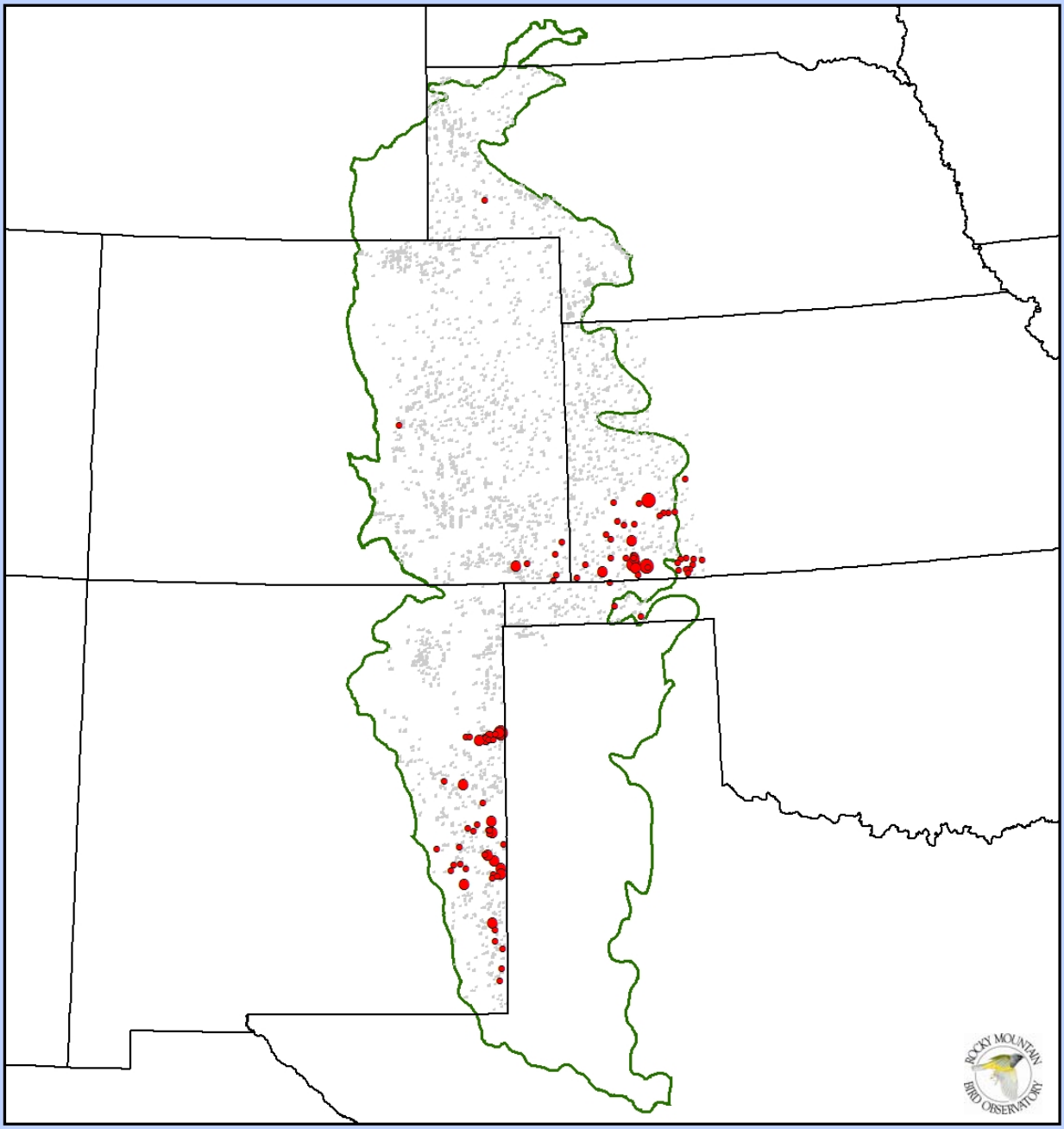






Northern Bobwhite

(Colinus virginianus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

White-faced Ibis
(Plegadis chihi)

In 2003, we detected one White-faced Ibis in Texas County, Oklahoma. White-faced Ibis is a species of concern as follows:

- Kansas – state threatened
- USFS R2 and R3 – sensitive species.

White-faced Ibis

(Plegadis chihi)

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

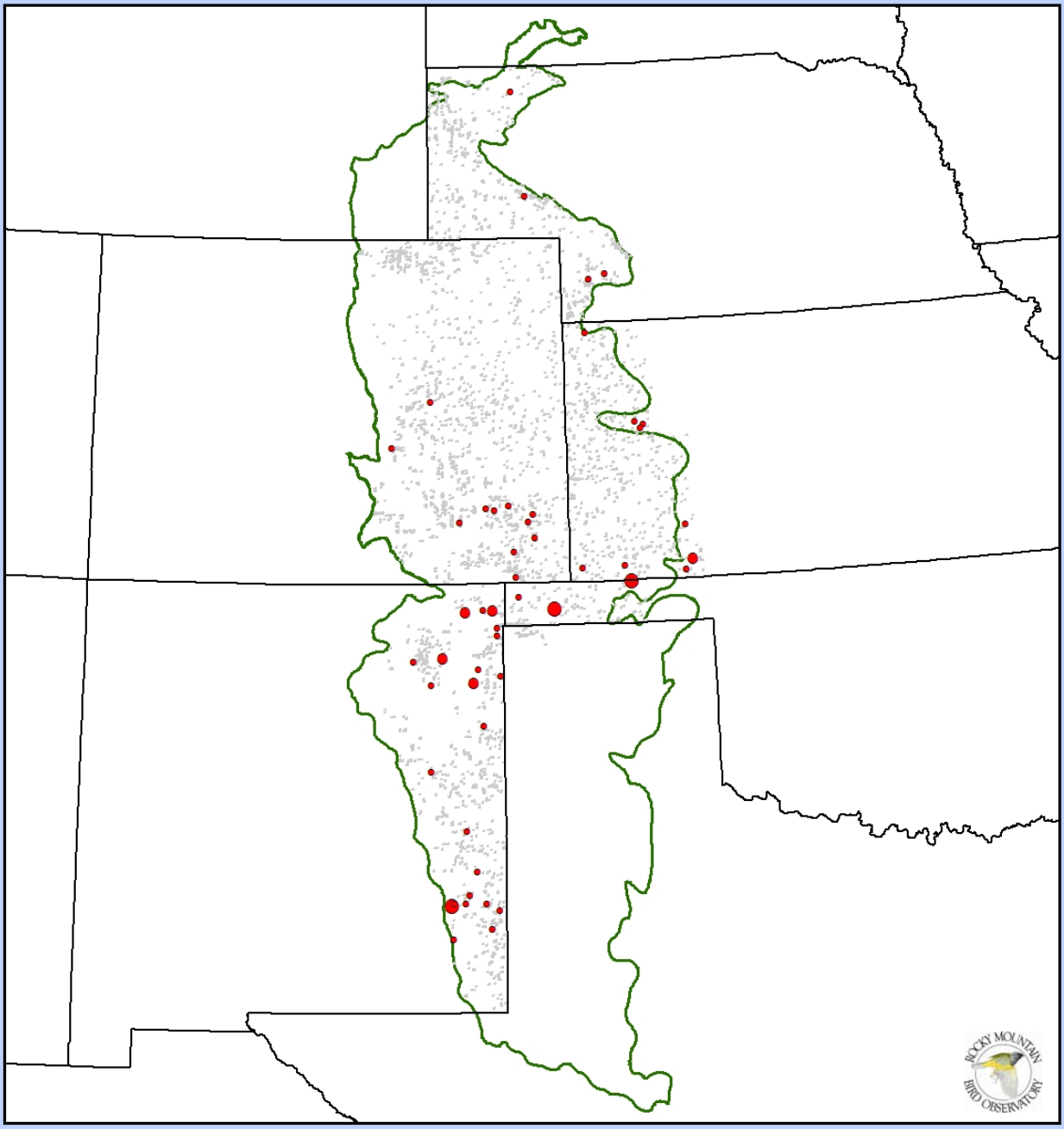
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Turkey Vulture
(Cathartes aura)

In 2003, we observed 88 Turkey Vultures on 50 (2%) of the surveyed sections. Turkey Vultures were observed throughout the study area with concentrations in southeast Colorado and eastern New Mexico.

Turkey Vulture

(Cathartes aura)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Mississippi Kite

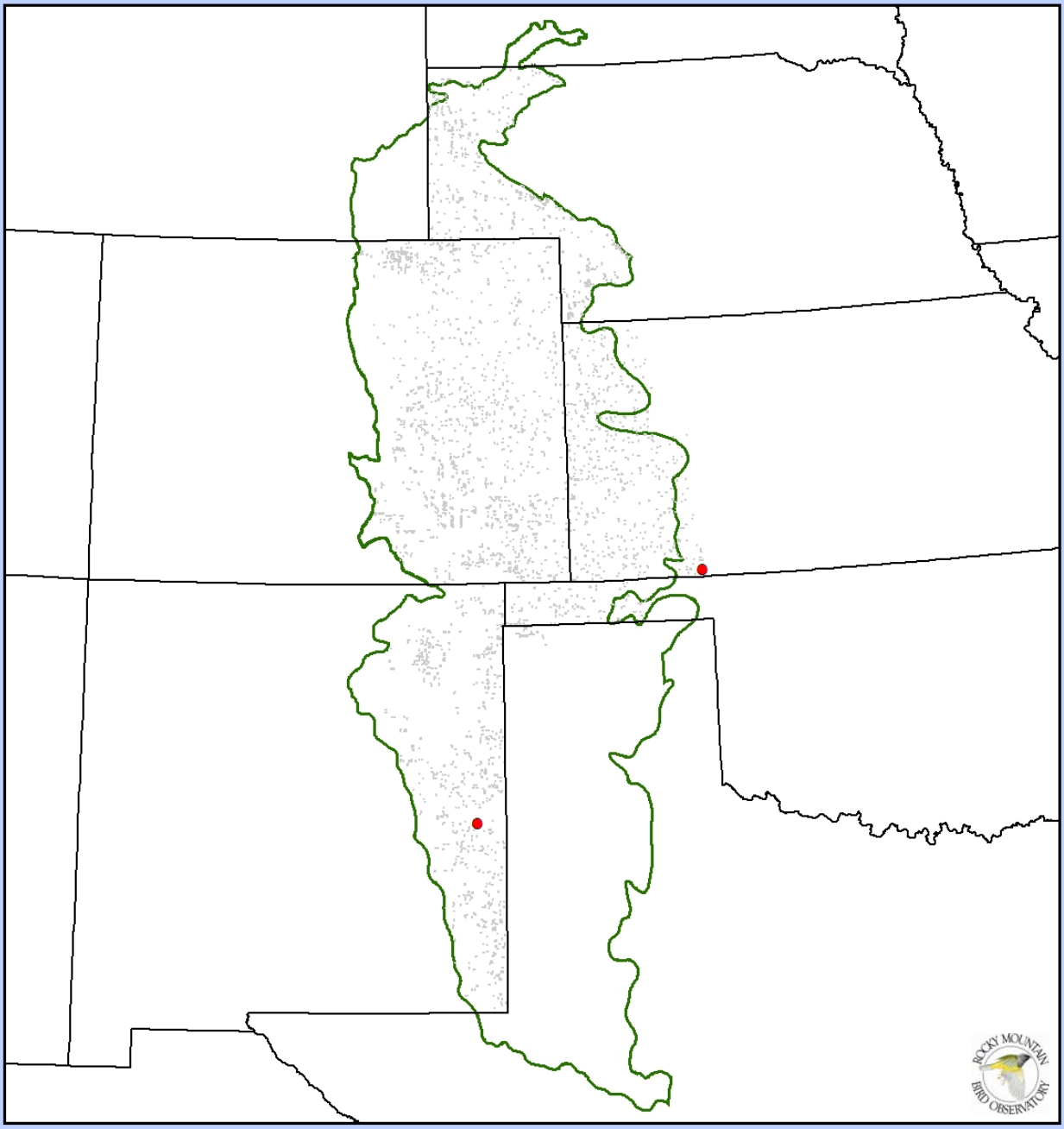
(Ictinia mississippiensis)

In 2003, we detected two Mississippi Kites in Meade County, Kansas and in Roosevelt County, New Mexico. Mississippi Kite is a species of concern as follows:

- Nebraska – species of concern
- USFS R3 – species of concern.

Mississippi Kite

(Ictinia mississippiensis)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

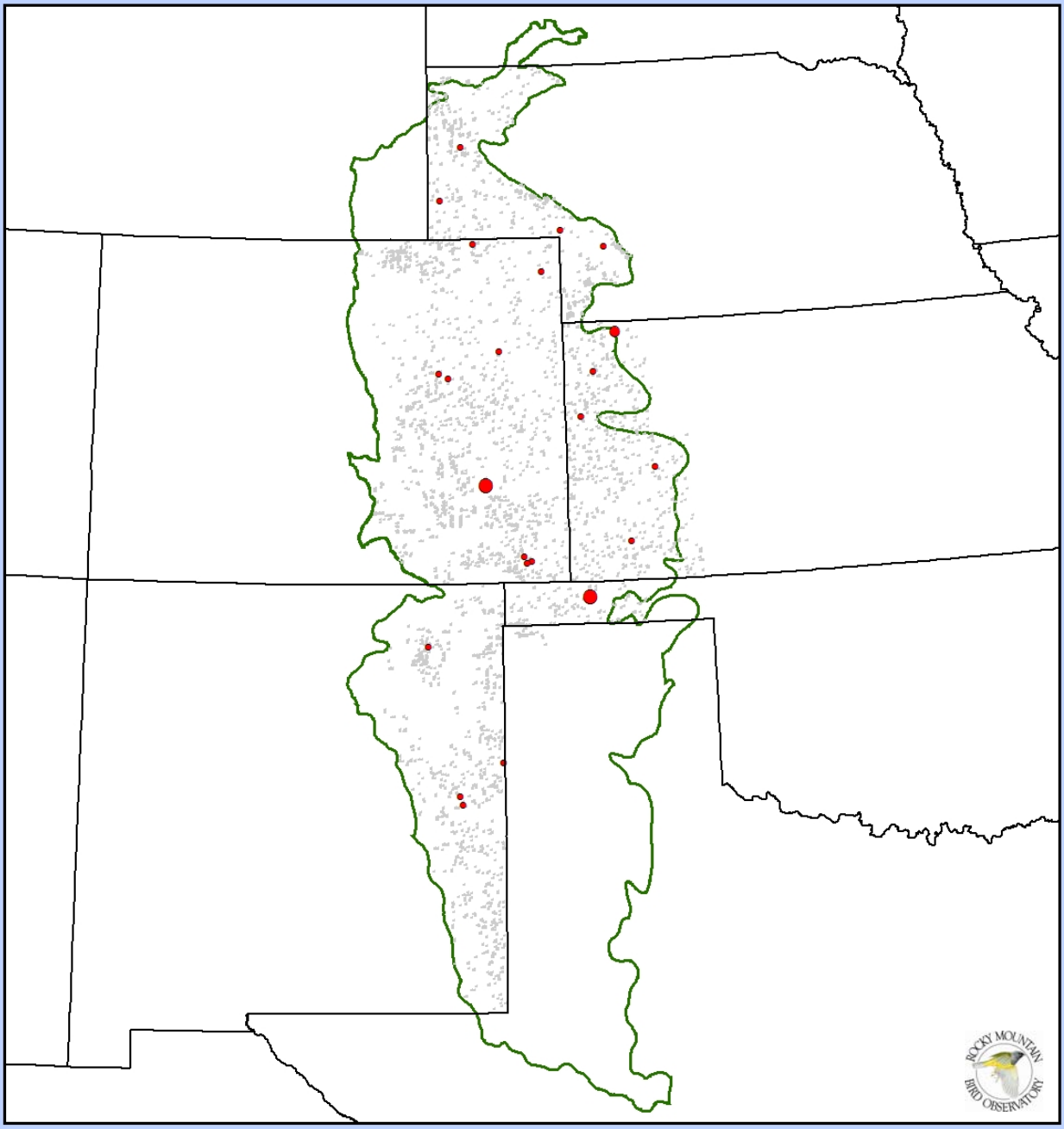
Northern Harrier
(Circus cyaneus)

In 2003, we detected 29 Northern Harriers on 23 (< 1%) of the surveyed sections. This species was widely distributed throughout the study area. Densest populations of this species are associated with large undisturbed tracks of land (R. B. Macwhirte and K.L. Bildstein 1996 No. 210). Northern Harriers are year round residents of the northern and central regions of BCR 18, only wintering in its southern most region. Northern Harrier is a species of concern as follows:

- Partners In Flight – Tier II (high regional priority)
- Nebraska – species of moderate concern
- USFS R2 – species of concern.

Northern Harrier

(Circus cyaneus)



LEGEND

Index of Bird Abundance*

- 0.33 - 0.55
- 0.56 - 0.78
- 0.79 - 1.00

Surveyed Sections

BCR 18**

States

0 50 100 Miles

N

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

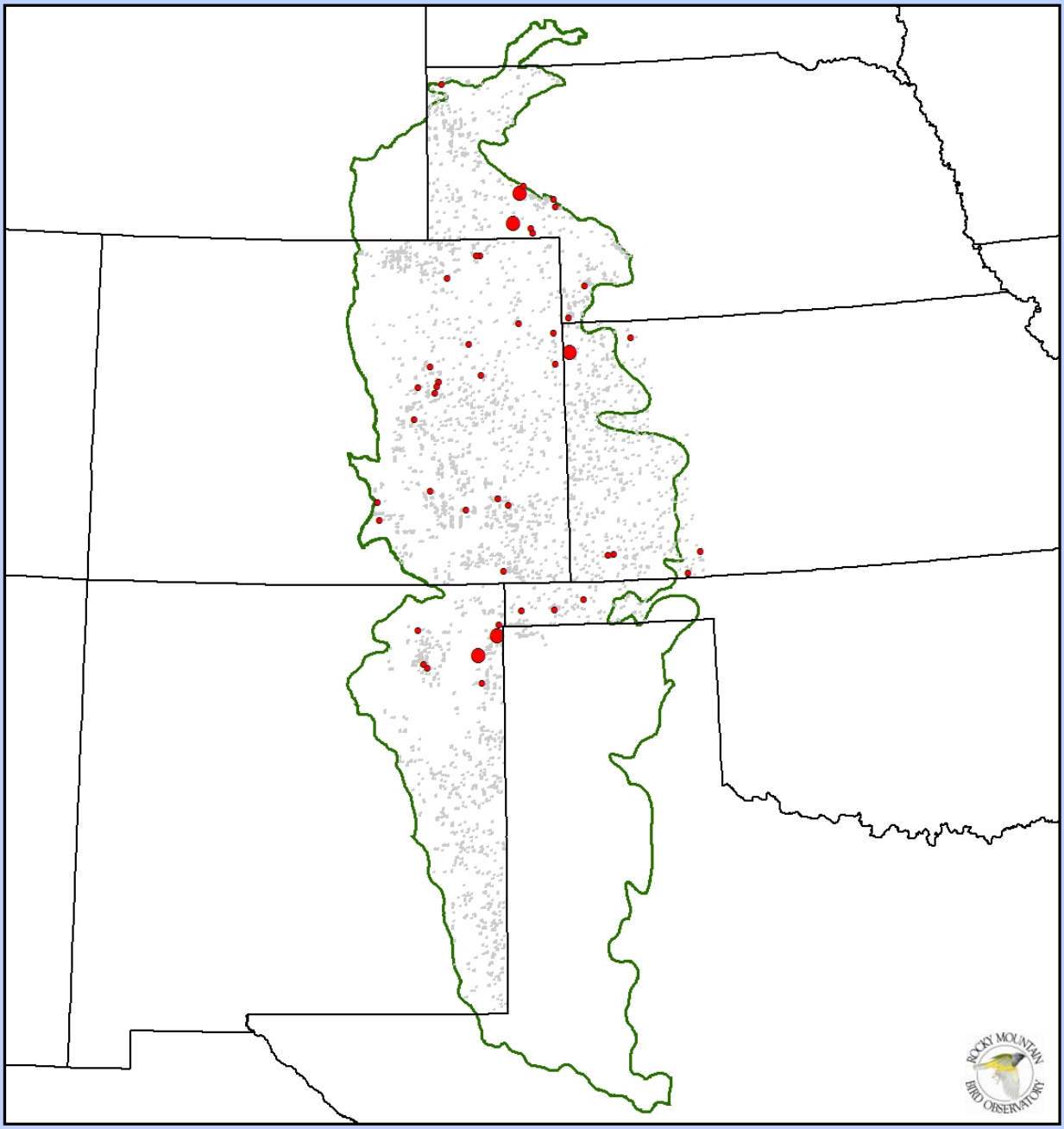
Red-tailed Hawk

(Buteo jamaicensis)

In 2003, we detected 52 Red-tailed Hawks on 47 (2%) of the surveyed sections. The species was widely distributed and occurred at a density of 0.17 birds/km2 (CV = 26%, *n* = 26) throughout native prairie habitat in BCR 18.

Red-tailed Hawk

(Buteo jamaicensis)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

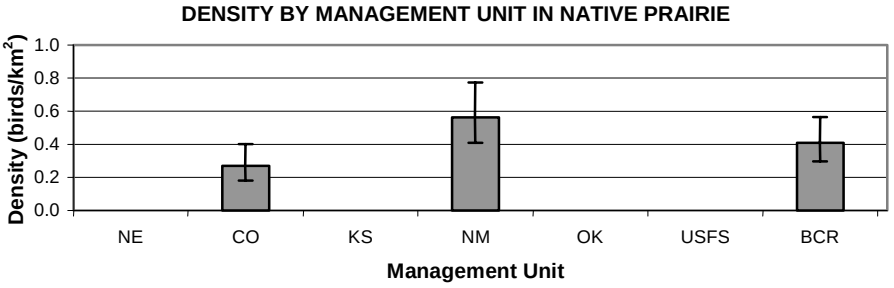
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

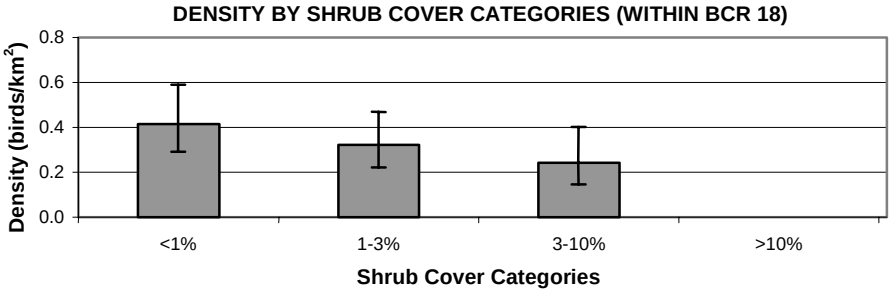
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

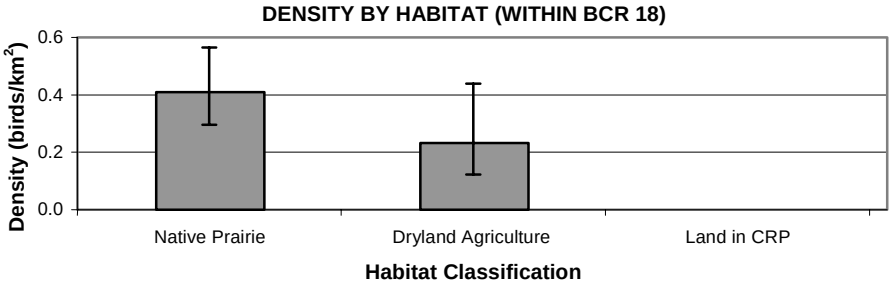
Swainson's Hawk
(Buteo jamaicensis)

In 2003, we detected 334 Swainson's Hawks on 262 (9%) of the surveyed sections. The species was widely distributed across the study area. Density was higher in native prairie habitat (D = 0.41 birds/km^2, CV = 17%, *n* = 160) than in dryland agriculture habitats (D = 0.23 birds/km^2, CV = 33%, *n* = 29). Within native prairie habitat, densities were highest in New Mexico (D = 0.56 birds/km^2, CV = 16%, *n* = 77) and areas of < 1% percent shrub cover (D = 0.41 birds/km^2, CV = 18%, *n* = 52). Swainson's Hawk is a species of concern as follows:

- Partners In Flight – Tier I (high overall priority)
- Nebraska – species of moderate concern
- New Mexico – wildlife of concern
- Oklahoma – species of special concern (Category II).

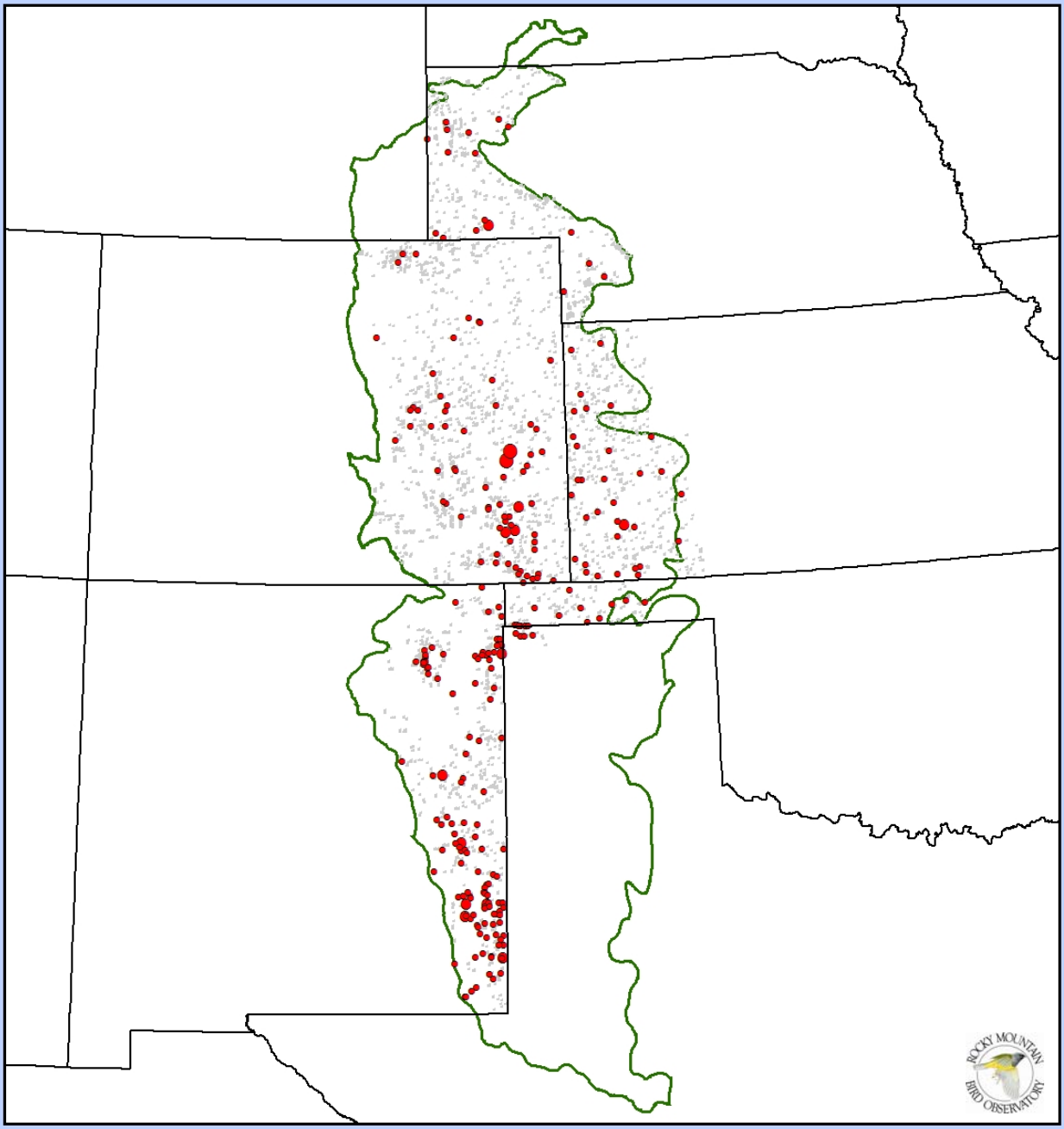






Swainson's Hawk

(Buteo swainsoni)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

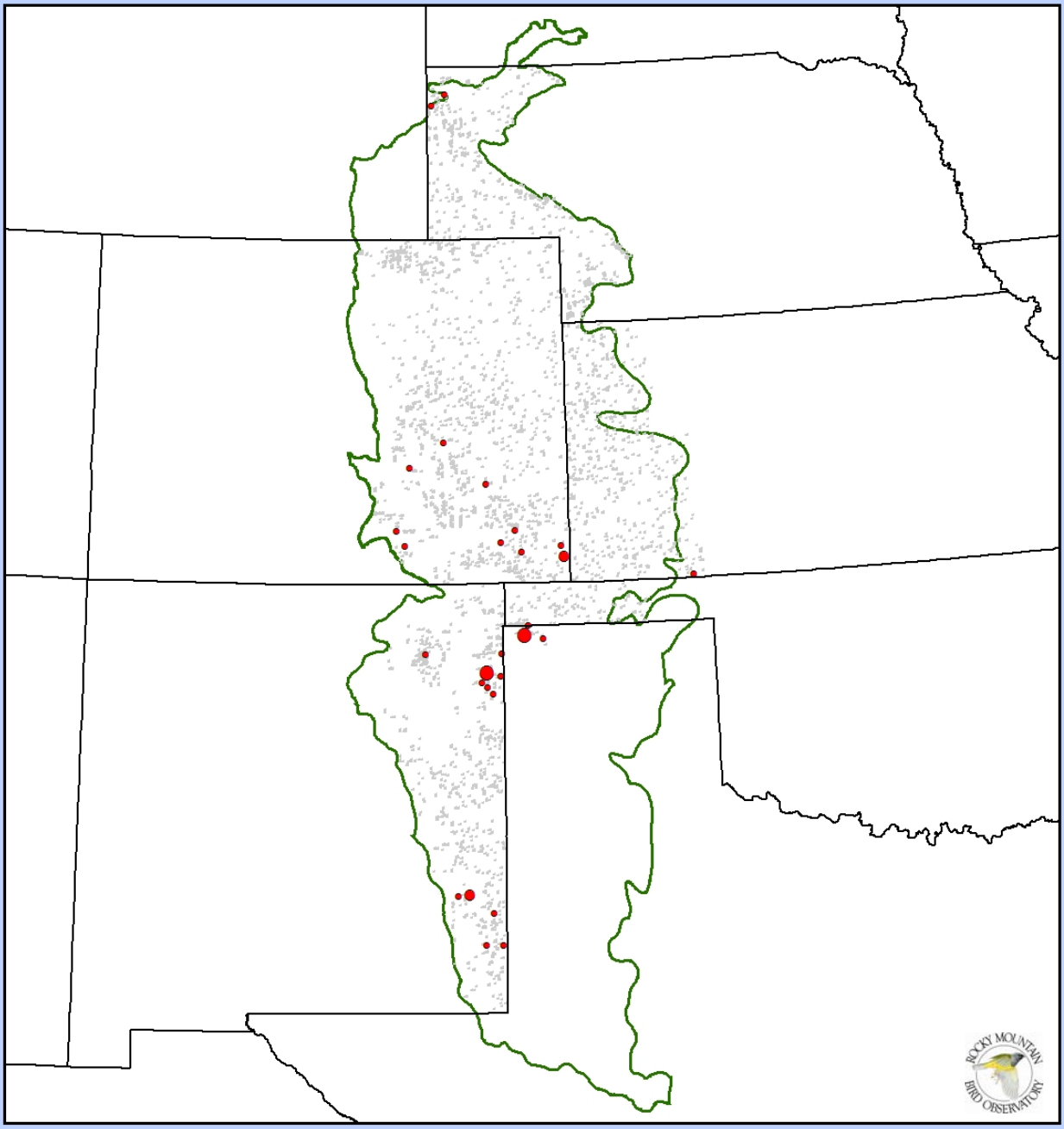
Ferruginous Hawk
(Buteo regalis)

In 2003, we observed 35 Ferruginous Hawks on 28 (< 1%) of the surveyed sections. Observations were scattered throughout the study area. Density of Ferruginous Hawks in native prairie habitat was 0.07 birds/km^2 (CV = 30%, n = 28). Ferruginous Hawk is a species of concern as follows:

- Partners In Flight – Tier I (high overall priority)
- Nebraska – species of high concern
- Colorado – state species of special concern
- Kansas – species in need of conservation (SINC)
- Oklahoma – species of special concern
- USFS R2 and R3 – sensitive species.

Ferruginous Hawk

(Buteo regalis)



LEGEND

Index of Bird Abundance*

- 0.33 - 0.66
- 0.67 - 1.00
- 1.01 - 1.33

Surveyed Sections

BCR 18**

States

0 50 100 Miles

N

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Golden Eagle

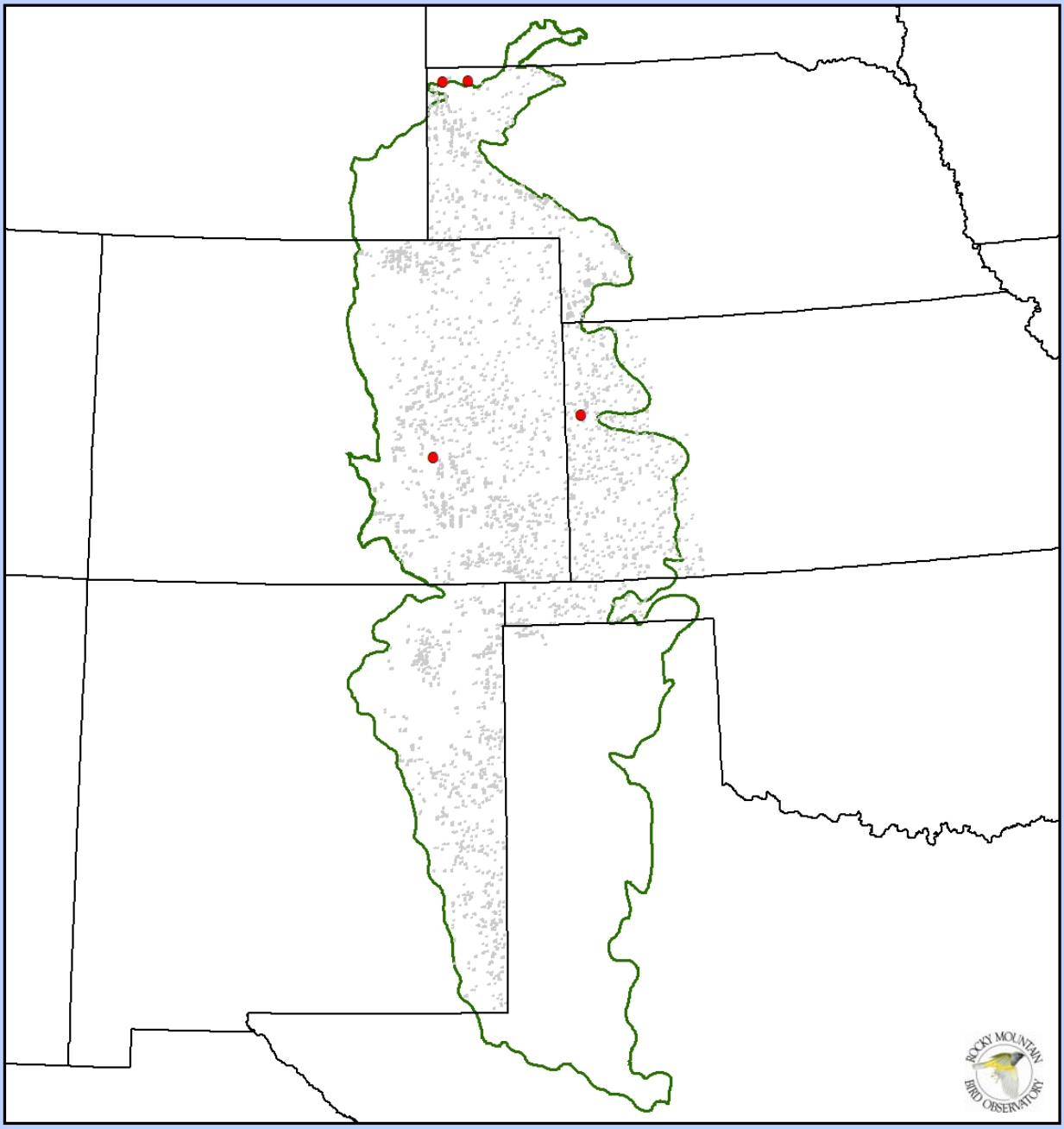
(Aquila chrysaetos)

In 2003, we detected four Golden Eagles –one in each Dawes County and Sioux County, Nebraska, Crowley County, Colorado, and Wallace County, Kansas. Golden Eagle is a species of concern as follows:

- Kansas – species in need of conservation (SINC)
- Oklahoma – species of special concern.

Golden Eagle

(Aquila chrysaetos)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

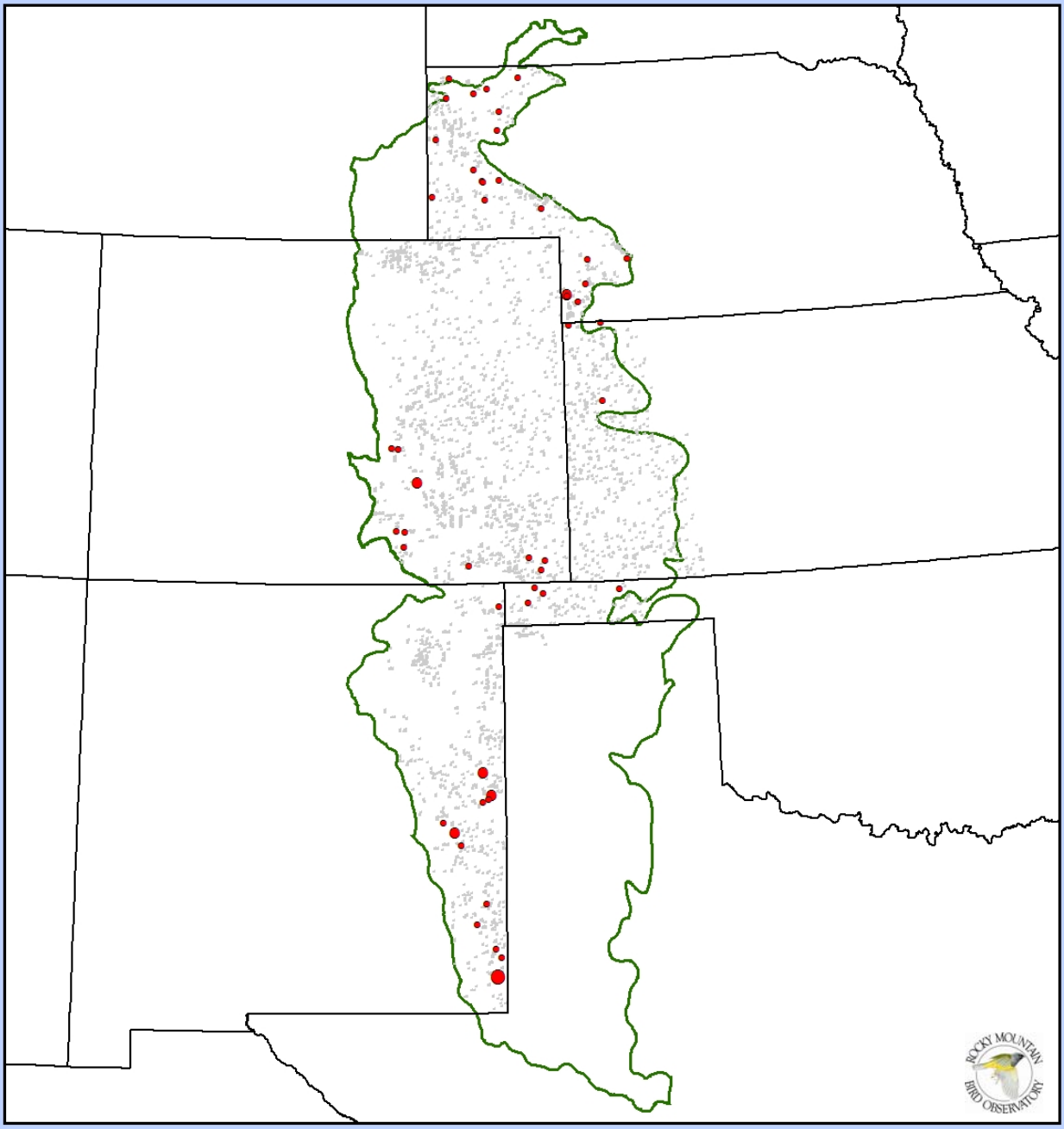
American Kestrel
(Falco sparverius)

In 2003, we detected 58 American Kestrels on 51 (2%) of the surveyed sections. The species was widely distributed throughout the study area. Estimated density in native prairie habitat was 0.23 birds/km^2 (CV = 36%, n = 20). American Kestrel is a species of concern as follows:

- Partners in Flight – Tier I (high overall priority)
- Oklahoma – species of special concern (Category I).

American Kestrel

(Falco sparverius)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

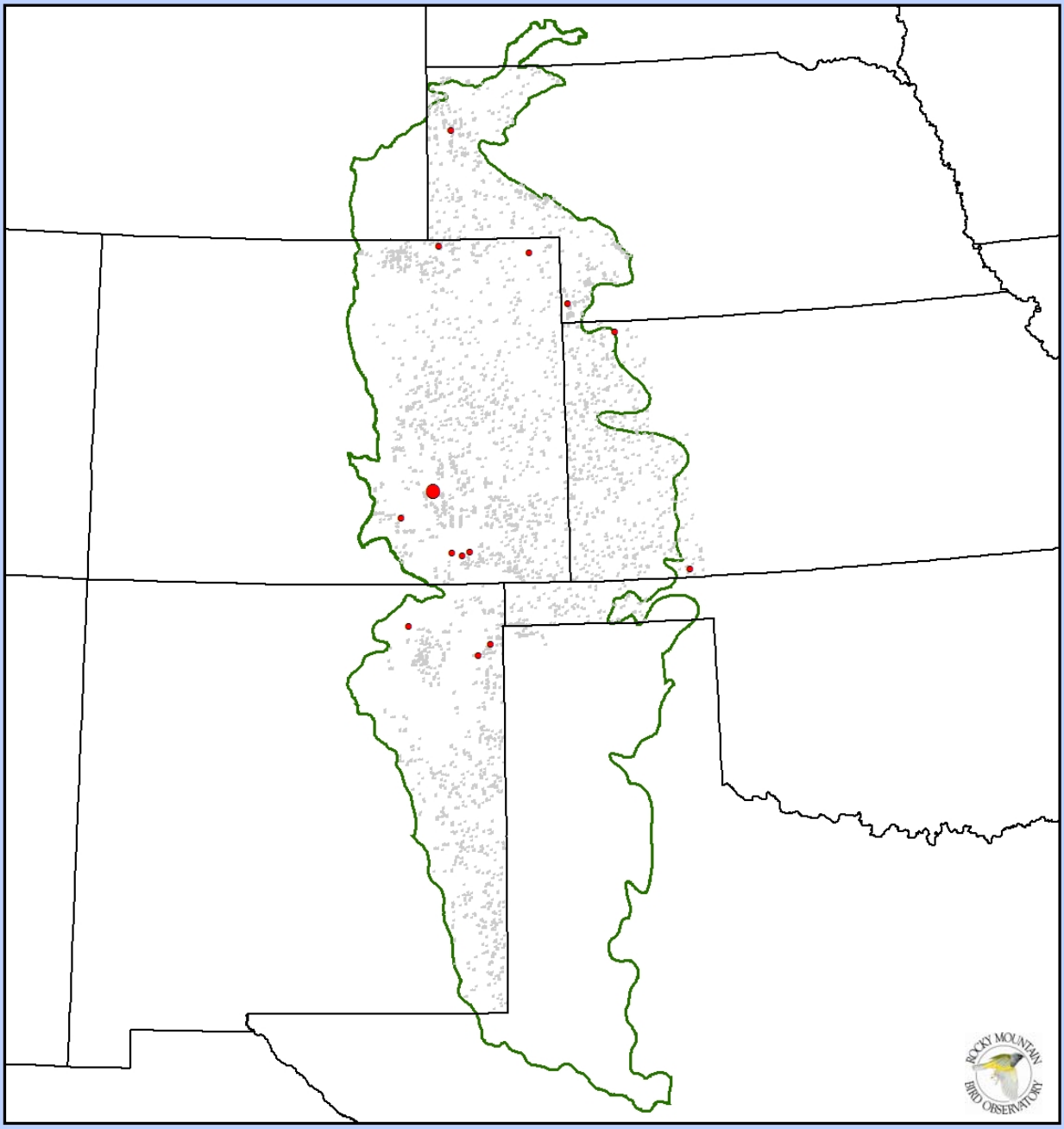
Prairie Falcon

(Falco mexicanus)

In 2003, we detected 15 Prairie Falcons on 14 (< 1%) of the surveyed sections. The species was distributed throughout the shortgrass prairie BRC with observations occurring in Nebraska, Colorado, Kansas, and New Mexico.

Prairie Falcon

(Falco mexicanus)



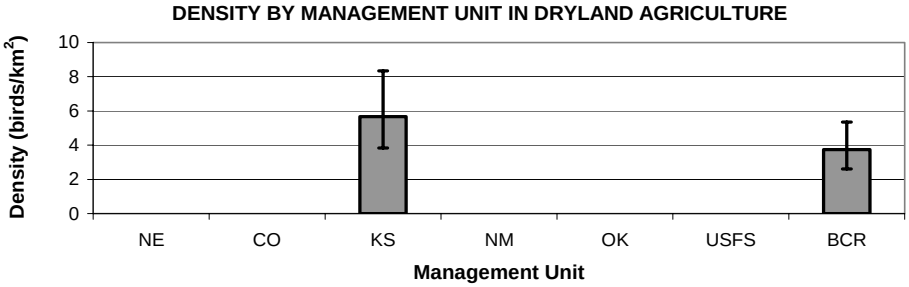
Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

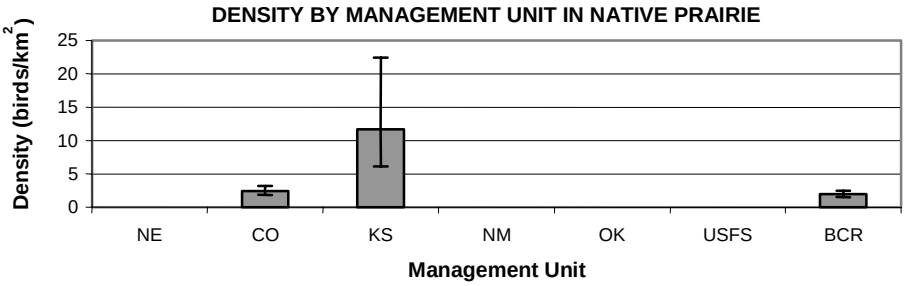
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

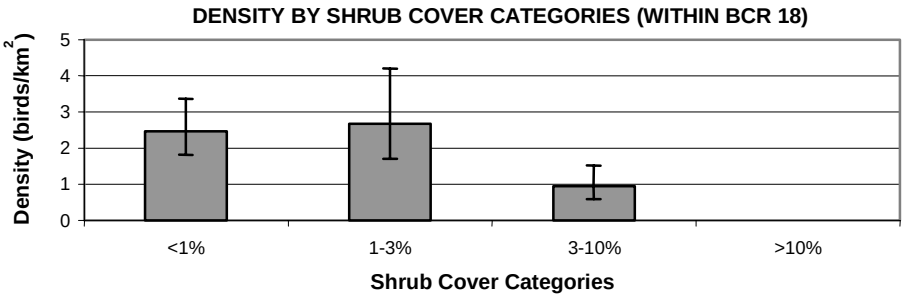
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

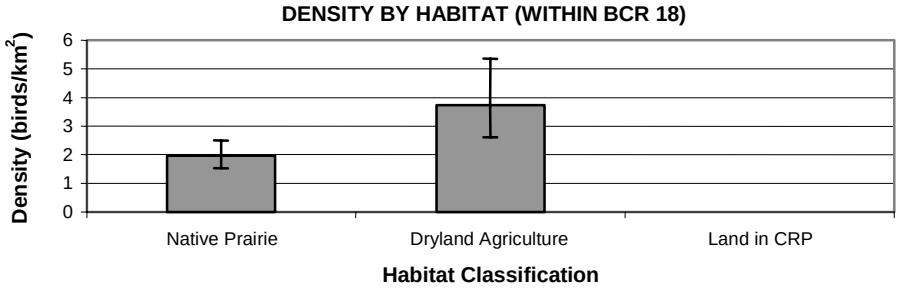
Killdeer
(Charadrius vociferus)

In 2003, we detected 423 Killdeer on 299 (10%) of the surveyed sections. This species was widely distributed throughout the study area. Density was higher in dryland agriculture habitat (D = 3.74 birds/km^2, CV = 18%, *n* = 64) than in native prairie habitat (D = 01.95 birds/km^2, CV = 12%, n = 152). Within native prairie habitat, density was highest in areas of 1-3% shrub cover (D = 0.2.68 birds/km^2, CV = 23%, *n* = 42).



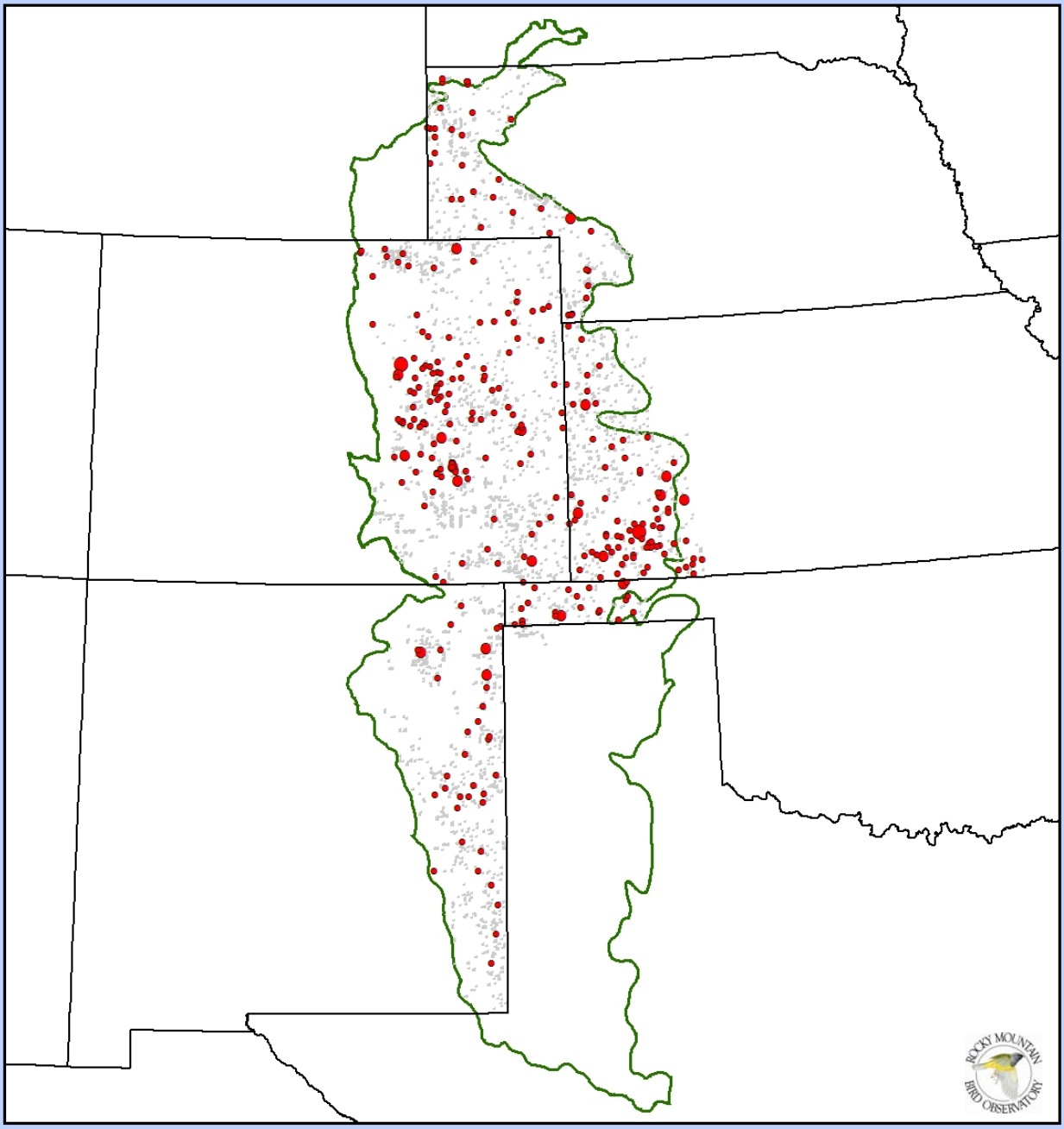






Killdeer

(Charadrius vociferus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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Mountain Plover

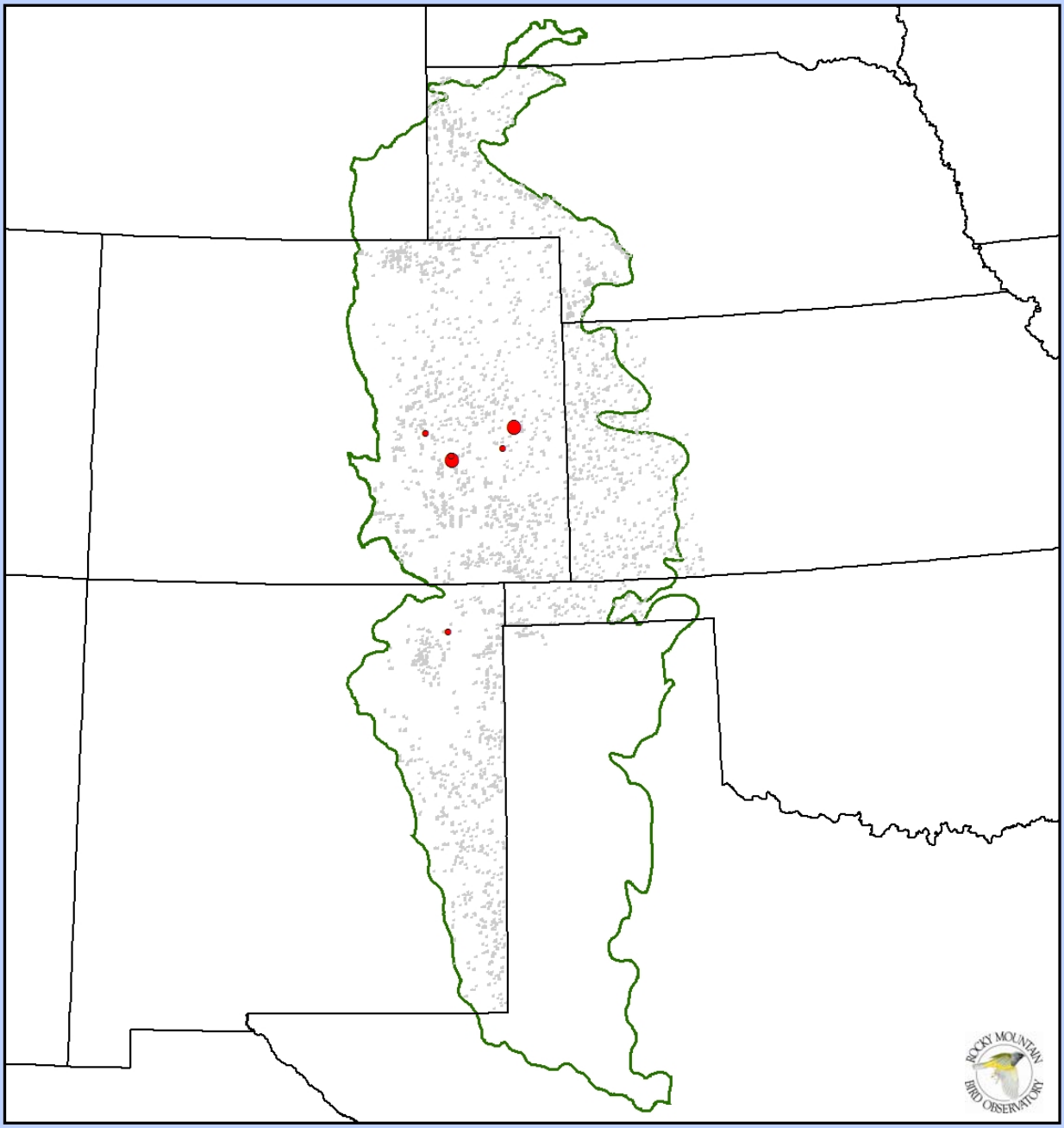
(Charadrius montanus)

In 2003, we detected eight Mountain Plovers on six (< 1%) of the surveyed sections. Seven observations occurred on sections of native prairie habitat where black-tailed prairie dogs were present. One observation occurred in dryland agriculture habitat categorized as fallow (with stubble). Mountain Plover is a species of concern as follows:

- Partners In Flight – Tier I (high overall priority)
- Nebraska – state listed species (threatened or endangered)
- Colorado – state species of special concern
- Kansas – species in need of conservation (SINC)
- New Mexico – wildlife of concern.

Mountain Plover

(Charadrius montanus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

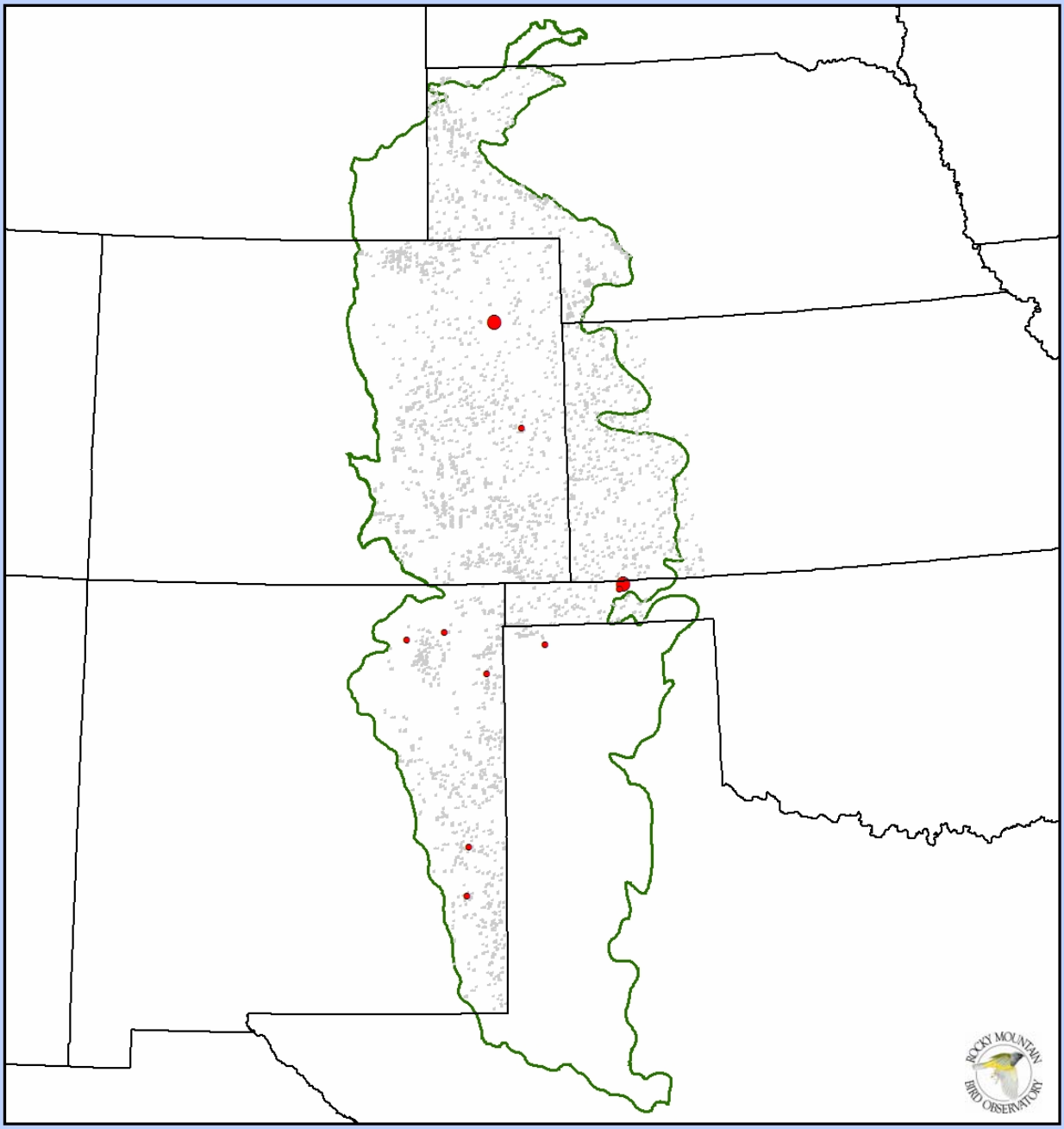
American Avocet

(Recurvirostra americana)

In 2003, we detected 28 American Avocets on 11 (< 1%) of the surveyed sections. The species was found scattered across BCR 18 with observations occurring in Colorado, New Mexico, Oklahoma and on Rita Blanca National Grassland in Texas. American Avocet is a species of moderate concern in Nebraska.

American Avocet

(Recurvirostra americana)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

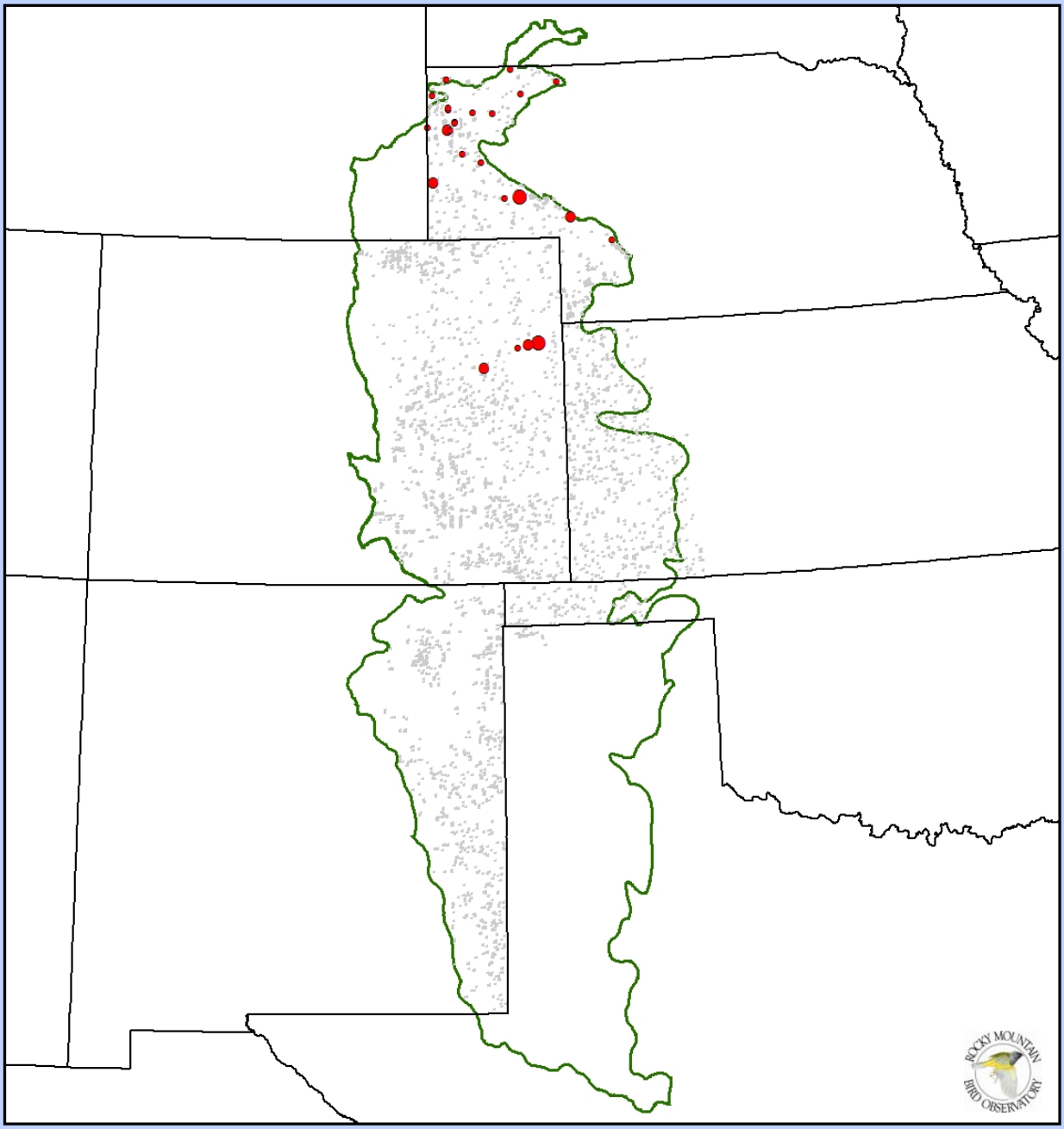
Upland Sandpiper
(Bartramia longicauda)

In 2003, we detected 34 Upland Sandpipers on 25 (< 1%) of the surveyed sections. This species' distribution was restricted to the northern region of the shortgrass prairie BCR with most observations occurring in western Nebraska. Upland Sandpiper is a species of concern as follows:

- Partners In Flight – Tier II (high regional priority)
- Nebraska – species of moderate concern
- USFS R2 – sensitive species.

Upland Sandpiper

(Bartramia longicauda)



LEGEND

Index of Bird Abundance*
- 0.33 - 0.55
- 0.56 - 0.78
- 0.79 - 1.00

Surveyed Sections
BCR 18**
States

0 50 100 Miles

N

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

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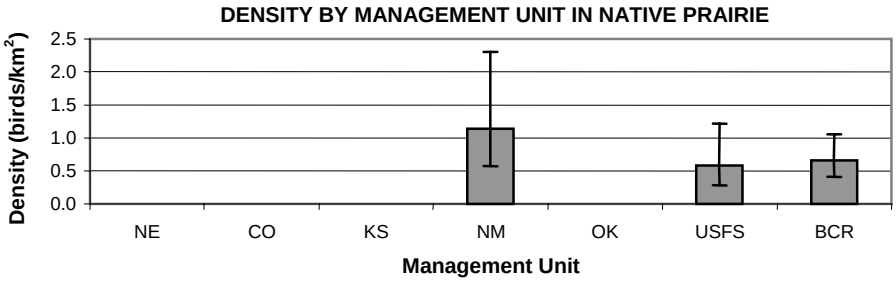
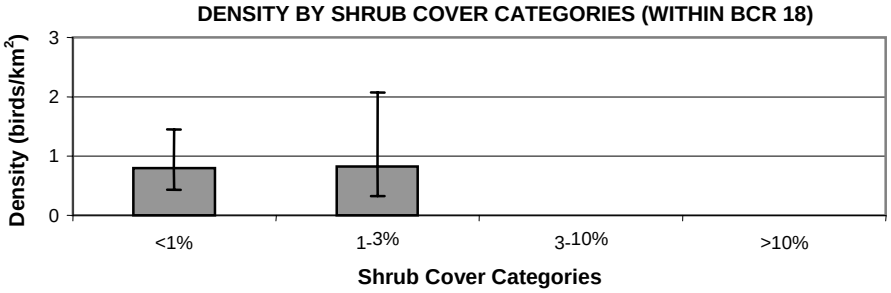
Long-billed Curlew
(Numenius americanus)

In 2003, we observed 244 Long-billed Curlews on 116 (4%) of the surveyed sections. This species was distributed across the study area with its highest densities occurring in eastern New Mexico (D = 1.14 birds/km^2, CV = 37%, *n* = 35). Long-billed Curlew is a species of concern as follows:

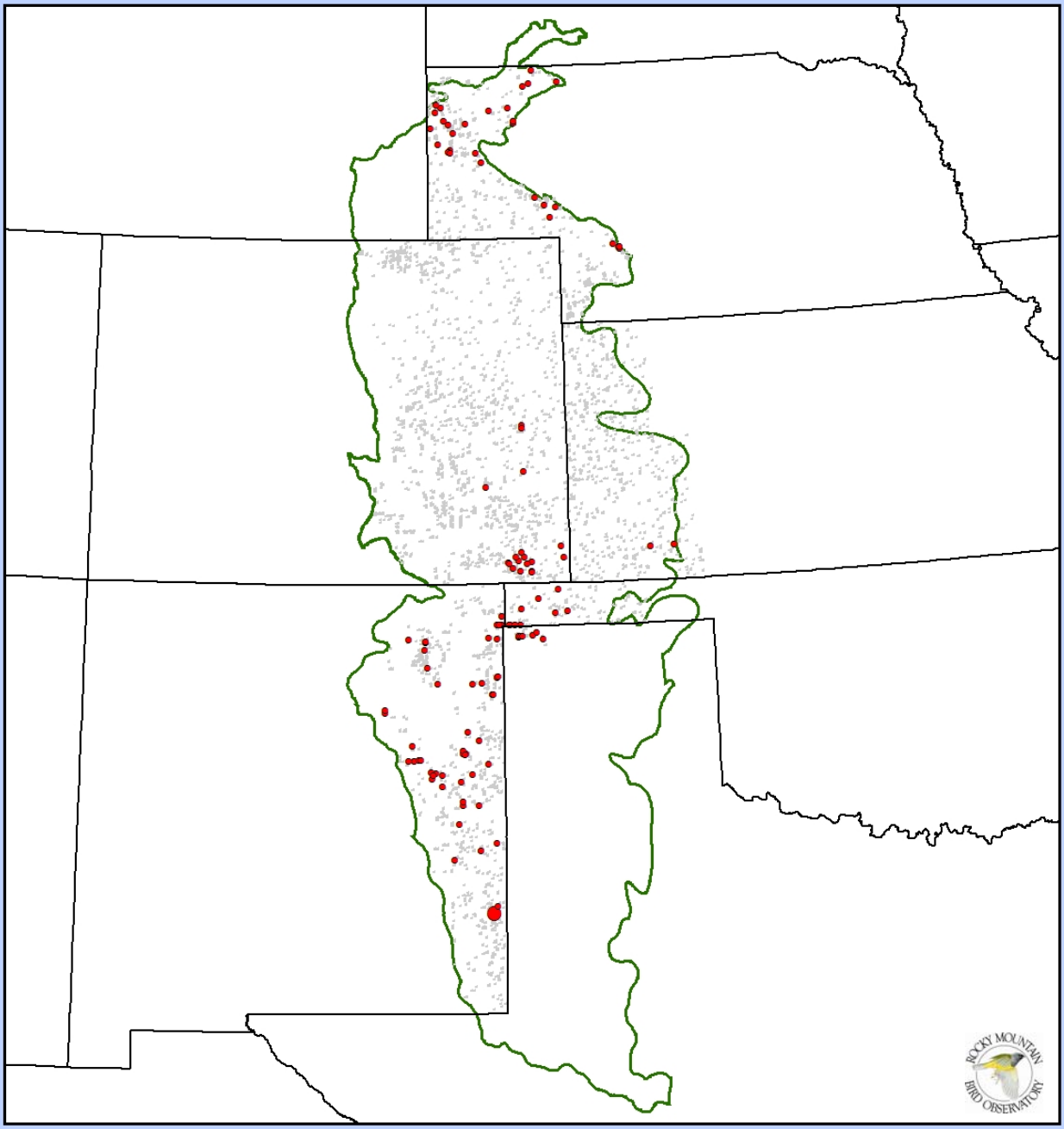
- Partners In Flight - Tier I (high overall priority)
- Nebraska – species of high concern
- Colorado – state species of special concern
- Kansas – species in need of conservation (SINC)
- Oklahoma – species of special concern (Category I)
- USFS R2 and R3 – sensitive species.





Long-billed Curlew

(Numenius americanus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

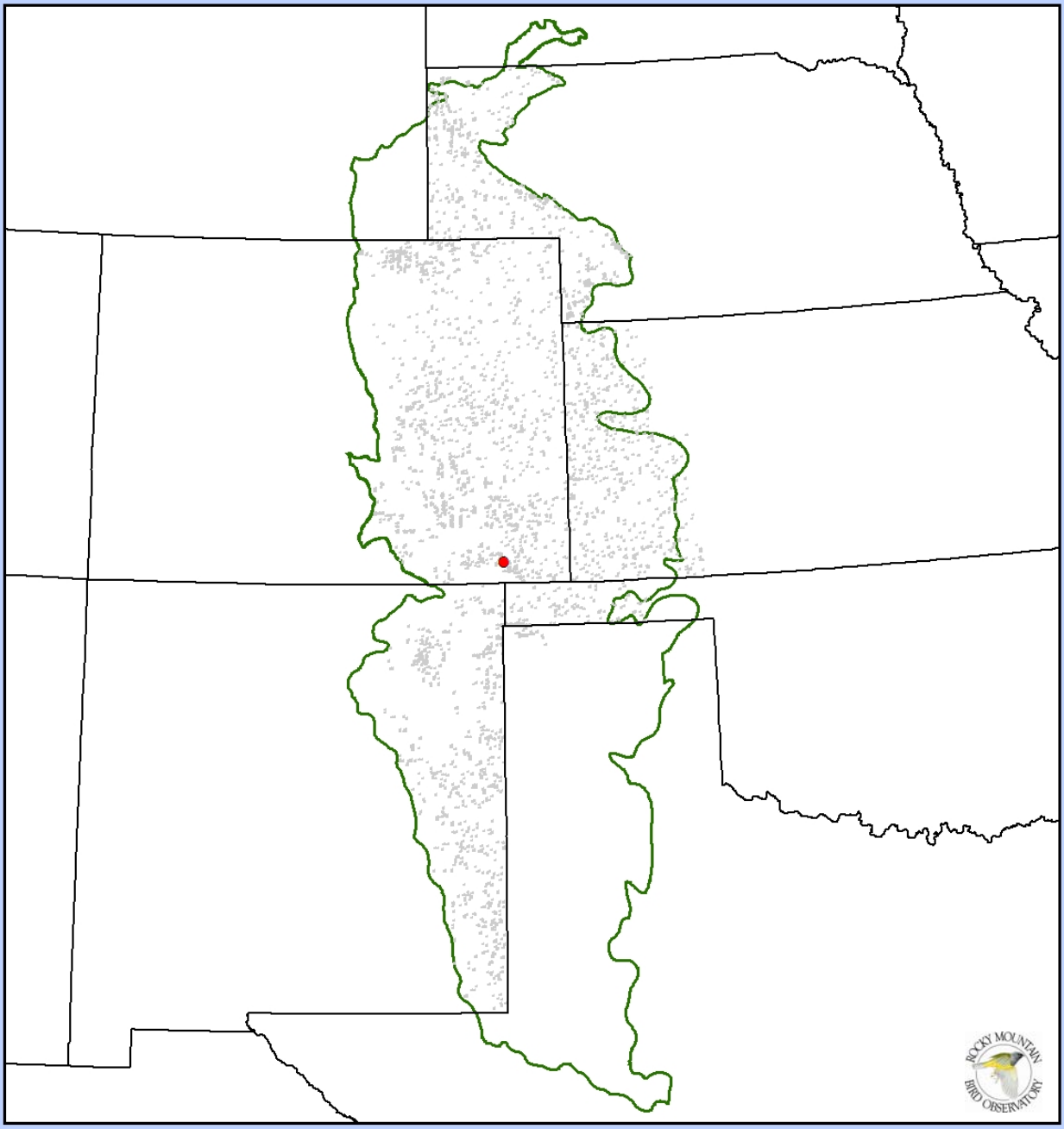
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Marbled Godwit
(Limosa fedoa)

In 2003, we detected two Marbled Godwits in Baca County, Colorado.

Marbled Godwit

(Limosa fedoa)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

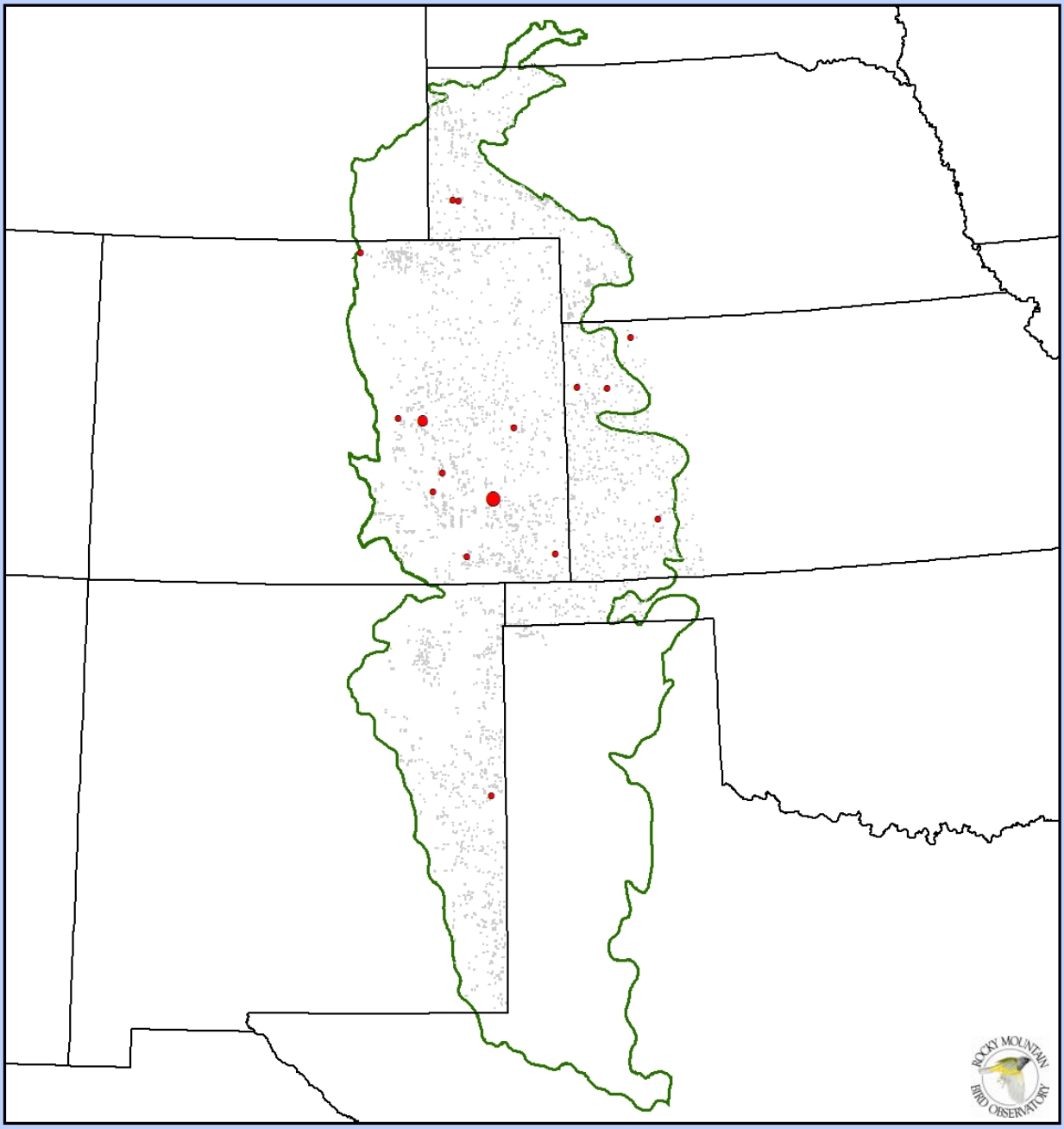
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Rock Pigeon
(Columbia livia)

In 2003, we detected 69 individuals on 16 (<1%) of the sections surveyed. This species was generally distributed throughout the Shortgrass Prairie BCR mainly nesting in crevices in both natural and anthropogenic habitats. This species was formerly known as Rock Dove.

Rock Pigeon

(Columbia livia)



LEGEND

Index of Bird Abundance*
- 0.33 - 2.22
- 2.23 - 4.11
- 4.12 - 6.00

Surveyed Sections
BCR 18**
States

0 50 100 Miles

N

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

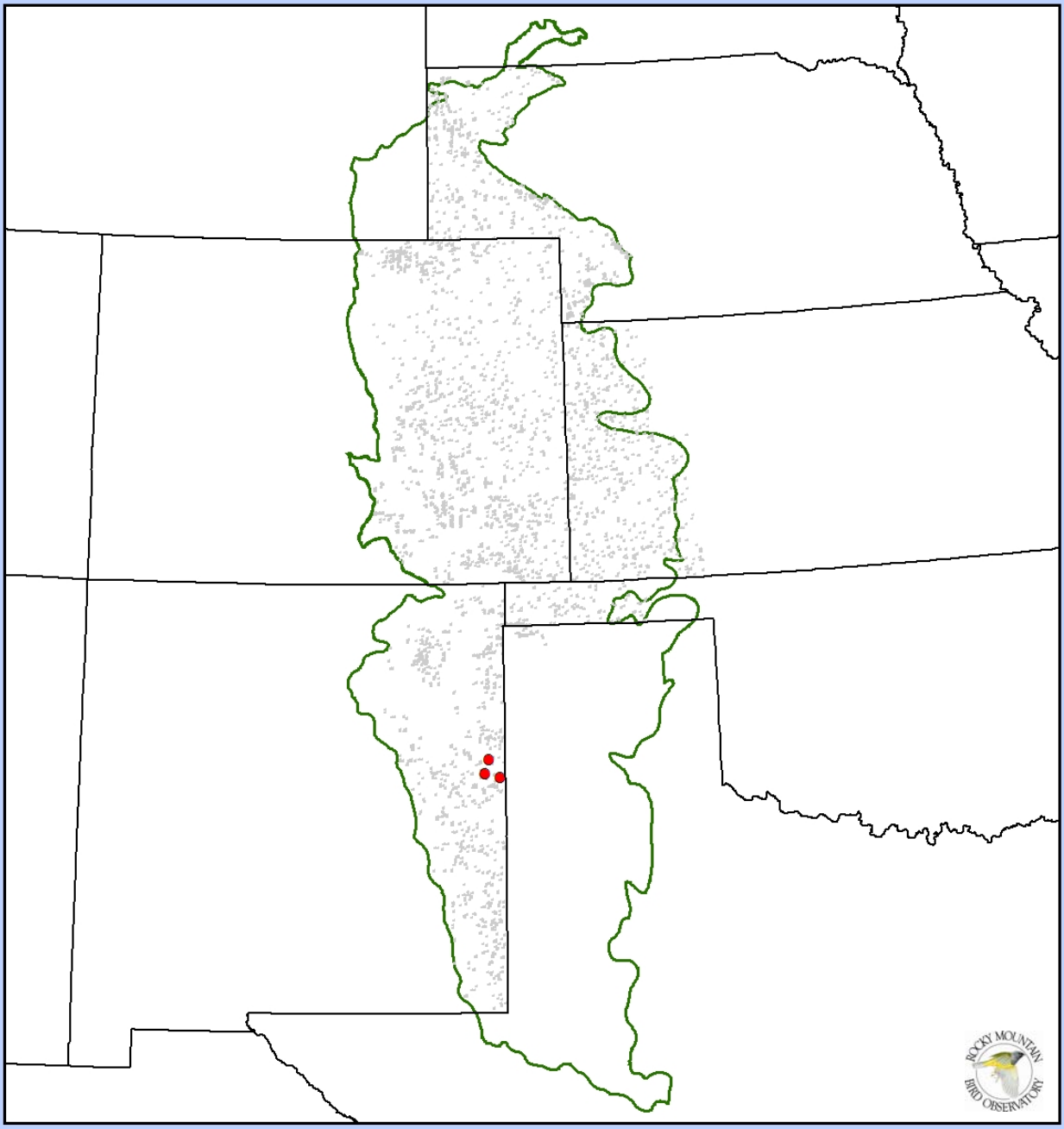
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

White-winged Dove
(Zenaida asiatica)

In 2003, we detected 26 individuals on three (<1%) of the sections surveyed. All of the detections occurred in the New Mexico portion of the Shortgrass Prairie BCR.

White-winged Dove

(Zenaida asiatica)



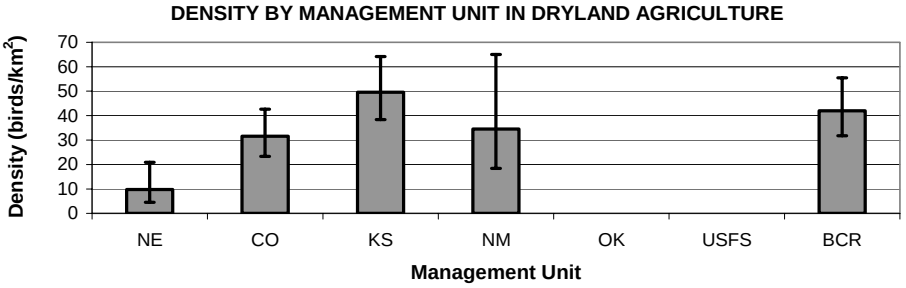
Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

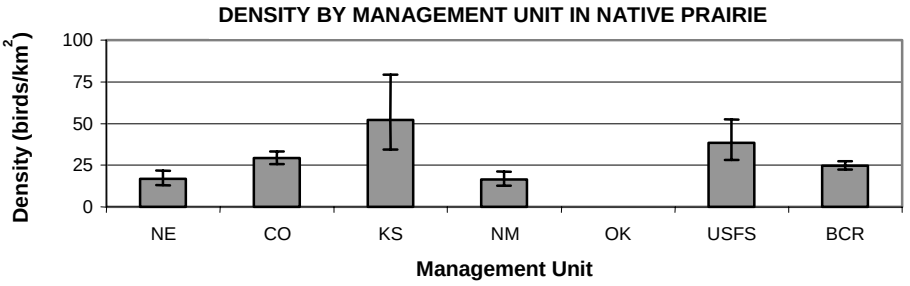
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

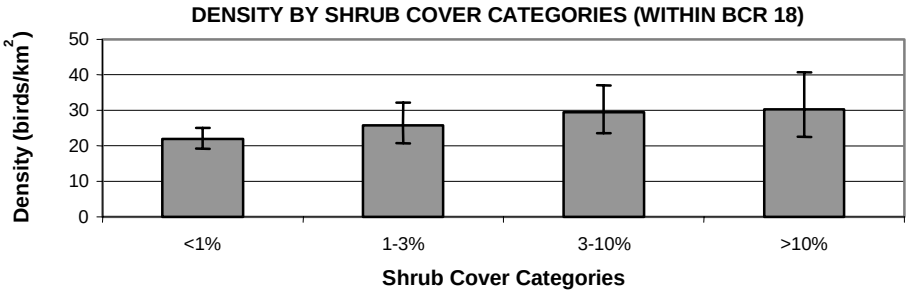
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

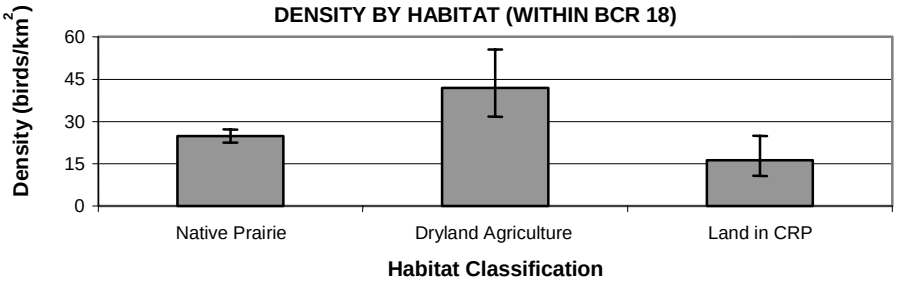
Mourning Dove
(Zenaida macroura)

In 2003, we detected 4357 individuals on 1514 (50%) of the sections surveyed. The Mourning Dove commonly occurs throughout the Shortgrass Prairie BCR. The largest density of this species occurs in the state of Kansas (D = 52.17 birds/km^2, CV = 22%, *n* = 150) which is mostly composed of dryland agriculture. Densities of the Mourning dove in Dryland agricultural habitat within BCR 18 is also large (D = 41.95 birds/km^2, CV = 14%, *n* = 593) showing preference for dryland agriculture. Generally, this species does not prefer percent shrub cover as it occurred in all categories at similar densities.



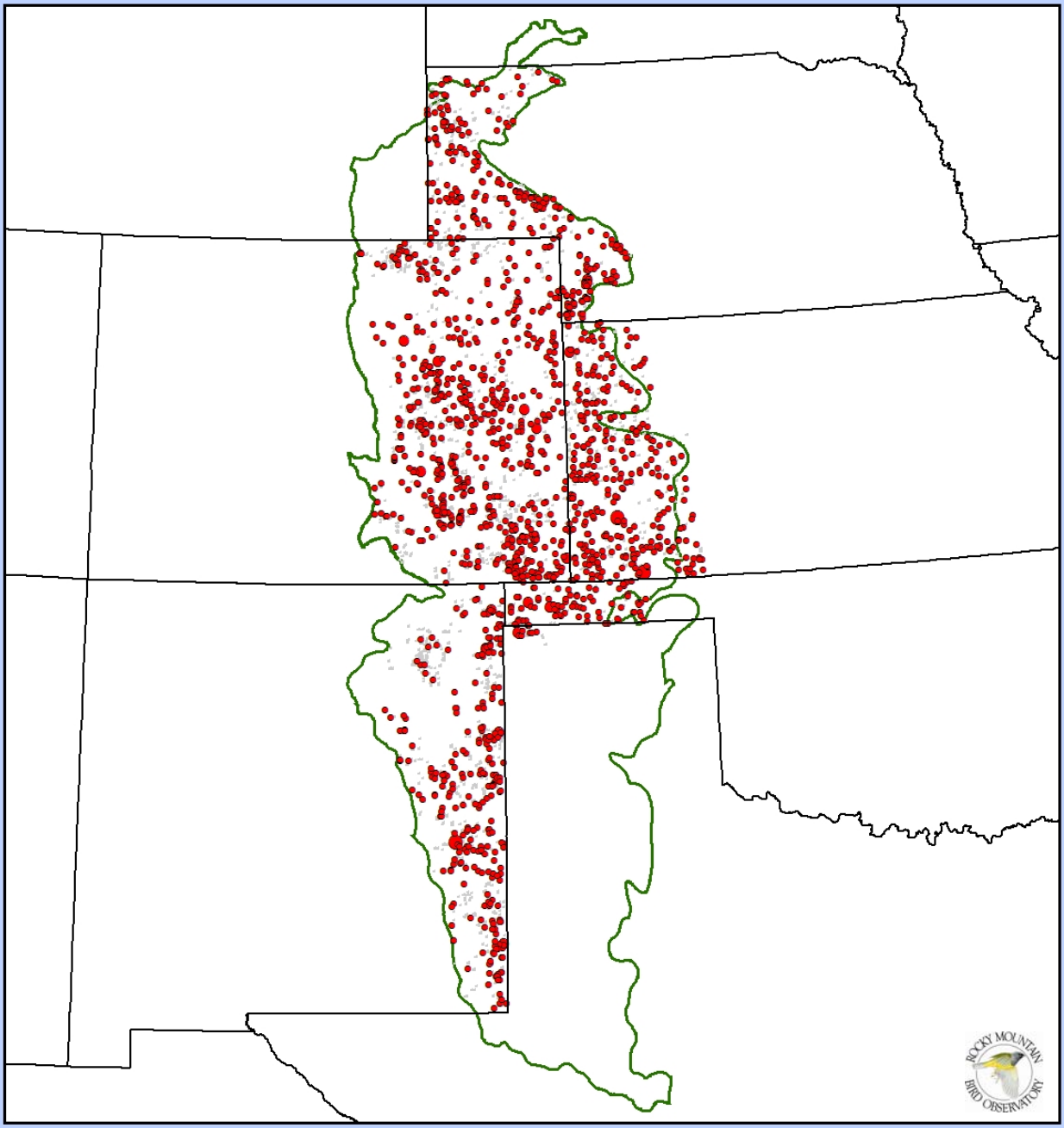






Mourning Dove

(Zenaida macroura)



LEGEND

Index of Bird Abundance*
- 0.33 - 3.44
- 3.45 - 6.56
- 6.57 - 9.67

Surveyed Sections
BCR 18**
States

0 50 100 Miles

N

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Yellow-billed Cuckoo

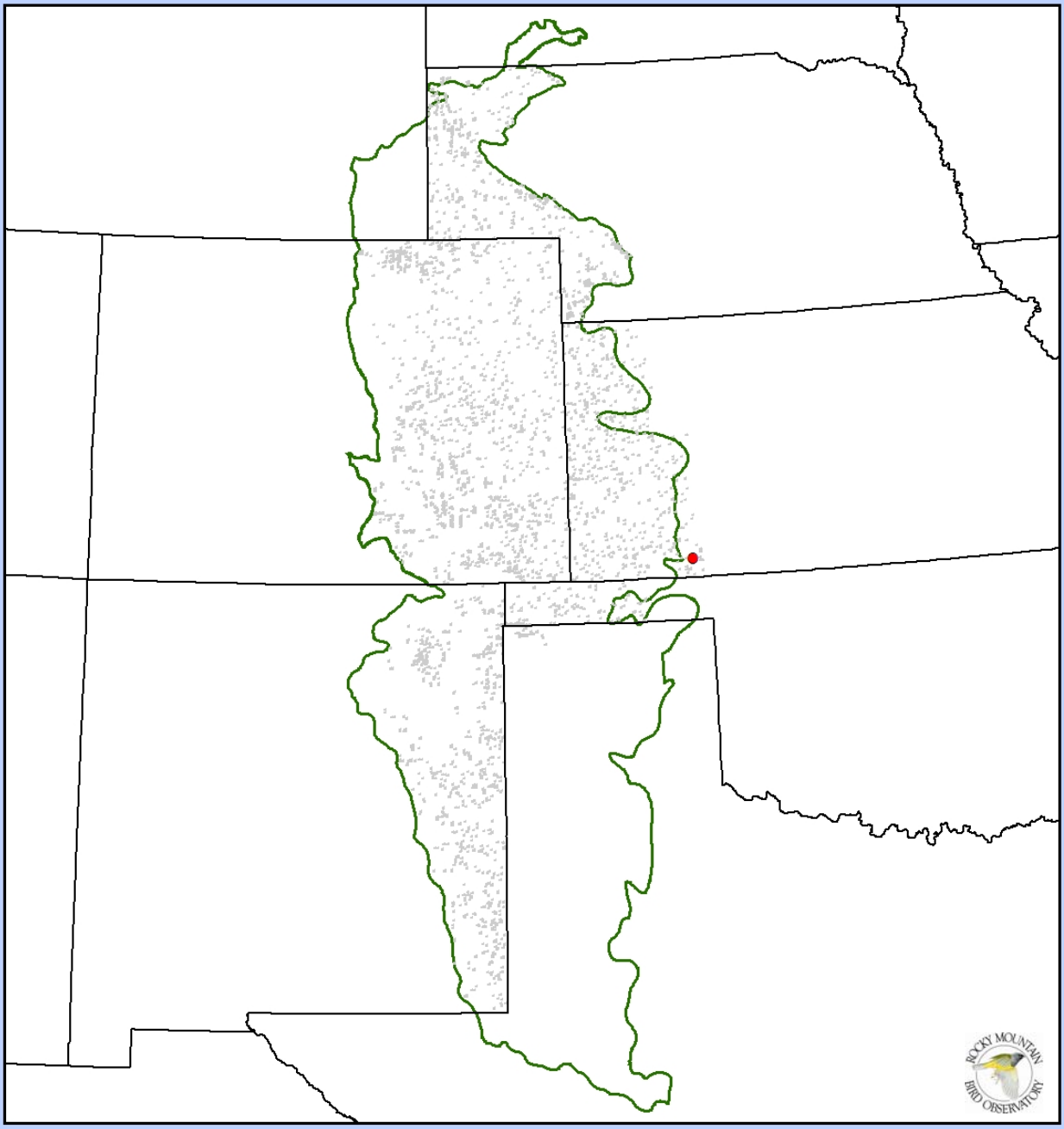
(Coccyzus americanus)

In 2003, we detected one individual bordering the Shortgrass Prairie BCR boundary in Meade County, Kansas. Yellow-billed Cuckoo is a species of concern as follows:

- Nebraska – species of high concern
- Colorado – state species of special concern
- New Mexico – wildlife of concern
- USFS R2 and R3 – sensitive species.

Yellow-billed Cuckoo

(Coccyzus americanus)



LEGEND

Index of Bird Abundance*
0.33

Surveyed Sections
BCR 18**
States
0 50 100 Miles
N

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

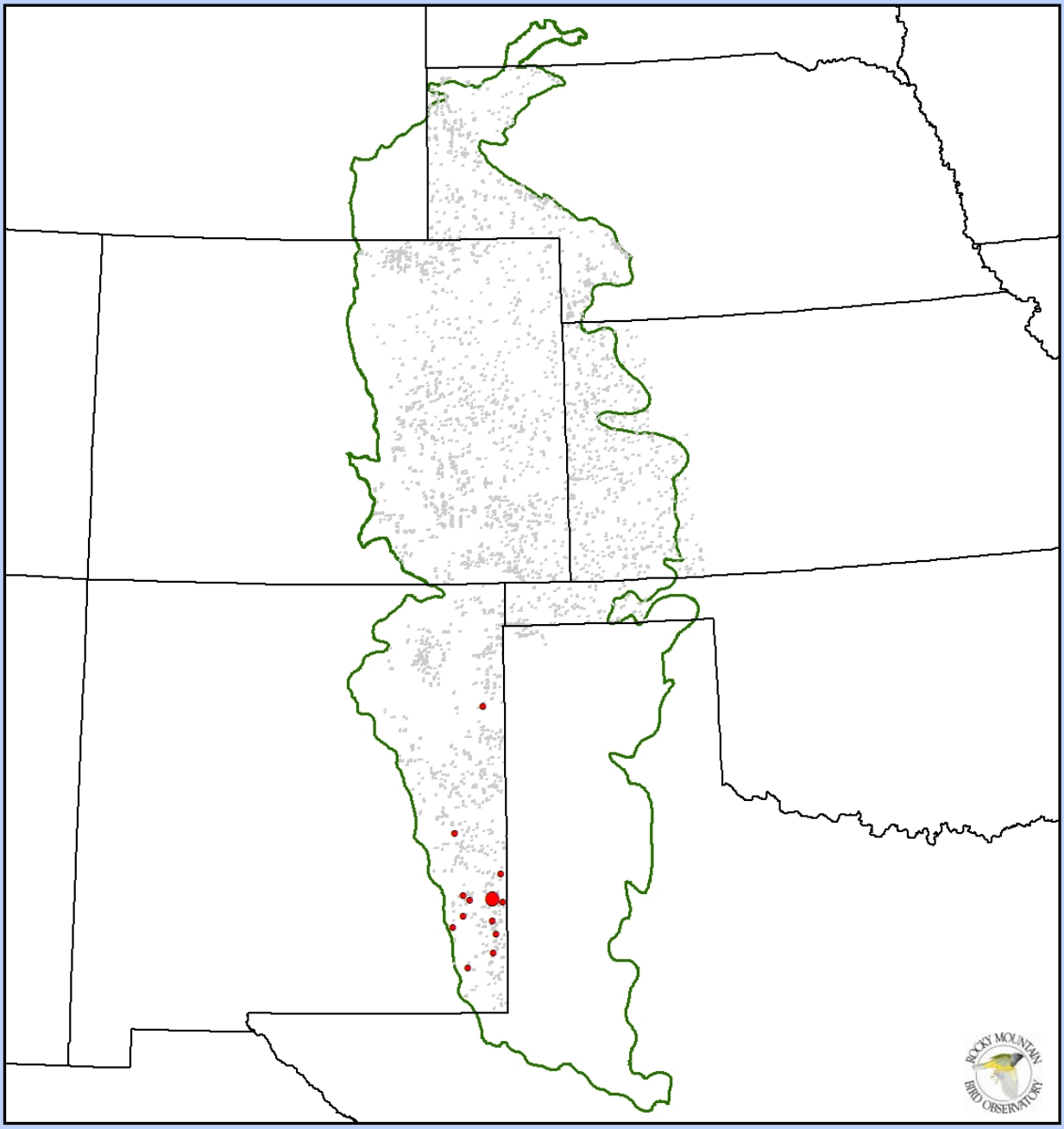
Greater Roadrunner

(Geococcyx californianus)

In 2003, we observed 14 Great Roadrunners on 13 (< 1%) of the surveyed sections. This species was detected only in eastern New Mexico with most observations occurring in the southeast region of the state.

Greater Roadrunner

(Geococcyx californianus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

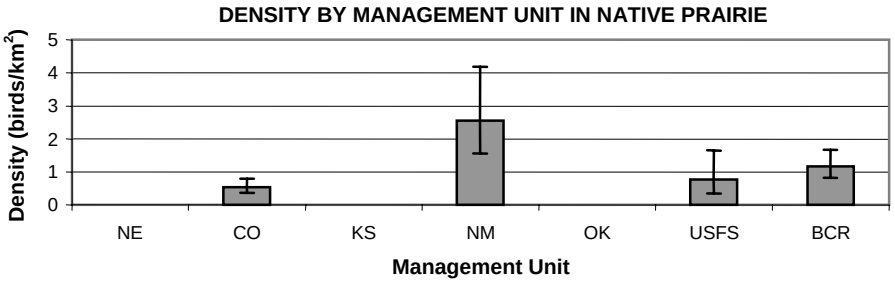
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

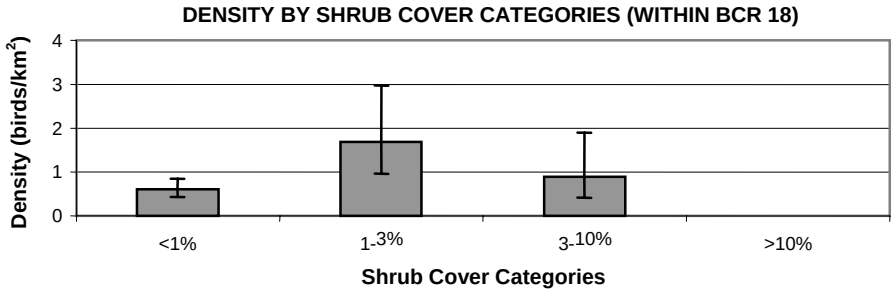
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Burrowing Owl
(Athene cunicularia)

In 2003, we detected 280 Burrowing Owls on 140 (5%) of the surveyed sections. This species was widely distributed throughout the study area with observations occurring in every state. The highest densities (D = 2.55 birds/km^2, CV = 26%, *n* = 57) of Burrowing Owls occurred in eastern New Mexico with concentrations in the southeast region of the state. Density within native prairie habitat across the study area was 1.17 birds/km^2 (CV = 18%, *n* = 123). Density within native prairie habitat was highest in areas of 1-3% shrub cover (D = 1.69 birds/km^2, CV = 29%, *n* = 38). Sixty-eight Burrowing Owl observations occurred on sections with Black-tailed Prairie Dog colonies. Burrowing Owl is a species of concern as follows:

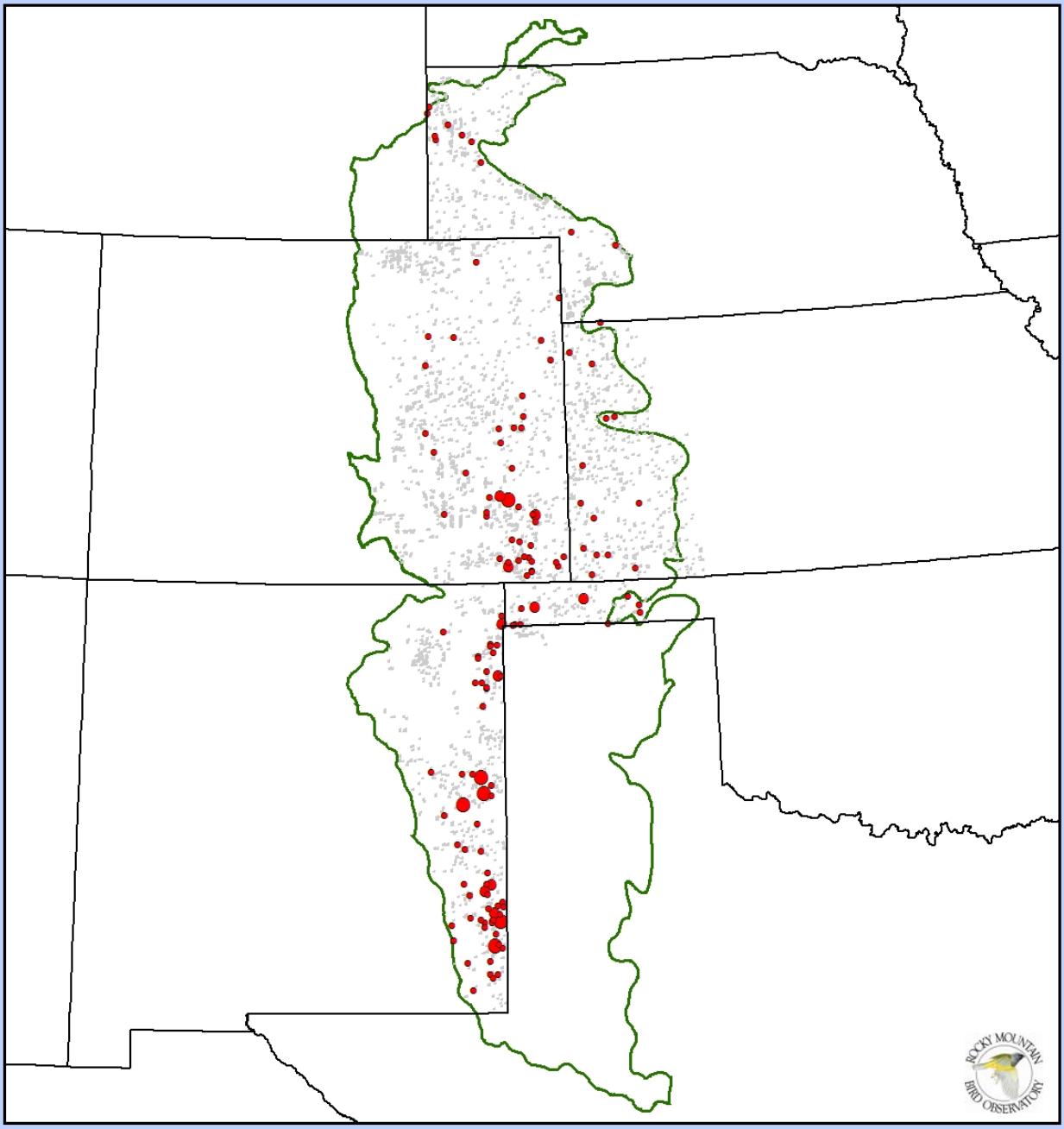
- Partners In Flight – Tier I (high overall priority)
- Nebraska – species of high concern
- Colorado – state threatened
- Oklahoma – species of special concern
- USFS R2 and R3 – sensitive species.





Burrowing Owl

(Athene cunicularia)



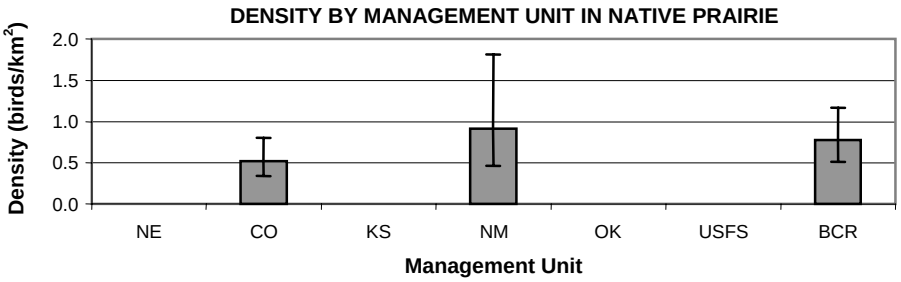
Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

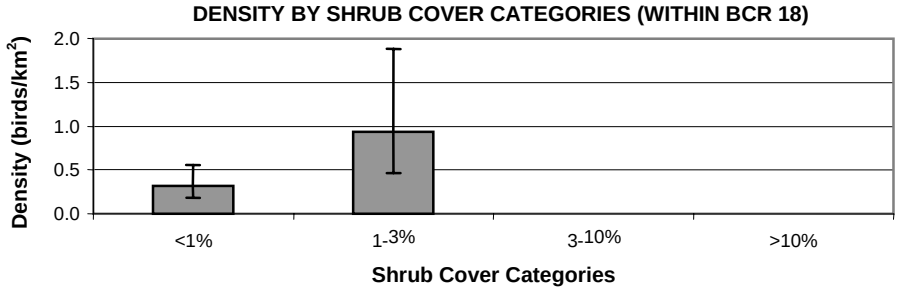
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Common Nighthawk
(Chordeilis minor)

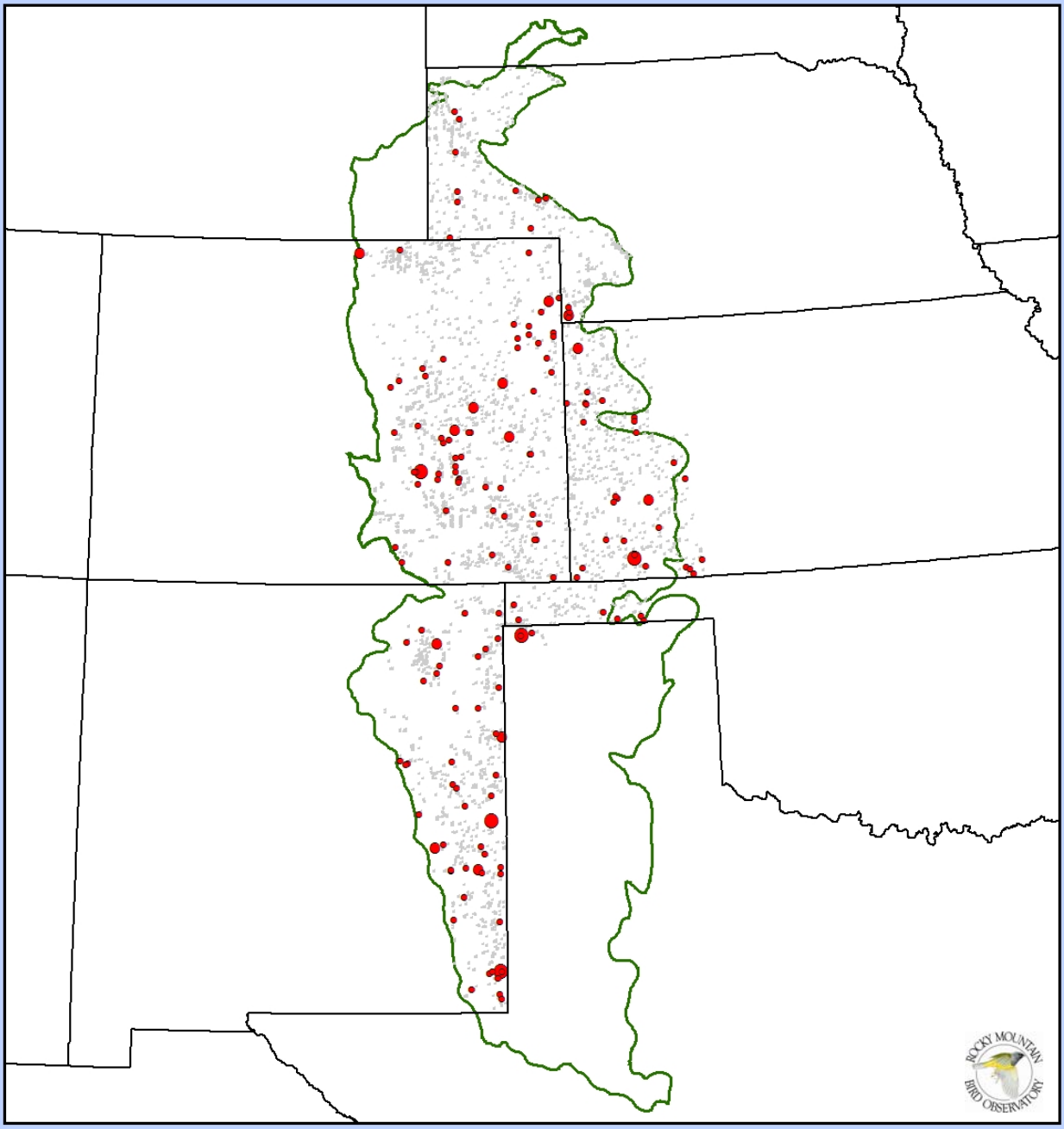
In 2003, we detected 267 individuals on 163 (5%) of the sections surveyed. The Common Nighthawk was distributed throughout the Shortgrass Prairie BCR. Largest densities occurred in New Mexico (D = 0.92 birds/km^2, CV = 35%, *n* = 13) and Colorado (D = 0.52 birds/km^2, CV = 22%, *n* = 48). The Common Nighthawk exhibits a preference for the 1-3% shrub category (D = 0.93 birds/km^2, CV = 37%, *n* = 21).





Common Nighthawk

(Chordeiles minor)



LEGEND

Index of Bird Abundance*

- 0.33 - 1.00
- 1.01 - 1.66
- 1.67 - 2.33

Surveyed Sections

BCR 18**

States

0 50 100 Miles

N

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

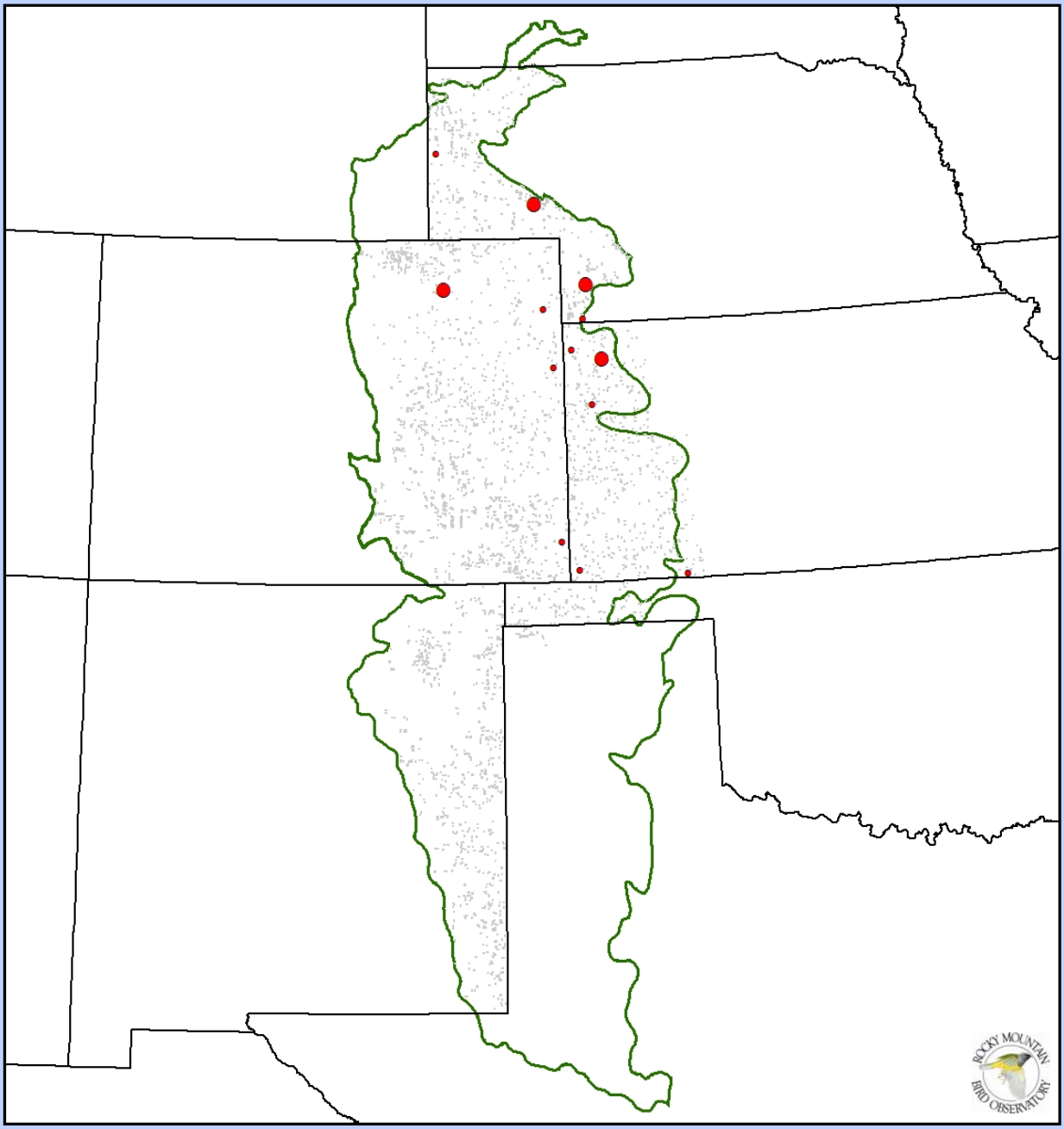
Red-headed Woodpecker

(Melanerpes erythrocephalus)

In 2003, we detected 17 individuals on 13 (<1%) of the sections surveyed. This species was distributed intermittently throughout the northern portion of the Shortgrass Prairie BCR, mainly in scattered woodlands (i.e. shelter belts). Red-headed woodpecker is a species of high concern in Nebraska.

Red-headed Woodpecker

(Melanerpes erythrocephalus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

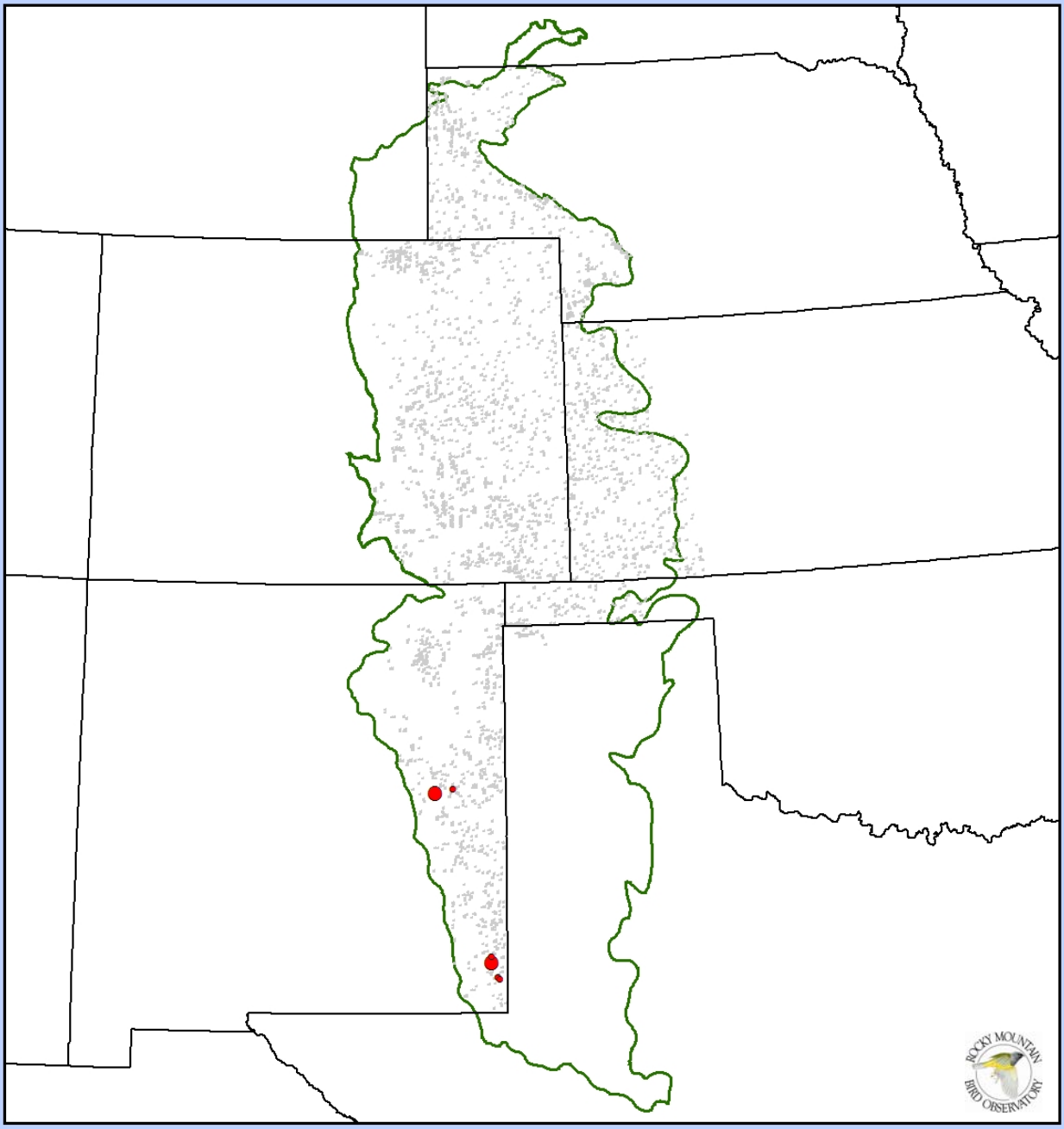
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Ladder-backed Woodpecker
(Picoides scalaris)

In 2003, we detected eight individuals on 6 (<1%) of the sections surveyed. The Ladder-backed Woodpecker was distributed in the southern portion of the Shortgrass Prairie BCR. All eight of the individuals were detected in New Mexico. Ladder-backed Woodpecker is a species in need of conservation (SINC) in Kansas.

Ladder-backed Woodpecker

(Picoides scalaris)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

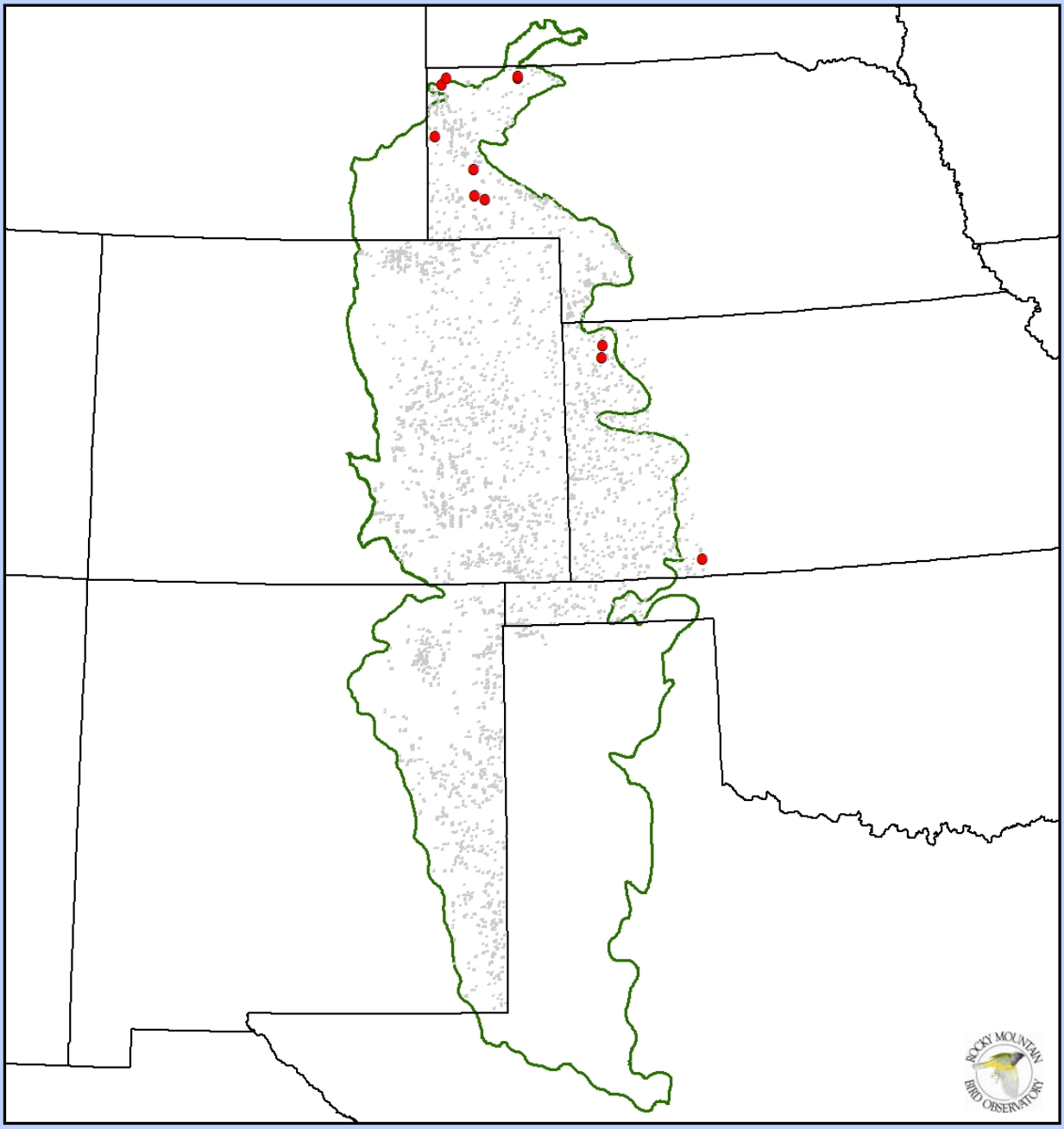
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Northern Flicker
(Colaptes auratus)

In 2003, we detected 11 individuals on 11 (<1%) of the sections surveyed. This species was distributed throughout the northern portion of Shortgrass Prairie BCR. The majority of the detections occurred in Nebraska.

Northern Flicker

(Colaptes auratus)



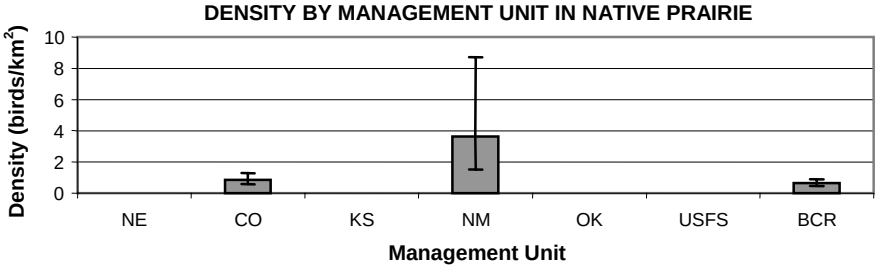
Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

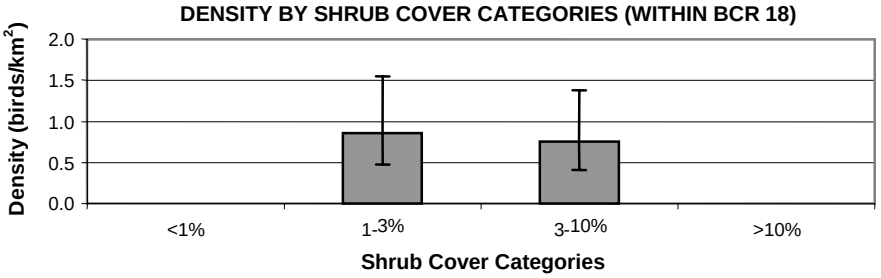
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Say's Phoebe
(Sayornis saya)

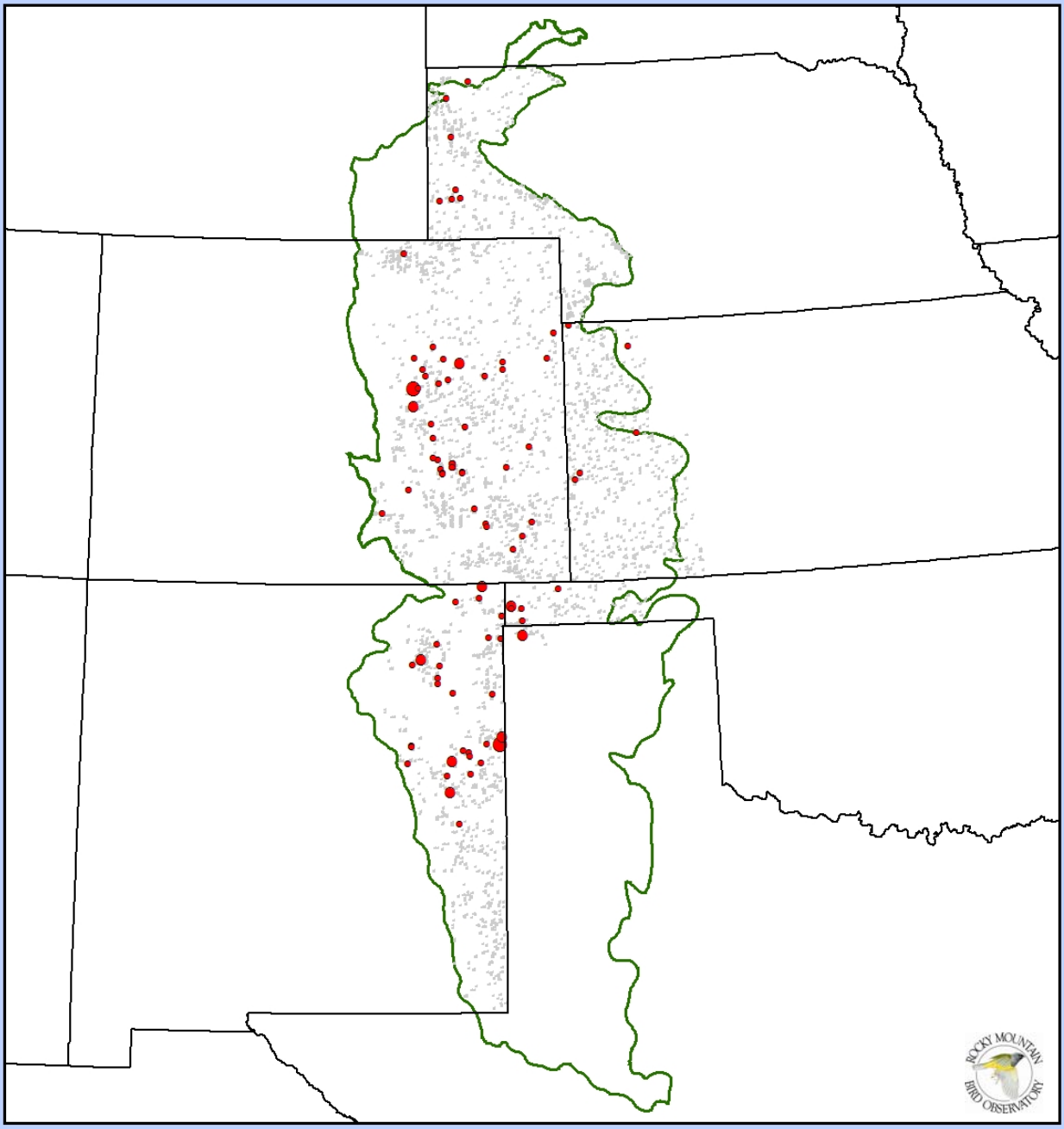
In 2003, we detected 101 Say's Phoebes on 88 (3%) of the surveyed sections. This species was widely distributed across the study area with observations occurring in every state. Highest density (D = 3.62 birds/km^2, CV = 46%, *n* = 10) of Say's Phoebe occurred in native prairie habitat in eastern New Mexico. Across the study area, highest density (D = 0.86 birds/km^2, CV = 30%, *n* = 19) occurred in native prairie habitat with 1-3 % shrub cover. Say's Phoebe is a Partners In Flight Tier II (high regional priority) species.





Say's Phoebe

(Sayornis saya)



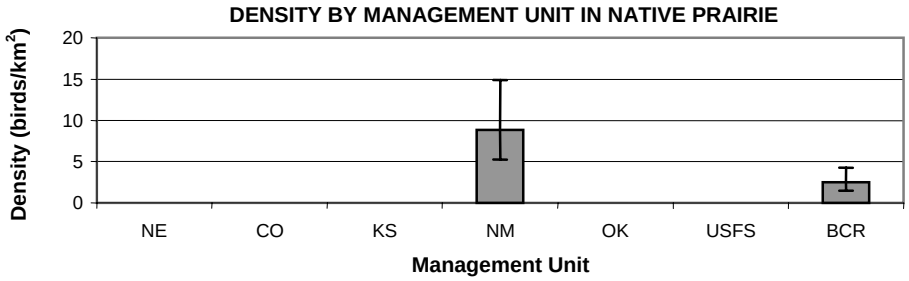
Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

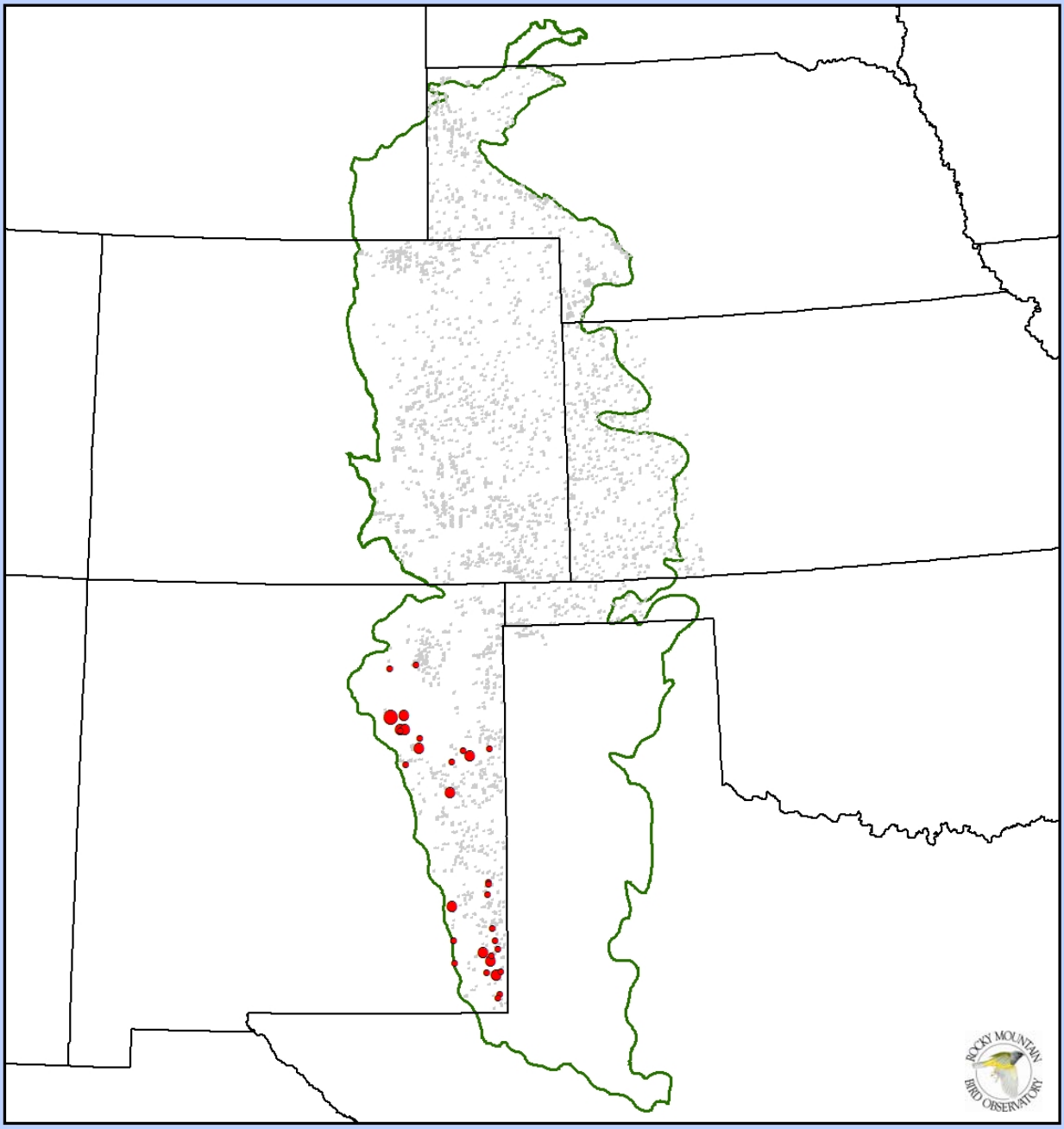
Ash-throated Flycatcher
(Myiarchus cinerascens)

In 2003, we detected 46 individuals on 32 (1%) of the sections surveyed. The Ash-throated Flycatcher was mainly distributed throughout the southern portion of the Shortgrass Prairie BCR. This species only occurred in New Mexico in an estimated density of 8.84 birds/km^2 (CV = 27%, n = 33).



Ash-throated Flycatcher

(Myiarchus cinerascens)



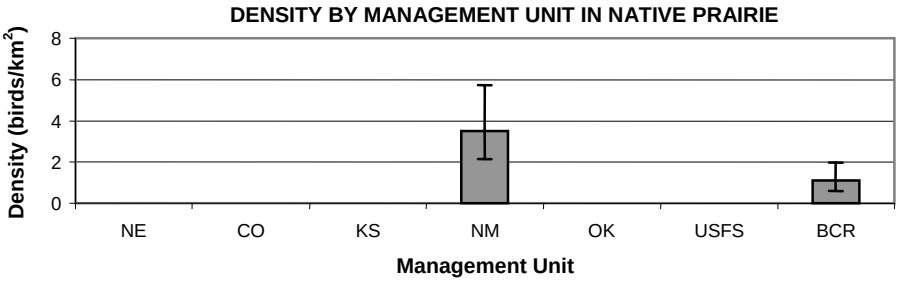
Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

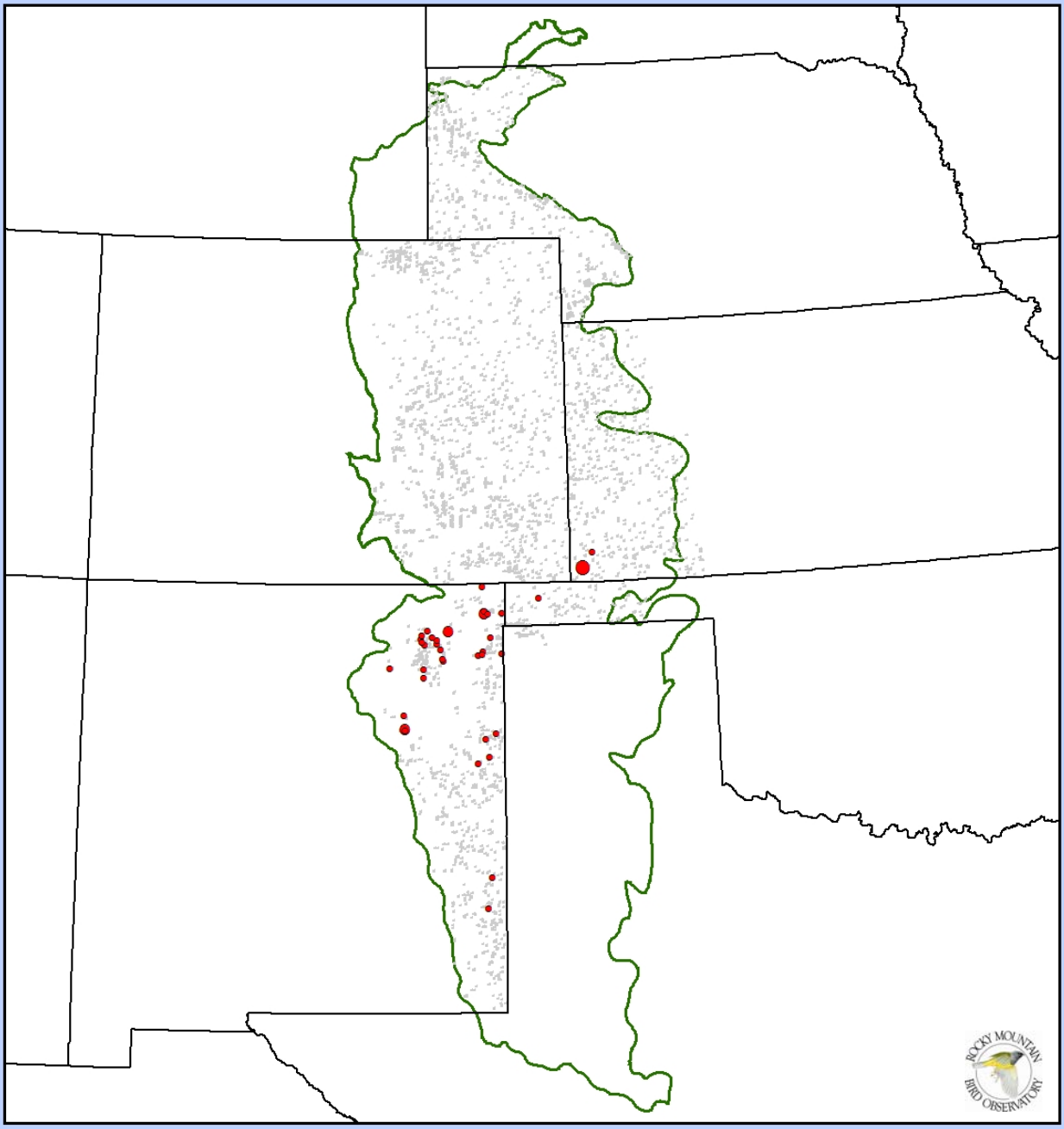
Cassin's Kingbird
(Tyrannus vociferans)

In 2003, we detected 74 individuals on 37 (1%) of the sections surveyed. The Cassin's Kingbird was mainly distributed in the southern portion of the Shortgrass Prairie BCR. The greatest densities for this species occur in New Mexico (D = 3.50 birds/km^2, CV = 26%, *n* = 38). Cassin's Kingbird is a species of moderate concern in Nebraska.



Cassin's Kingbird

(Tyrannus vociferans)



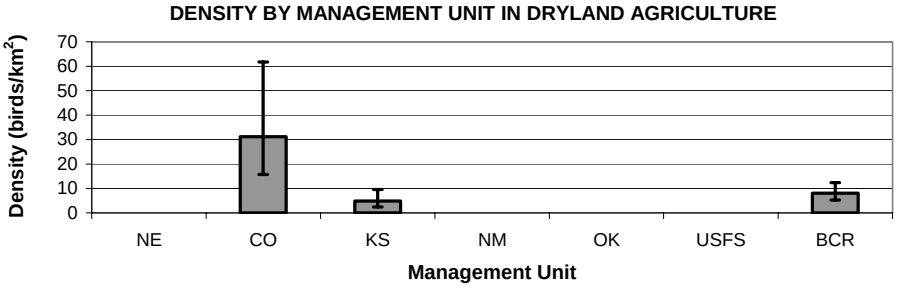
Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

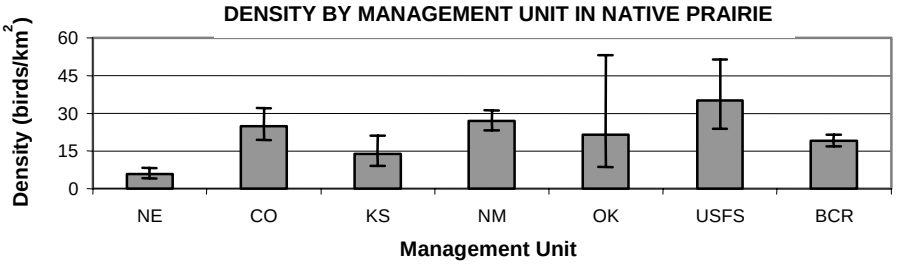
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

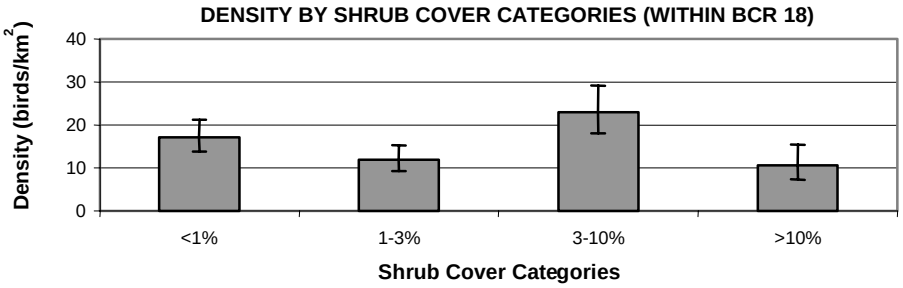
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

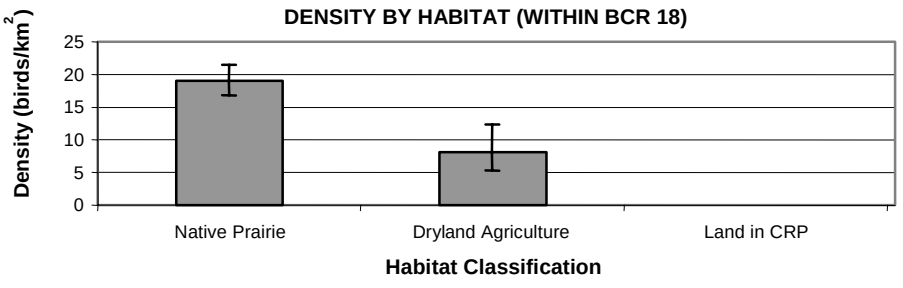
Western Kingbird
(Tyrannus verticalis)

In 2003, we detected 1896 individuals on 856 (28%) of the sections surveyed. The Western Kingbird was distributed throughout the Shortgrass Prairie BCR. This species occurred in highest densities when compared to the BCR on lands managed by the USFS (D = 35.06 birds/km^2, CV = 29%, *n* = 39), New Mexico (D = 26.97 birds/km^2, CV = 8%, *n* = 381) and Colorado (D = 24.89 birds/km^2, CV = 13%, *n* = 396). The Western Kingbird also exhibited high densities in the 3-10% shrub cover indicating that this species prefers this category of shrub cover.



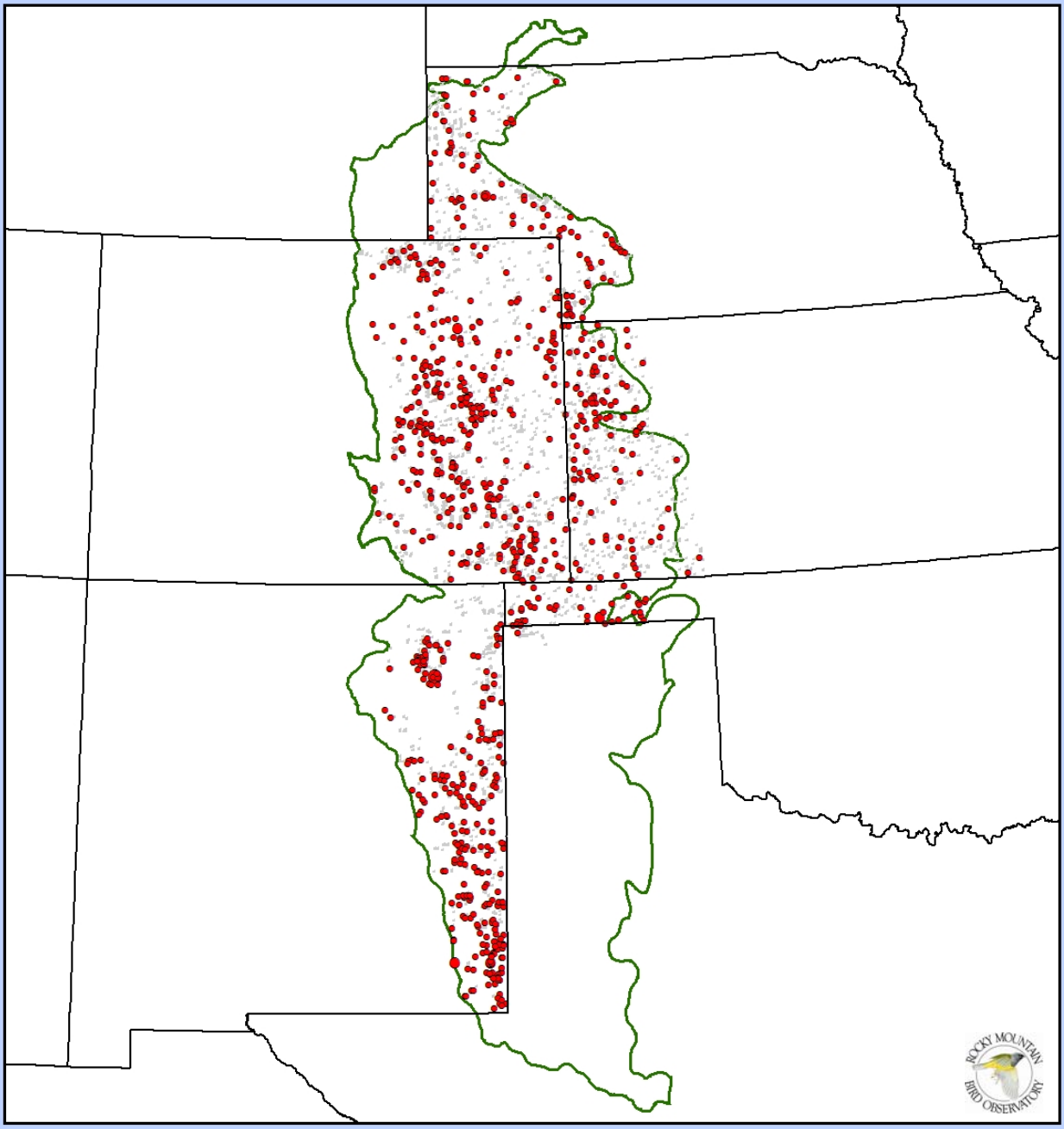






Western Kingbird

(Tyrannus verticalis)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

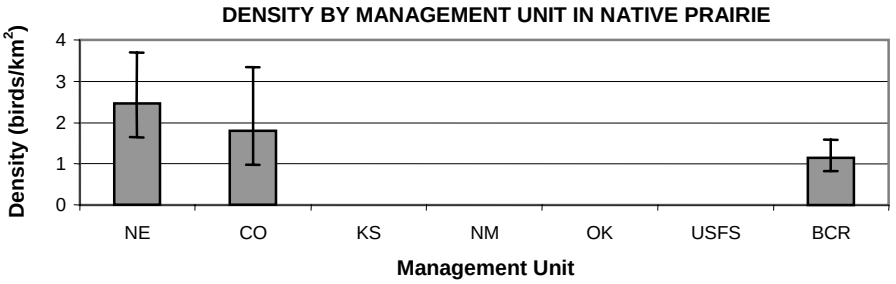
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

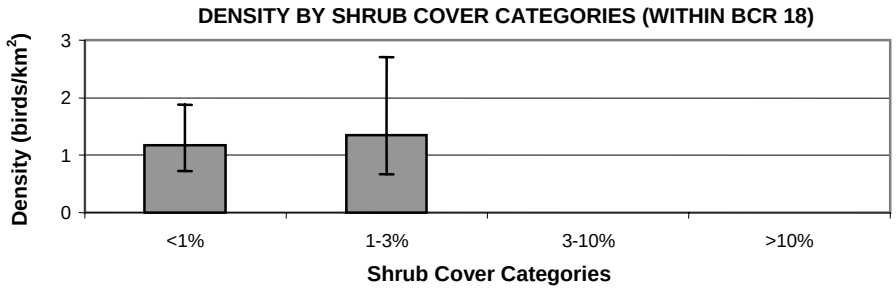
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Eastern Kingbird

(Tyrannus tyrannus)

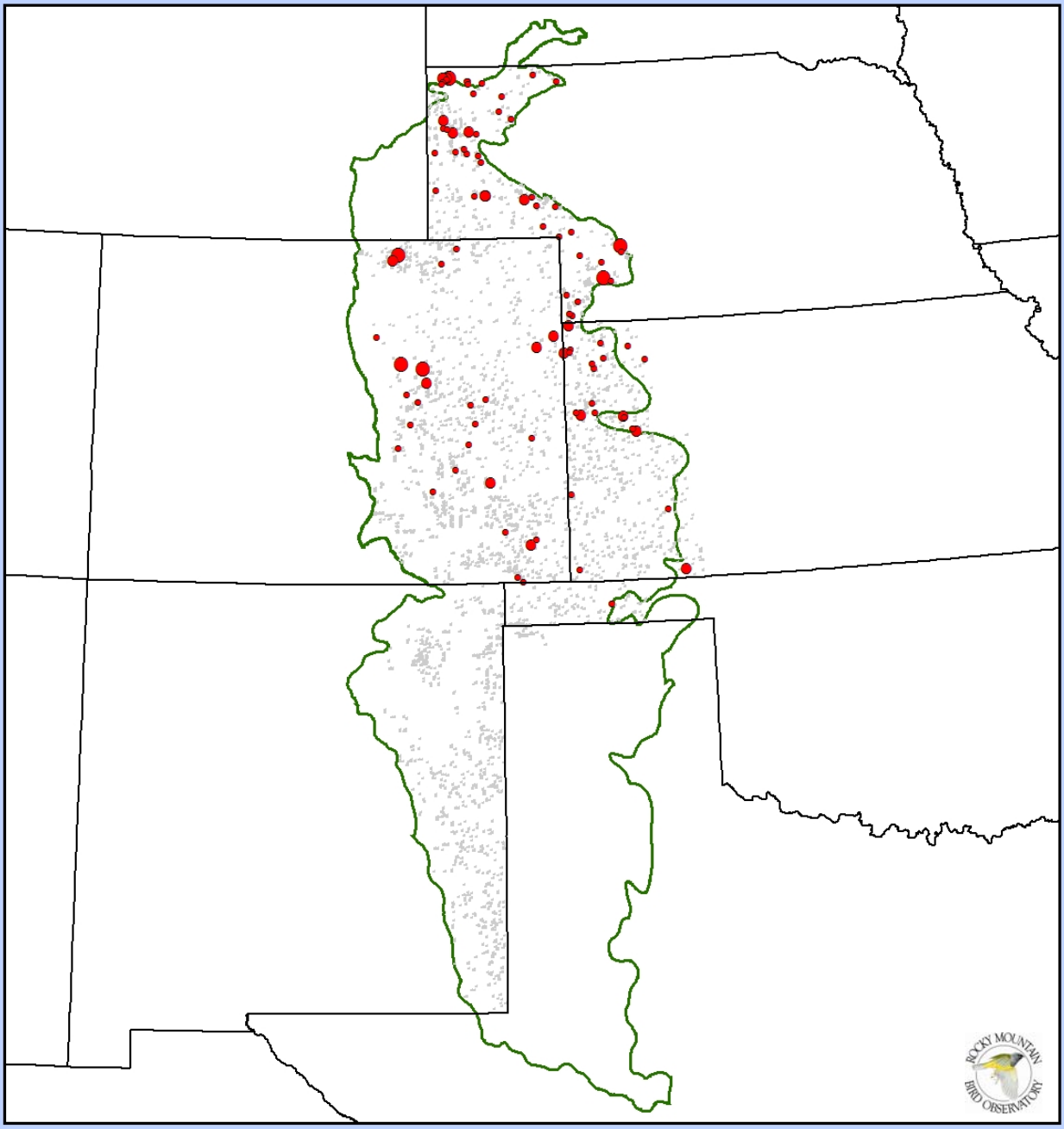
In 2003, we detected 134 individuals on 99 (3%) of the sections surveyed. The Eastern Kingbird was distributed throughout the northern portion of the Shortgrass Prairie BCR. This species occurred in greatest densities in Nebraska (D = 2.47 birds/km^2, CV = 21%, *n* = 46) and Colorado (D = 1.80 birds/km^2, CV = 32%, *n* = 21). This species was detected in similar densities in two shrub categories, <1% (D = 1.17 birds/km^2, CV = 24%, *n* = 45) and 1-3% (D = 1.3 birds/km^2, CV = 36%, *n* = 19).





Eastern Kingbird

(Tyrannus tyrannus)



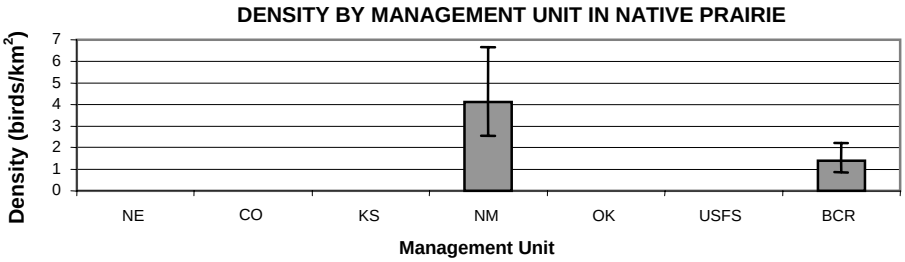
Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

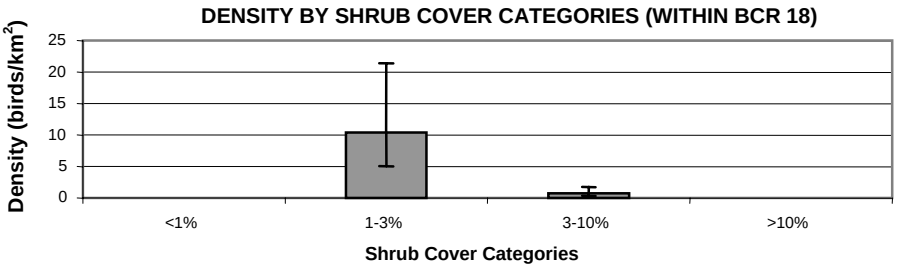
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Scissor-tailed Flycatcher
(Tyrannus forticatus)

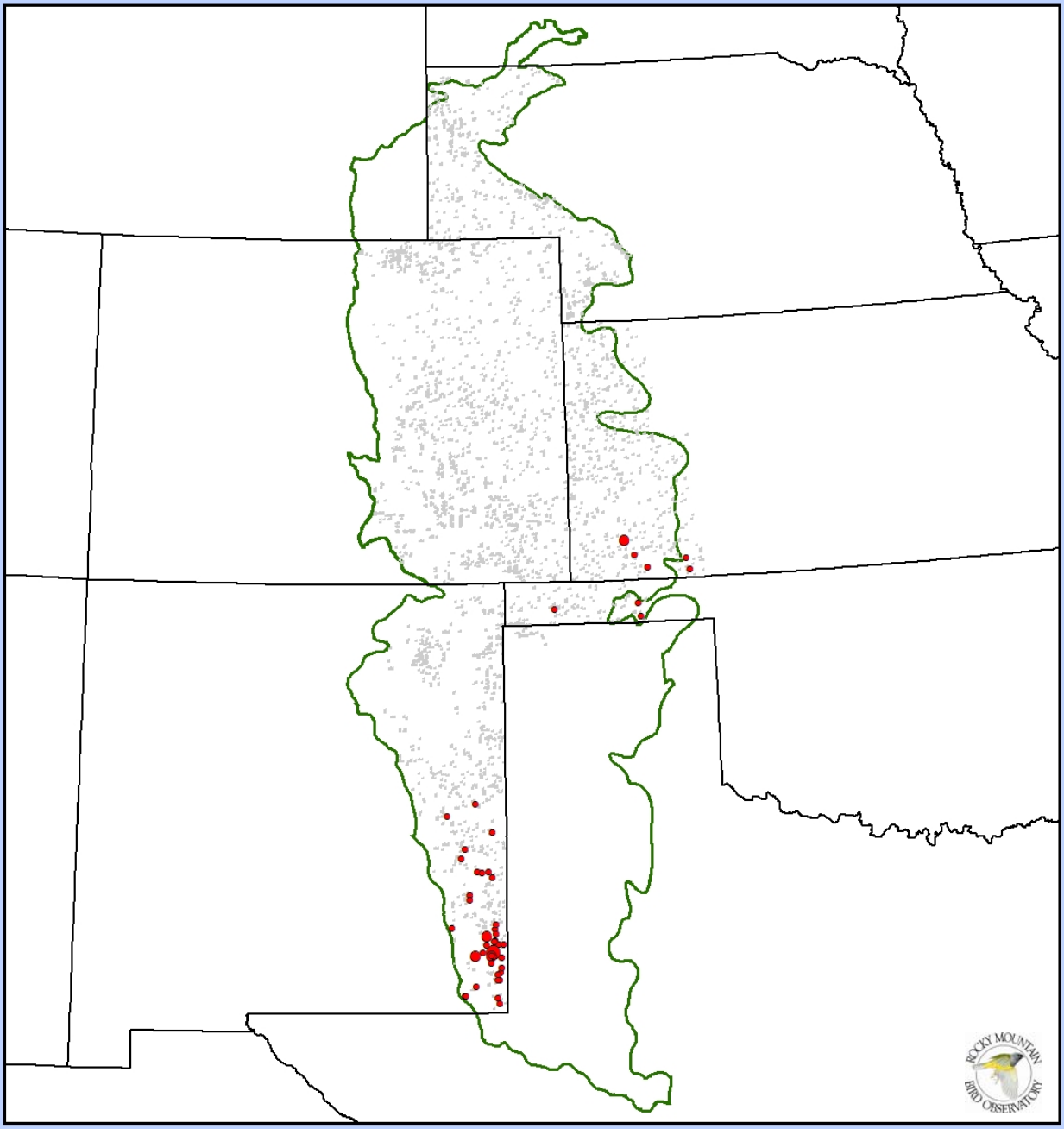
In 2003, we detected 80 Scissor-tailed Flycatchers on 48 (2%) of the surveyed sections. This species was observed in southwest Kansas, the panhandle of Oklahoma, and southeast New Mexico. Highest density (D = 4.12 birds/km^2, CV = 25%, *n* = 41) occurred in native prairie habitat in New Mexico with detections concentrated in the southeast region of the state. Within native prairie habitat across the study area, highest density (D = 10.38 birds/km^2, CV = 38%, *n* = 21) occurred in areas of 1-3% shrub cover. Scissor-tailed Flycatcher is a species of concern in Nebraska.





Scissor-tailed Flycatcher

(Tyrannus forficatus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

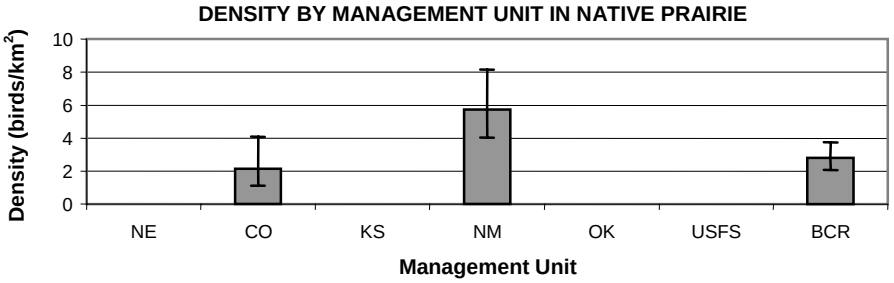
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

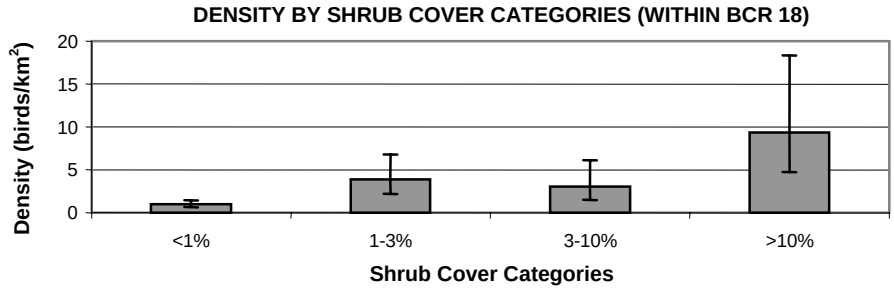
Loggerhead Shrike

(Lanius ludovicianus)

In 2003, we detected 207 Loggerhead Shrikes on 159 (5%) of the surveyed sections. This species was widely distributed across the study area with a concentration of observations in southeast New Mexico. Across the study area, density in native prairie habitat was 2.79 birds/km^2 (CV = 18%, *n* = 95). Highest density in native prairie habitat occurred in New Mexico (D = 5.75 birds/km^2, CV = 18%, *n* = 95). Within native prairie habitat, highest density (D = 9.33 birds/km^2, CV = 35%, *n* = 22) occurred in areas of > 10% shrub cover. Loggerhead Shrike is a species of concern as follows:

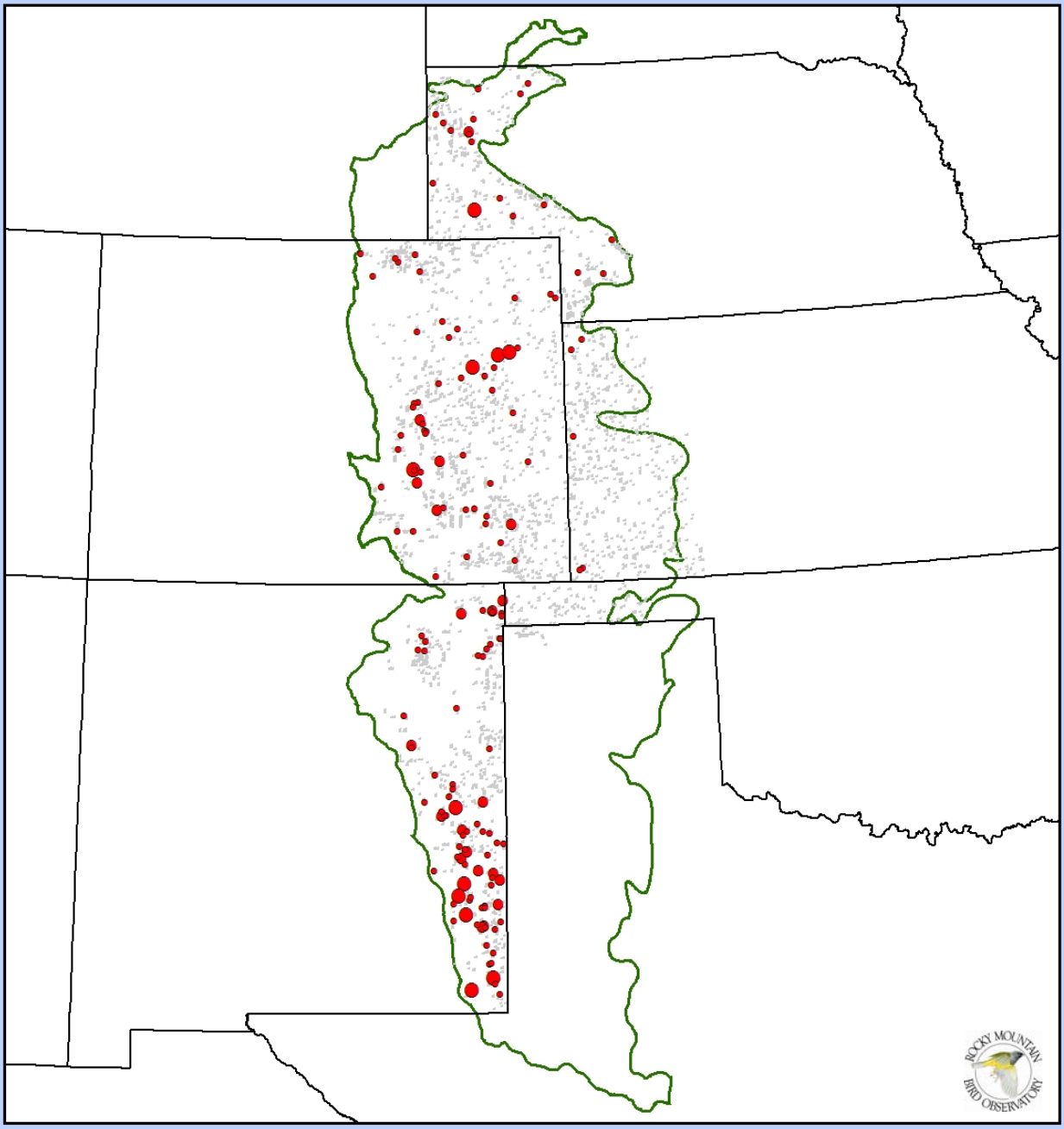
- Nebraska – species of high concern
- New Mexico – wildlife of concern
- Oklahoma – species of special concern (Category II)
- USFS R2 – sensitive species.





Loggerhead Shrike

(Lanius ludovicianus)



LEGEND

Index of Bird Abundance*
- 0.33 - 0.66
- 0.67 - 1.00
- 1.01 - 1.33

Surveyed Sections

BCR 18**

States

0 50 100 Miles

N

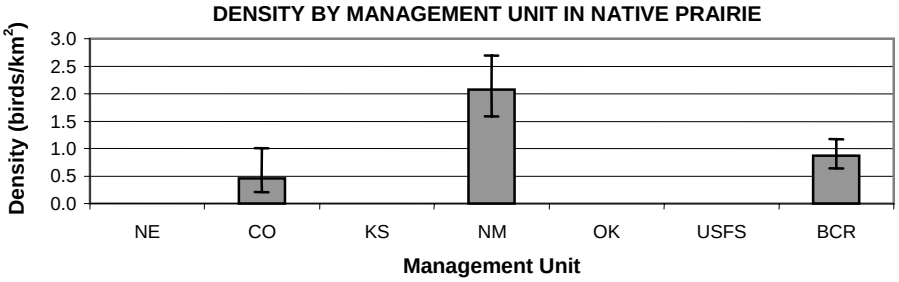
Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

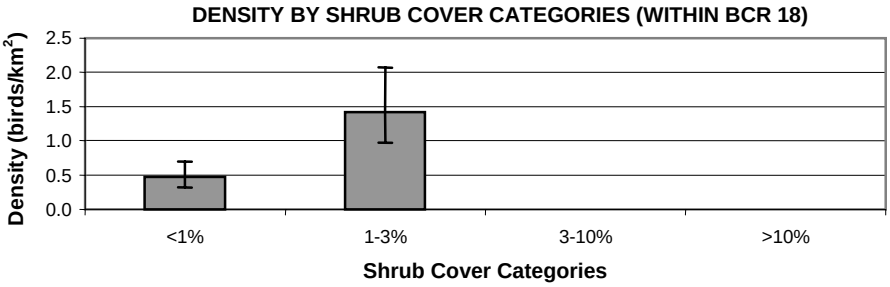
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Chihuahuan Raven
(Corvus cryptoleucus)

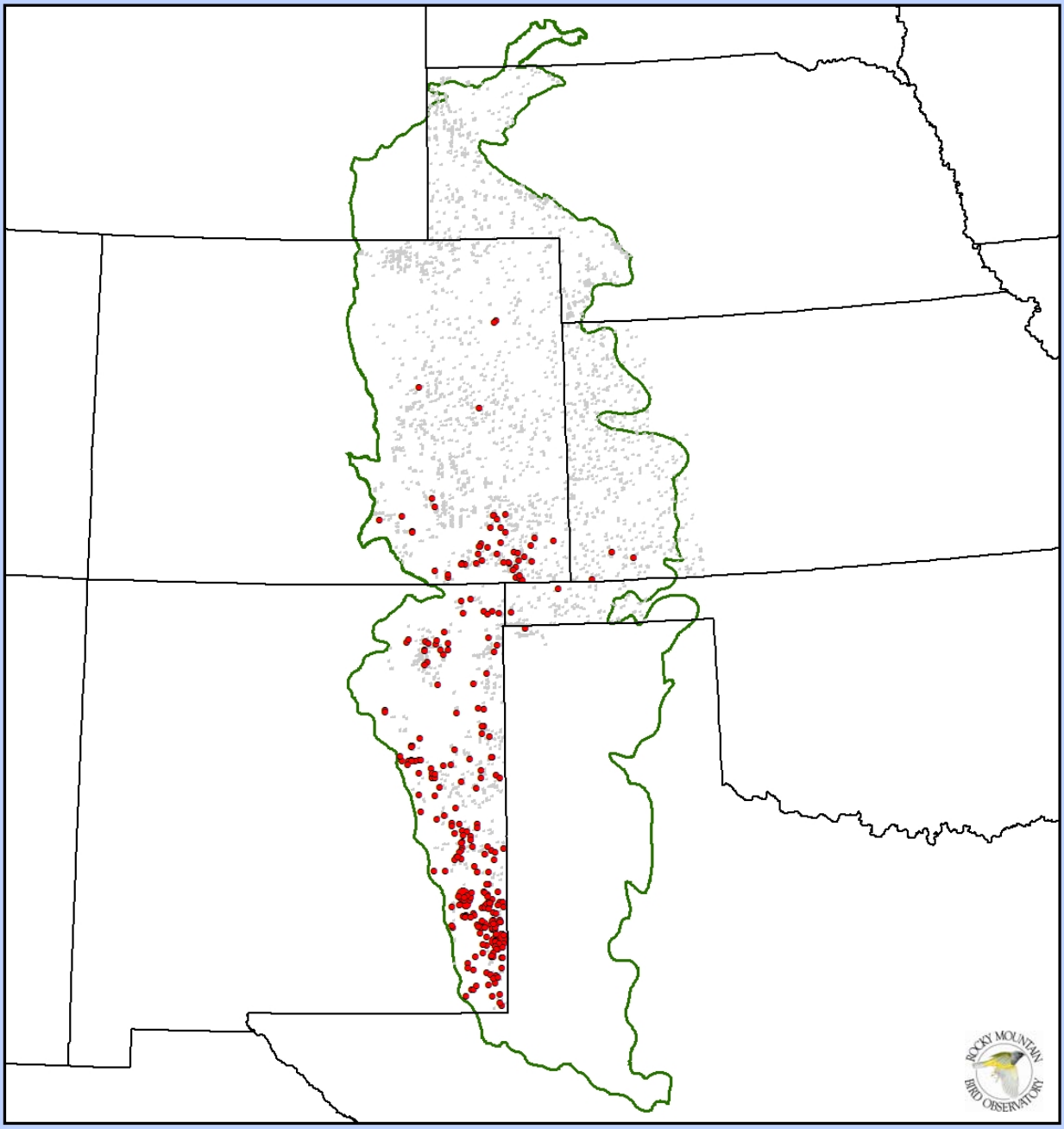
In 2003, we detected 699 individuals on 270 (9%) of the sections surveyed. The Chihuahuan Raven was primarily distributed throughout native grassland habitats in the southern portion of BCR 18, where the highest densities (D = 2.07 birds/km^2, CV = 14%, n = 323) occur in New Mexico. Within this area, this species is most abundant in native habitats that contain between 1-3% shrub cover. Management for this species should focus on creating open grassland habitat with a 1-3% shrub cover component. Chihuahuan Raven is a Partners In Flight Tier II (high regional priority) species.





Chihuahuan Raven

(Corvus cryptoleucus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

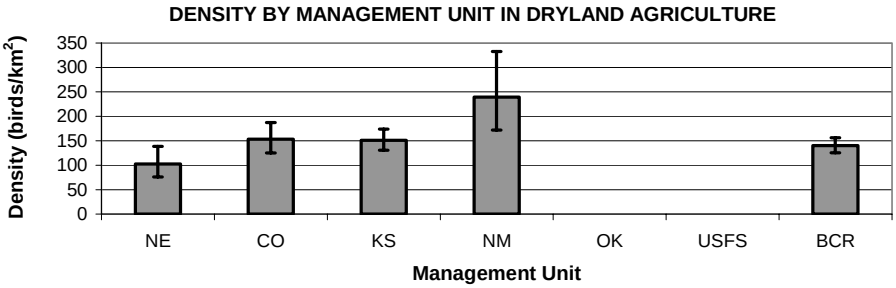
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

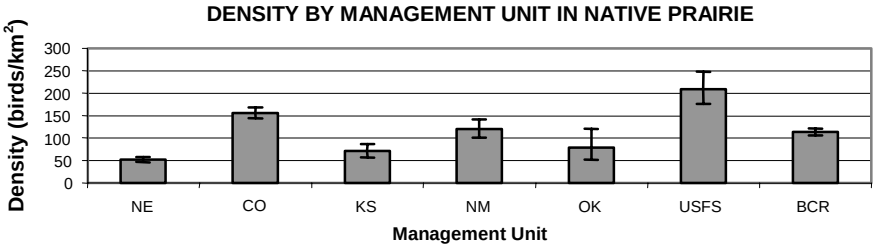
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

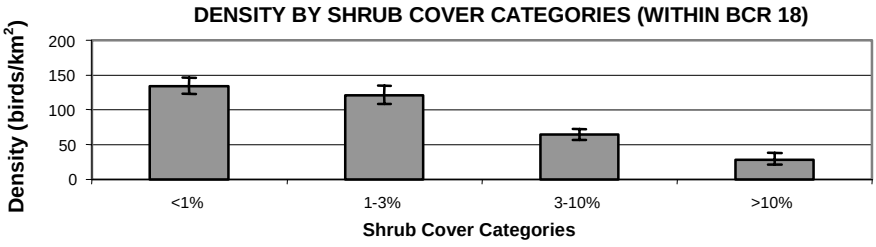
Horned Lark

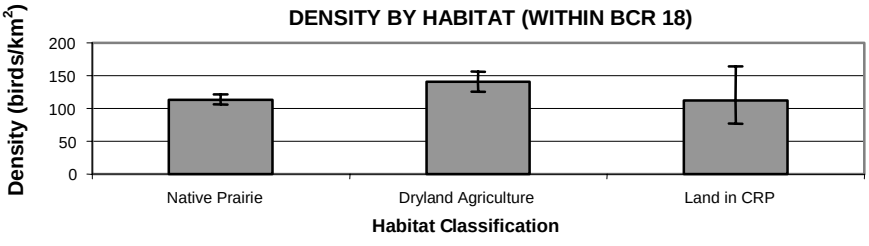
(Eremophila alpestris)

In 2003, we detected 11,643 Horned Larks on 2,323 (77%) of the surveyed sections. We observed more Horned Larks than any other species. This species was widely distributed over the study area with observations occurring in every state. Across the study area, density was higher in dryland agriculture habitat (D = 140.24 birds/km^2, CV = 6%, *n* = 1668) than in native prairie habitat (D = 113.63 birds/km^2, CV = 3%, *n* = 5999). Highest densities in native prairie habitat occurred on National Grasslands (D = 209.53 birds/km^2, CV = 9%, *n* = 571) and in areas of < 1% shrub cover (D = 134.30 birds/km^2, CV = 4%, *n* = 285). Horned Lark is a Partners In Flight Tier III (additional watch list) species.



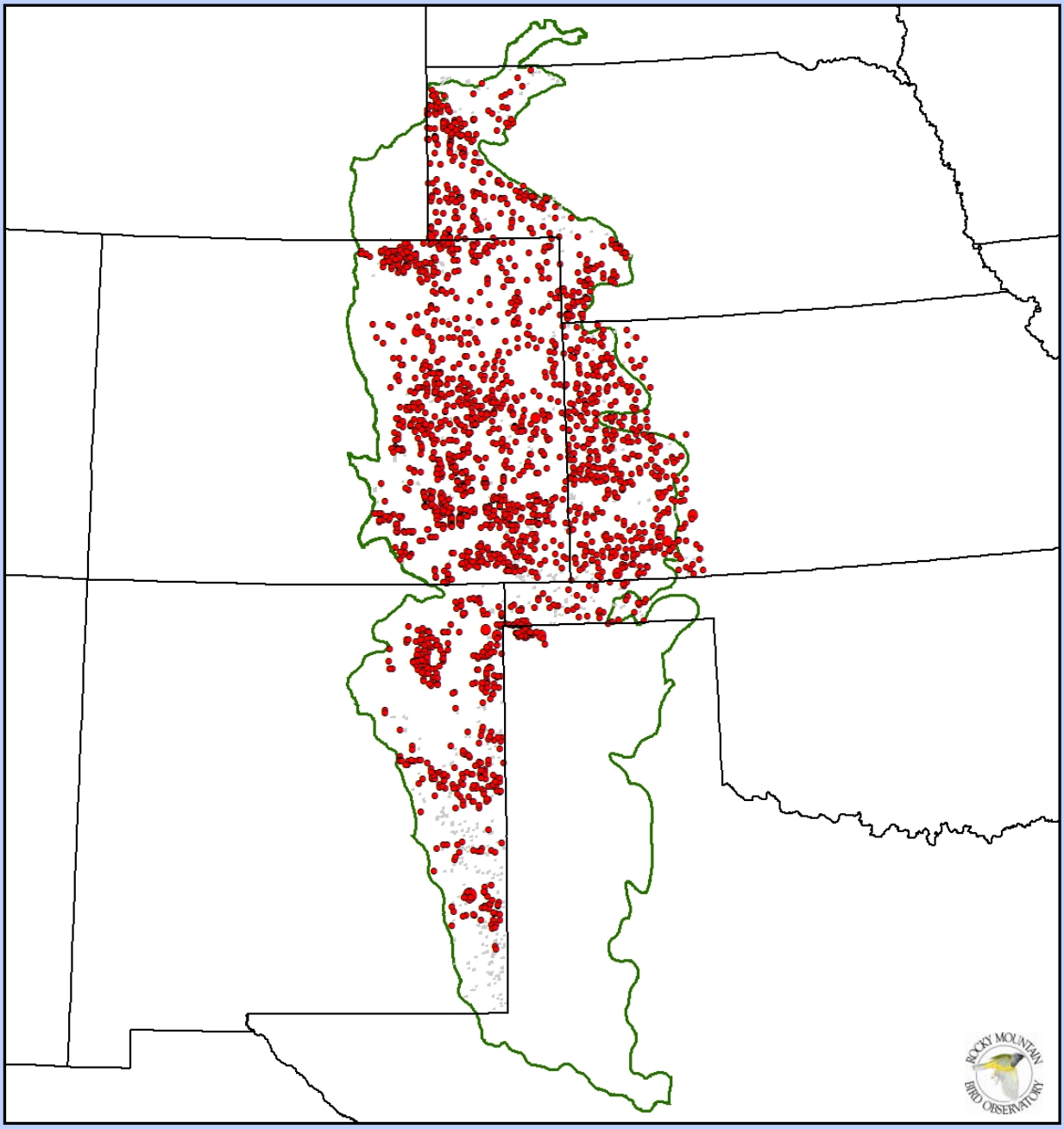






Horned Lark

(Eremophila alpestris)



LEGEND

Index of Bird Abundance*

- 0.33 - 6.00
- 6.01 - 11.66
- 11.67 - 17.33

Surveyed Sections

BCR 18**

States

0 50 100 Miles

N

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

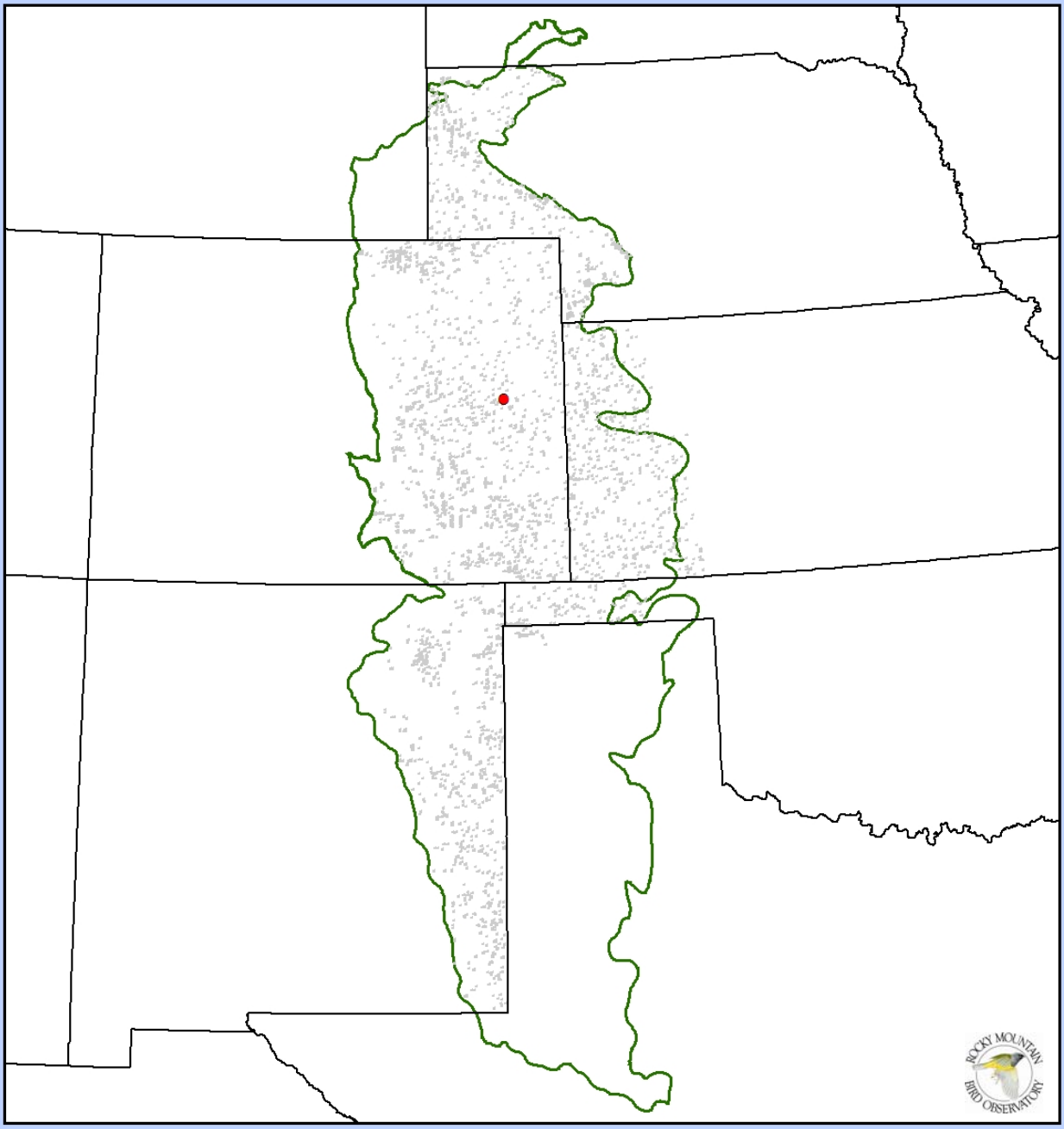
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Purple Martin
(Progne subis)

In 2003, we detected one individual in Kit Carson County, Colorado. Purple Martin is a sensitive species in USFS Region 2.

Purple Martin

(Progne subis)



LEGEND

Index of Bird Abundance*
0.33

Surveyed Sections
BCR 18**
States
0 50 100 Miles

N

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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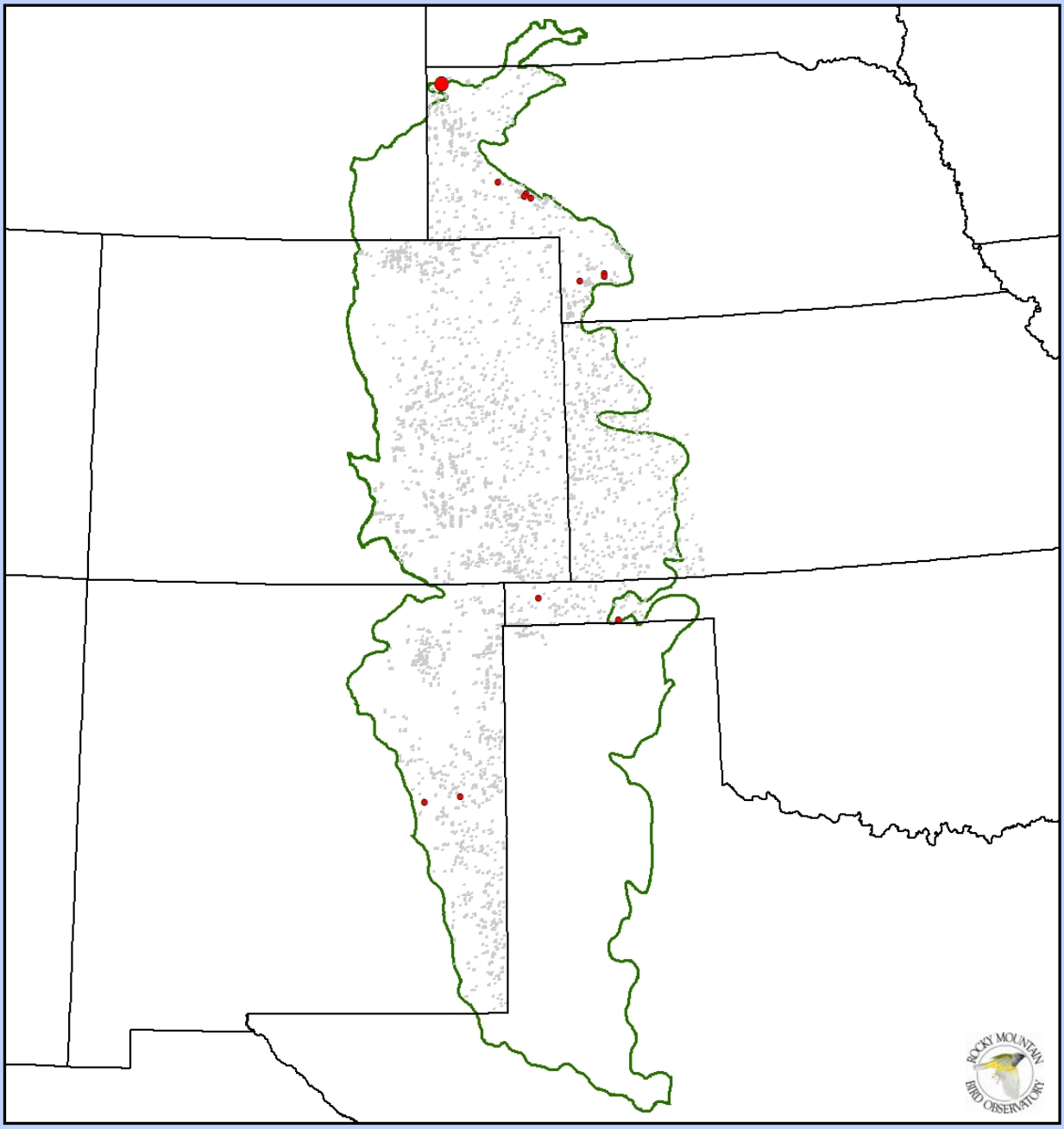
Northern Rough-winged Swallow

(Stelgidopteryx serripennis)

In 2003, we detected 33 individuals on 12 (<1%) of the sections surveyed. The majority of the detections occurred in Nebraska.

Northern Rough-winged Swallow

(Stelgidopteryx serripennis)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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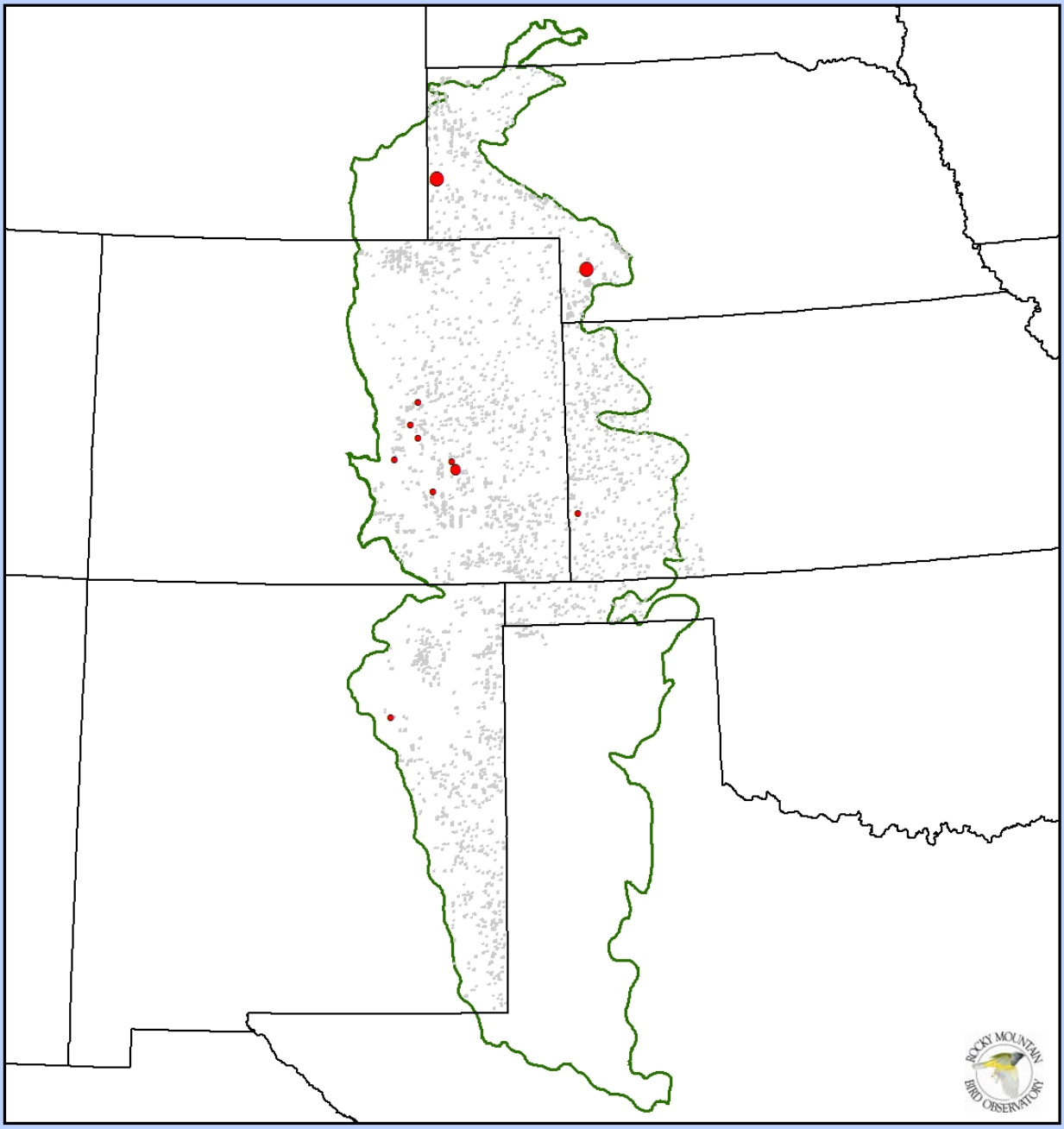
Bank Swallow
(Riparia riparia)

In 2003, we detected 25 individuals on 11 (<1%) of the sections surveyed. The majority of the Bank Swallow detections occurred in Colorado.

Bank Swallow

(Riparia riparia)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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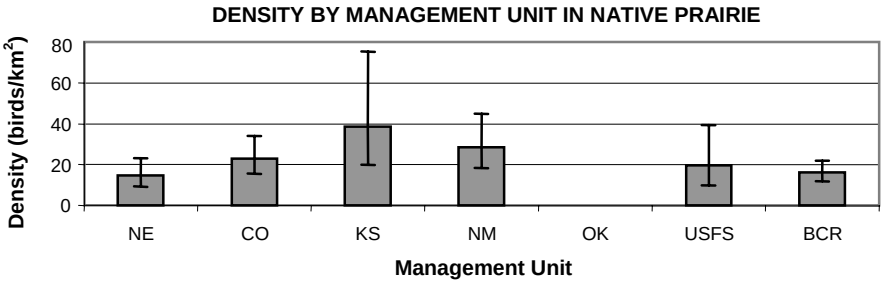
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

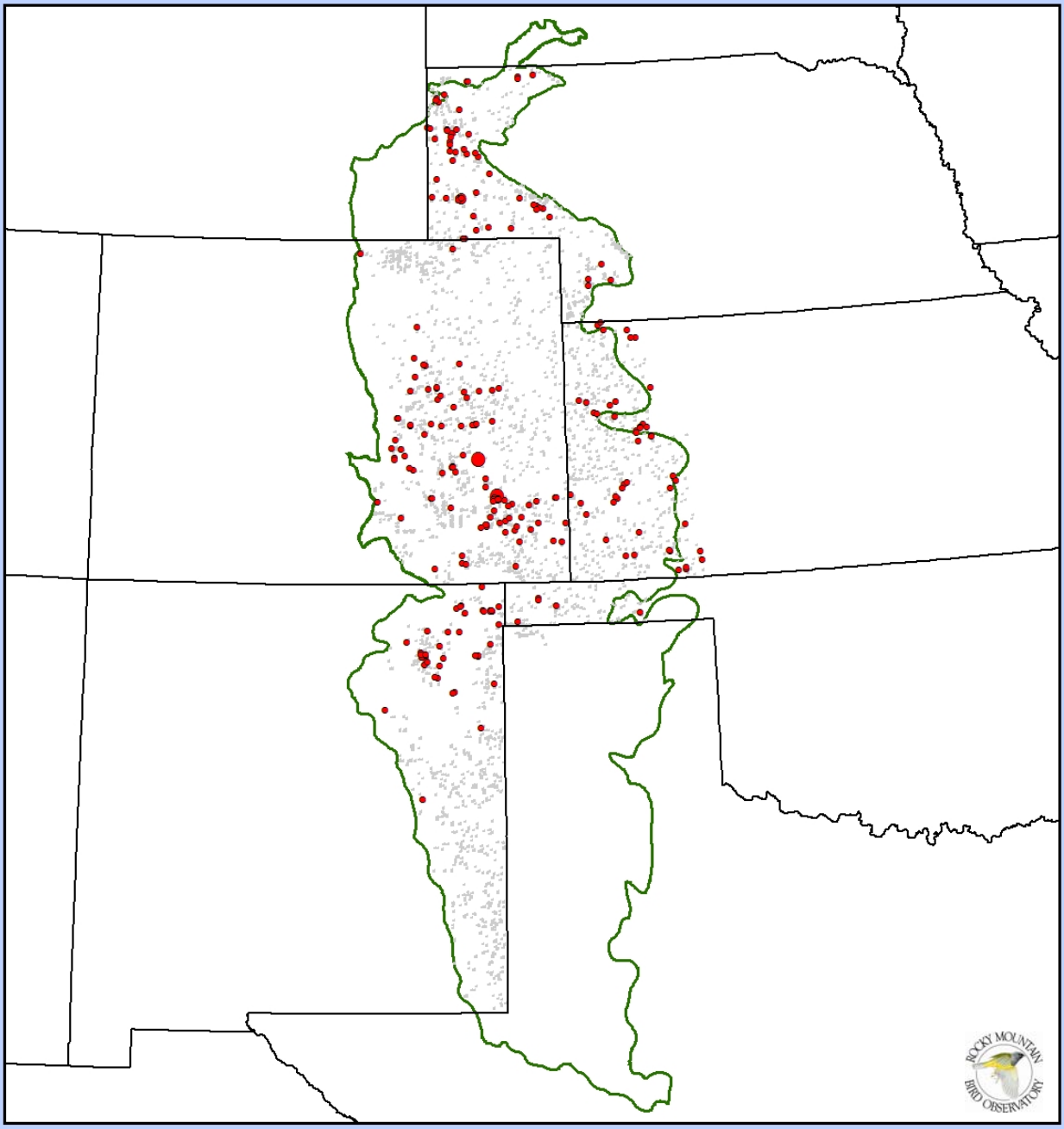
Cliff Swallow
(Petrochelidon pyrrhonota)

In 2003, we detected 1213 individuals on 241 (8%) of the sections surveyed. The Cliff Swallow was distributed throughout the Shortgrass Prairie BCR. The largest density of this species occurred in Kansas (D = 38.65 birds/km^2, CV = 35%, *n* = 40).



Cliff Swallow

(Petrochelidon pyrrhonota)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

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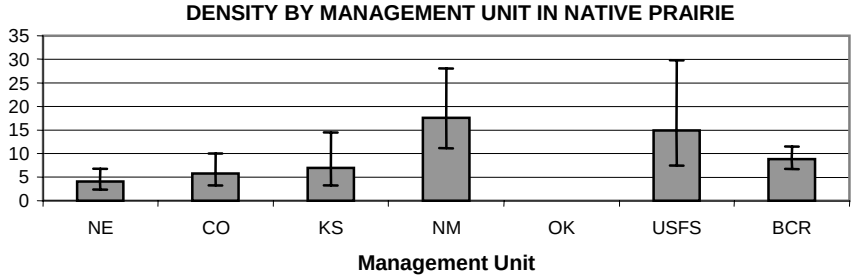
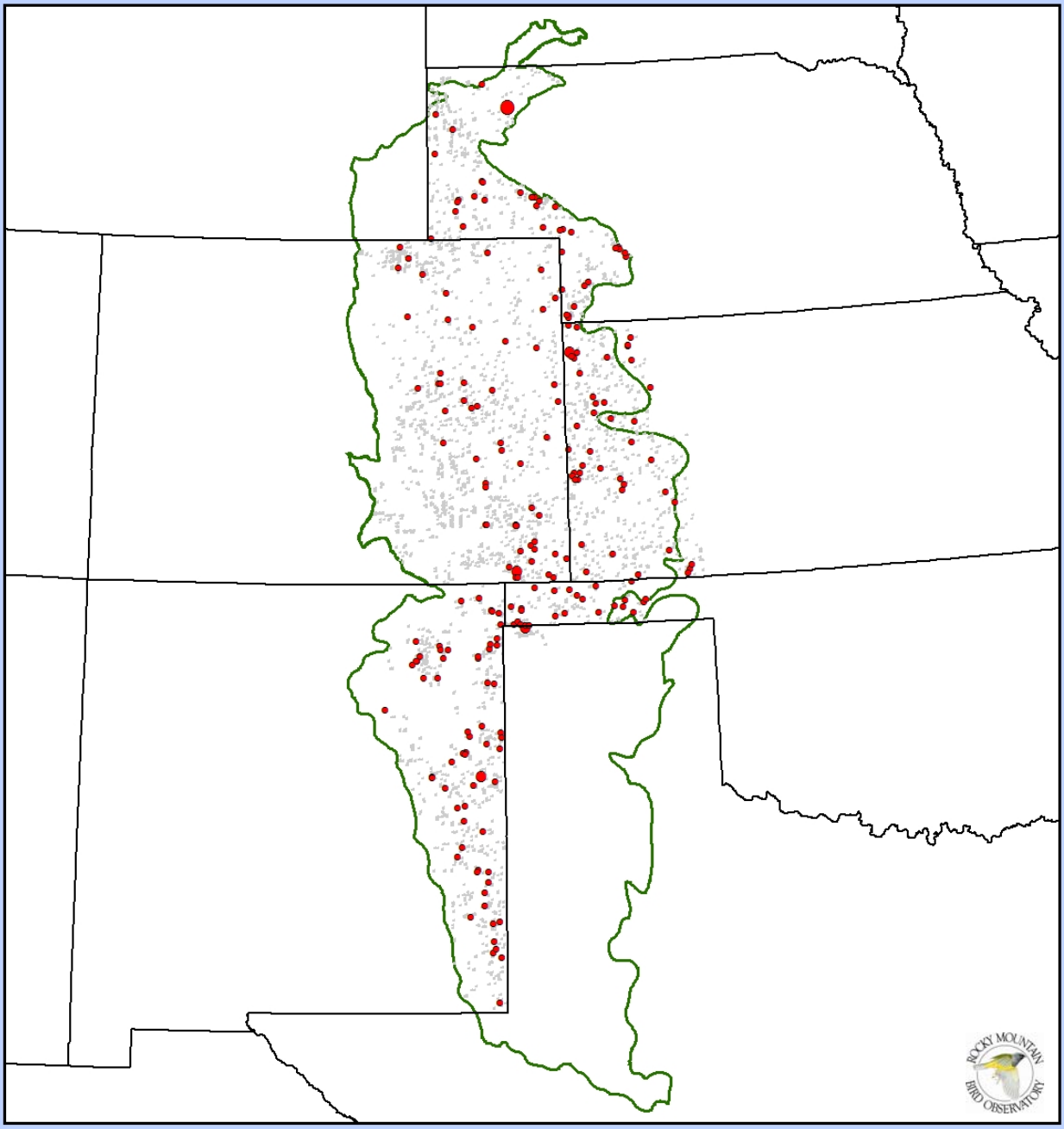
Barn Swallow
(Hirundo rustica)

In 2003, we detected 467 individuals on 223 (7%) of the sections surveyed. The Barn Swallow was distributed throughout the Shortgrass Prairie BCR. The largest densities for this species occurred in New Mexico (D = 17.63 birds/km^2, CV = 24%, *n* = 109) and on land managed by the USFS (D = 14.92 birds/km^2, CV = 36%, *n* = 32).



Barn Swallow

(Hirundo rustica)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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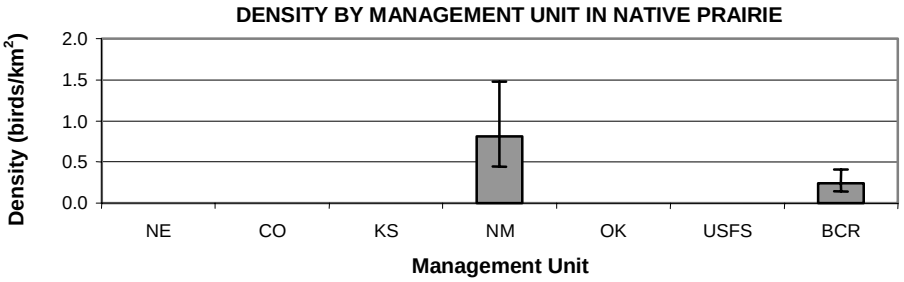
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

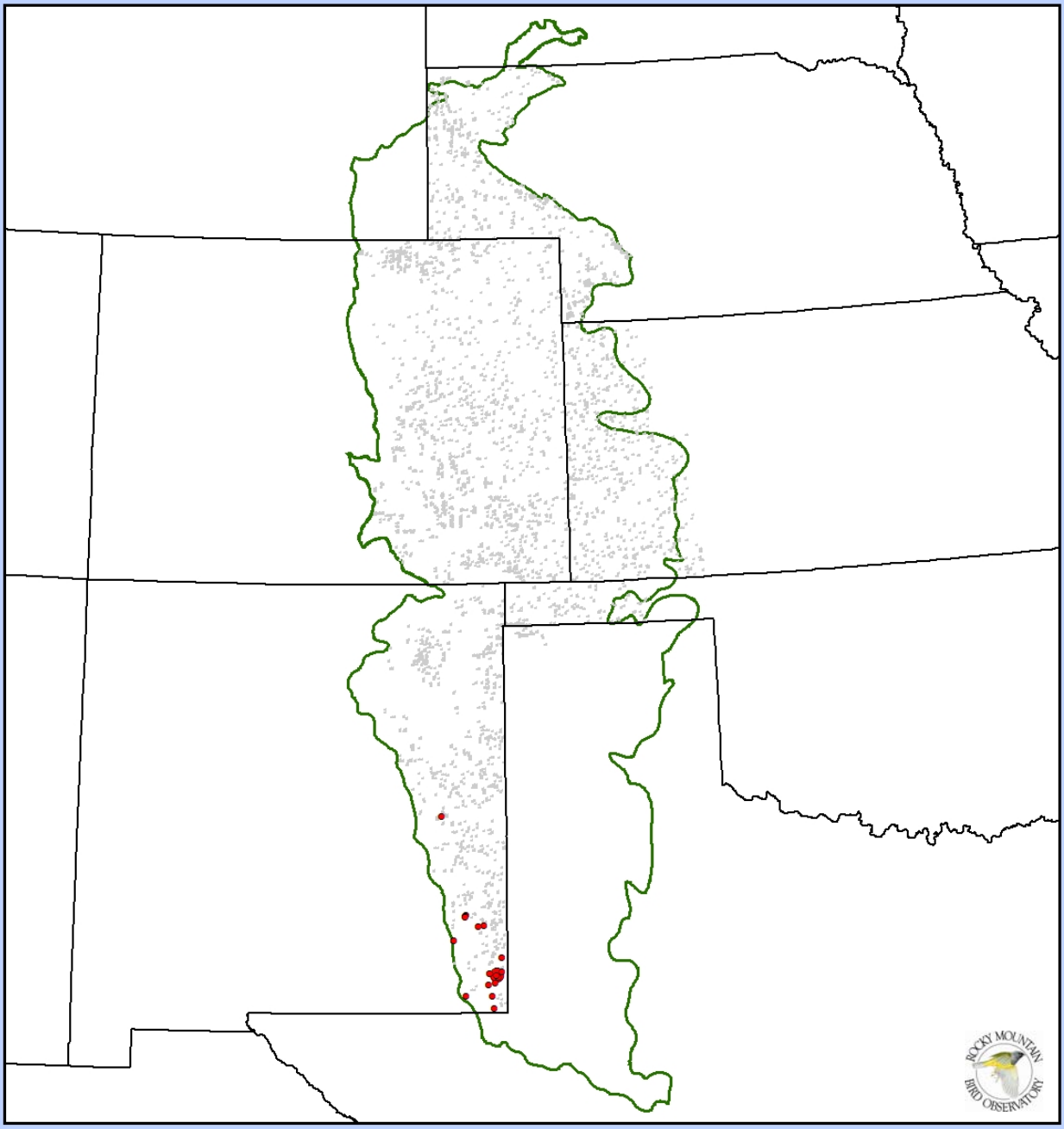
Cactus Wren
(Campylorhynchus brunneicapillus)

In 2003, we detected 26 individuals on 18 (<1%) of the sections surveyed. The Cactus Wren occurred mainly in the extreme southern portion of the Shortgrass Prairie BCR. New Mexico plays host to the highest density (D = 0.81 birds/km^2, CV = 31%, n = 23) of this species.



Cactus Wren

(Campylorhynchus brunneicapillus)



LEGEND

Index of Bird Abundance*

- 0.33 - 0.89
- 0.90 - 1.44
- 1.45 - 2.00

Surveyed Sections

BCR 18**

States

0 50 100 Miles

N

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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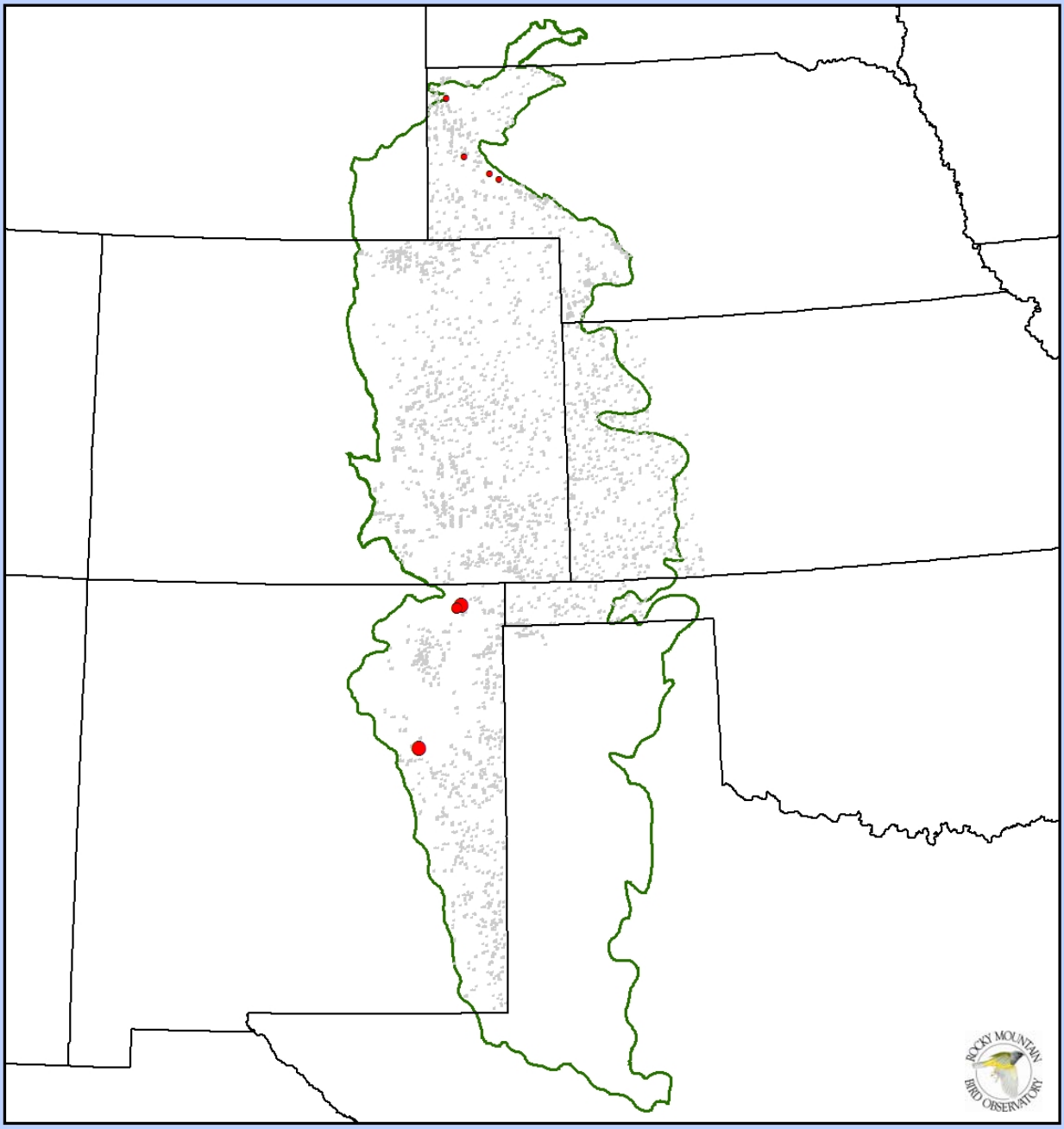
Rock Wren
(Salinctes obsoletus)

In 2003, we detected 13 individuals on seven (<1%) of the sections surveyed. The Rock Wren occurred mainly in Nebraska and New Mexico parts of the Shortgrass Prairie BCR.

Rock Wren

(Salpinctes obsoletus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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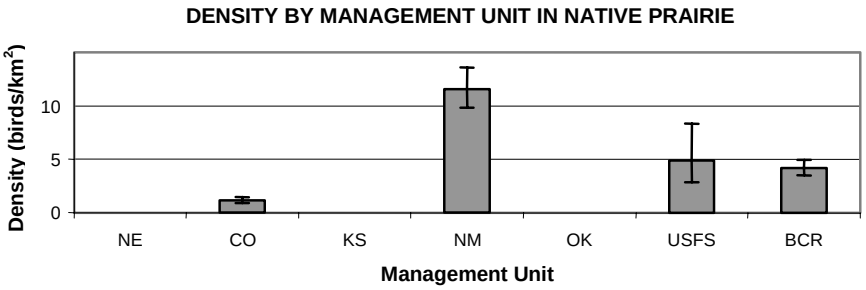
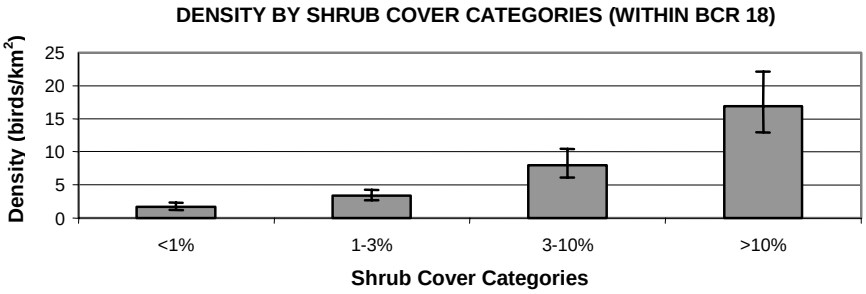
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Northern Mockingbird

(Mimus polyglottos)

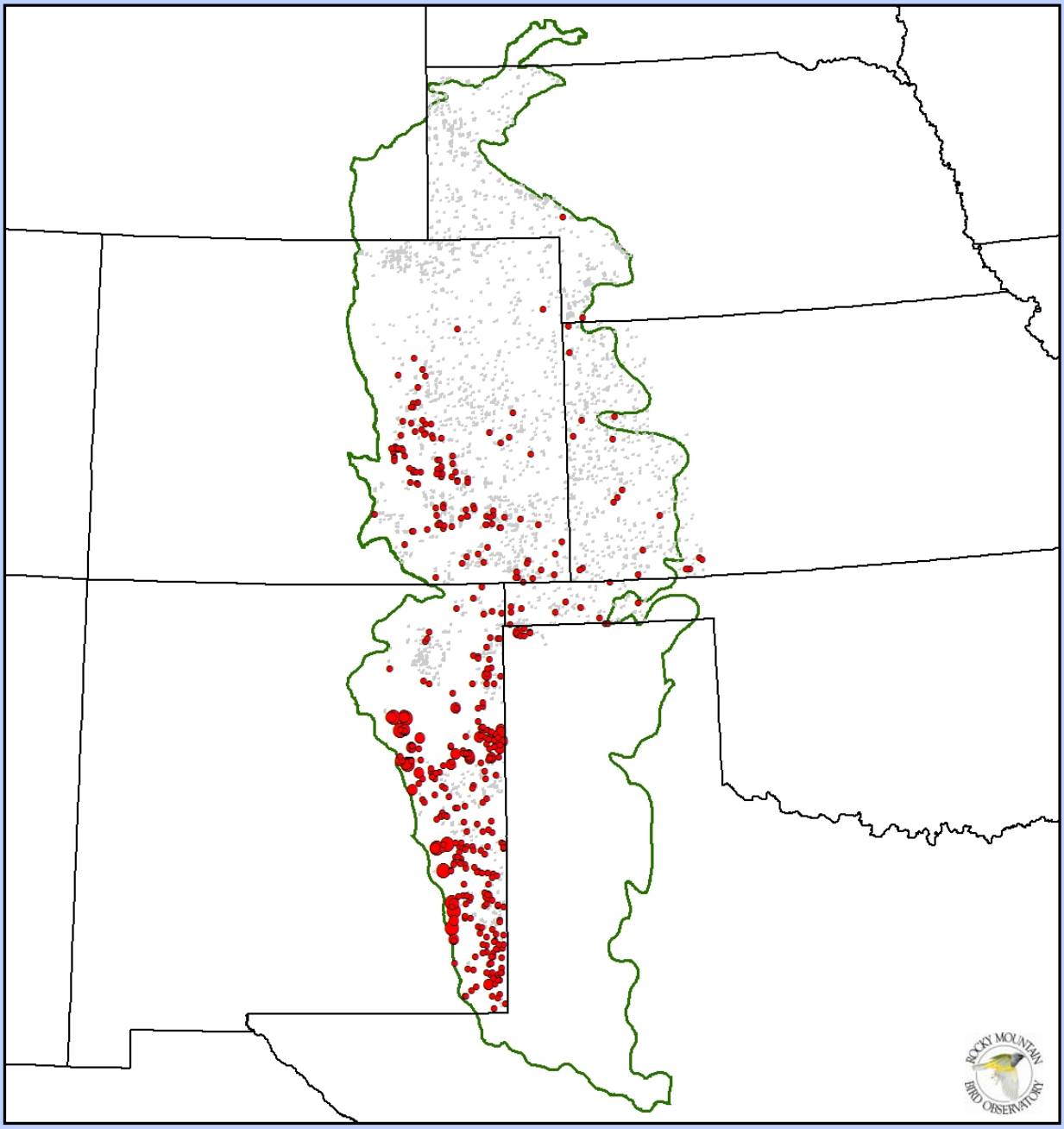
In 2003, we detected 1087 individuals on 435 (14%) of the sections surveyed. The Northern Mockingbird was mainly distributed throughout the southern portion of the Shortgrass Prairie BCR. New Mexico has the highest densities (D = 11.58 birds/km^2, CV = 8%, *n* = 742) of all of the states and management units. This species exhibits a positive correlation with the percent of shrub cover and with largest densities occurring in the >10% category.





Northern Mockingbird

(Mimus polyglottos)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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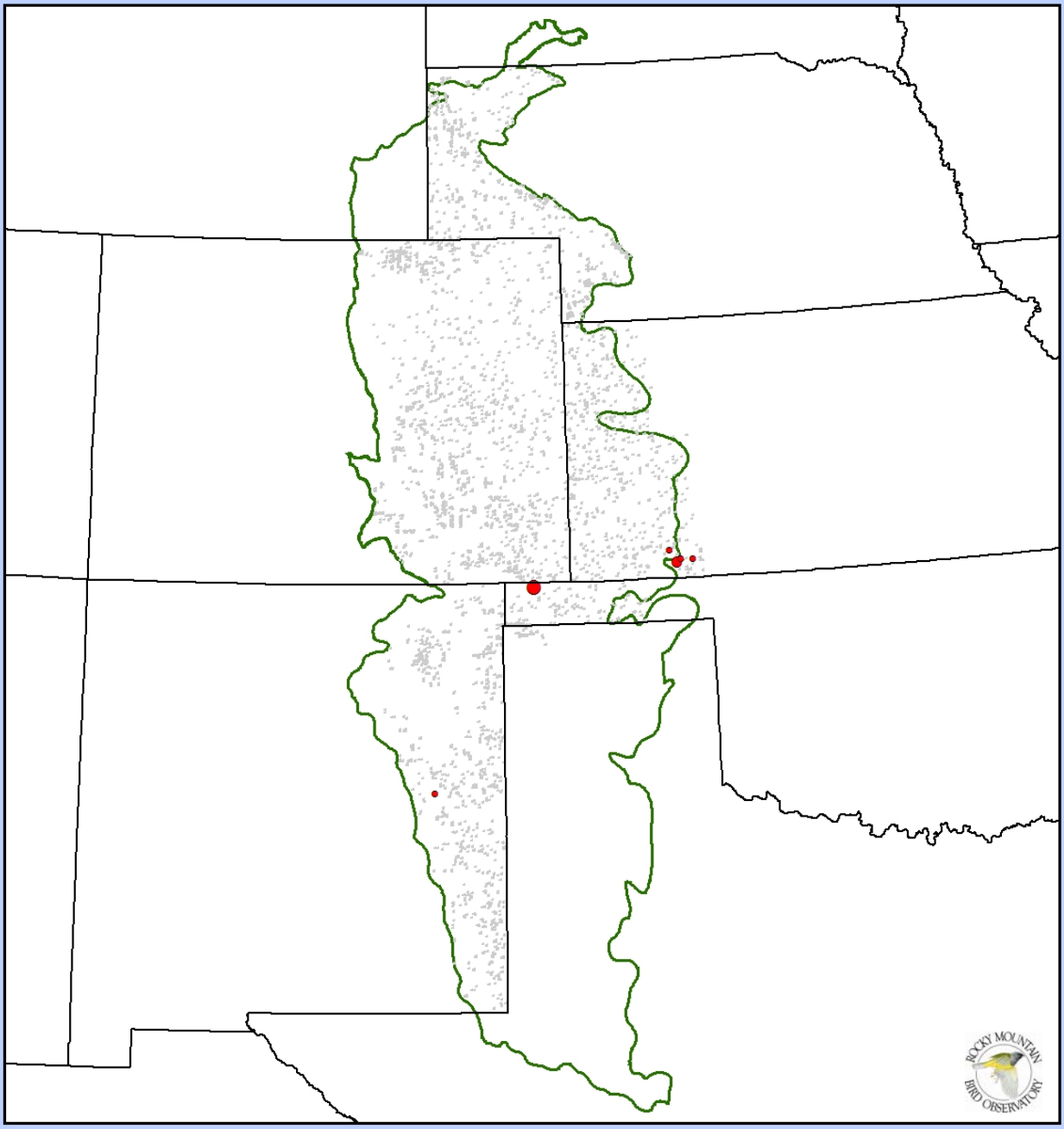
Sage Thrasher
(Oreoscoptes montanus)

In 2003, we detected nine individuals on six (<1%) of the sections surveyed. The Sage Thrasher occurred rarely in the Shortgrass Prairie BCR. The majority of the detections were in Kansas.

Sage Trasher

(Oreoscoptes montanus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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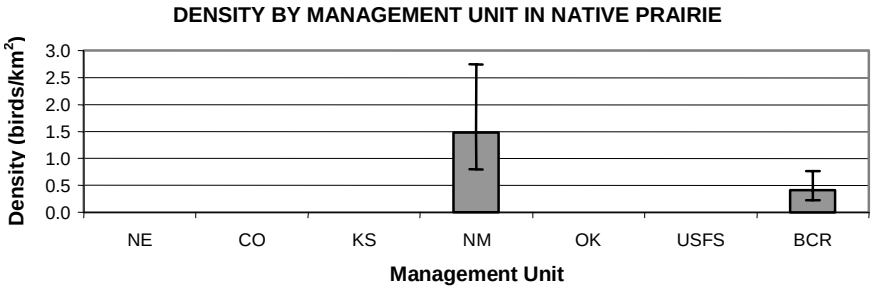
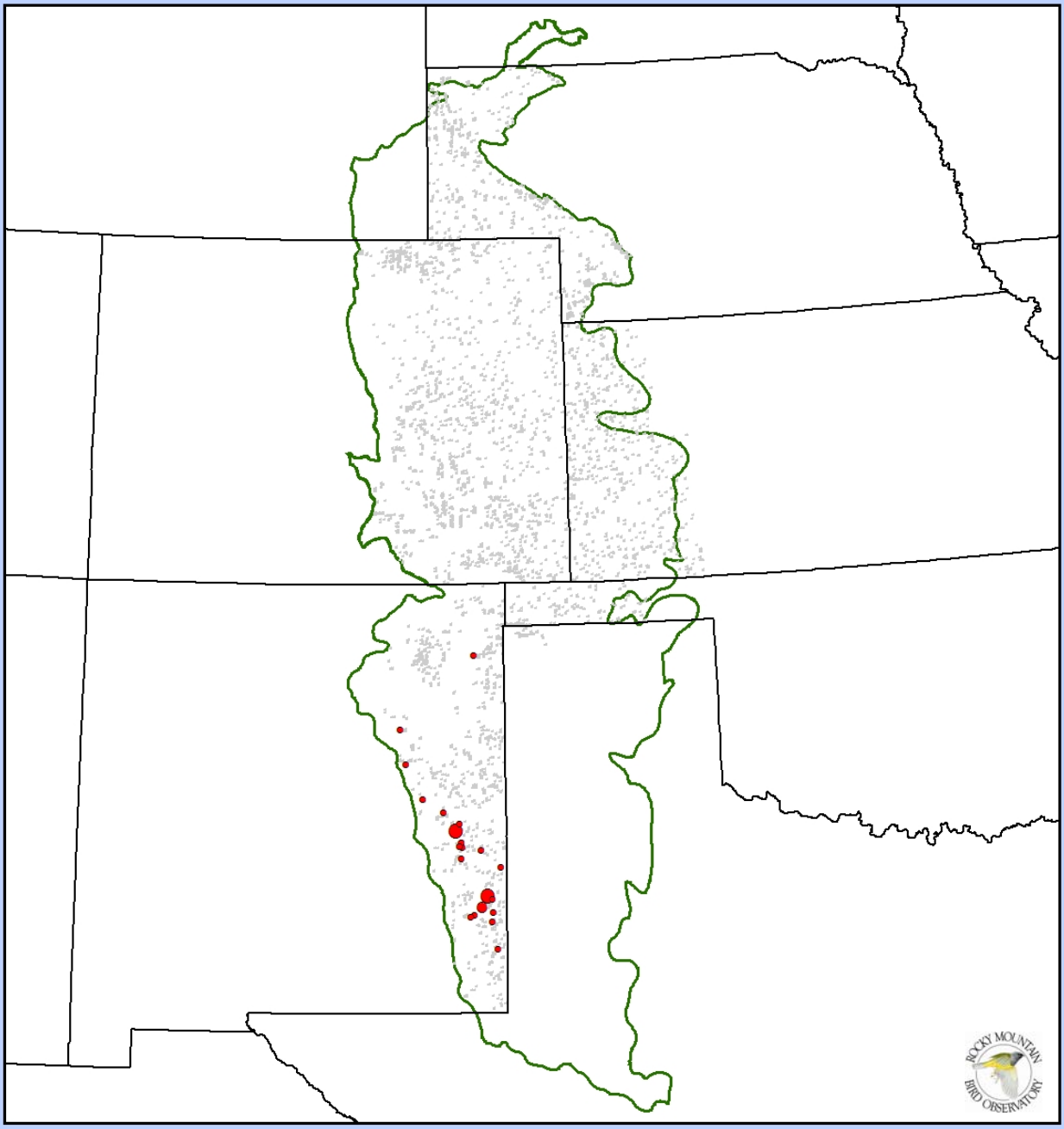
Curve-billed Thrasher
(Toxostoma curvirostre)

In 2003, we detected 37 individuals on 22 (<1%) of the sections surveyed. The Curve-billed Thrasher only occurred in the southern portion of the Shortgrass Prairie BCR. The highest density of this species occurred in New Mexico (D = 1.48 birds/km^2, CV = 32%, *n* = 26).



Curve-billed Thrasher

(Toxostoma curvirostre)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

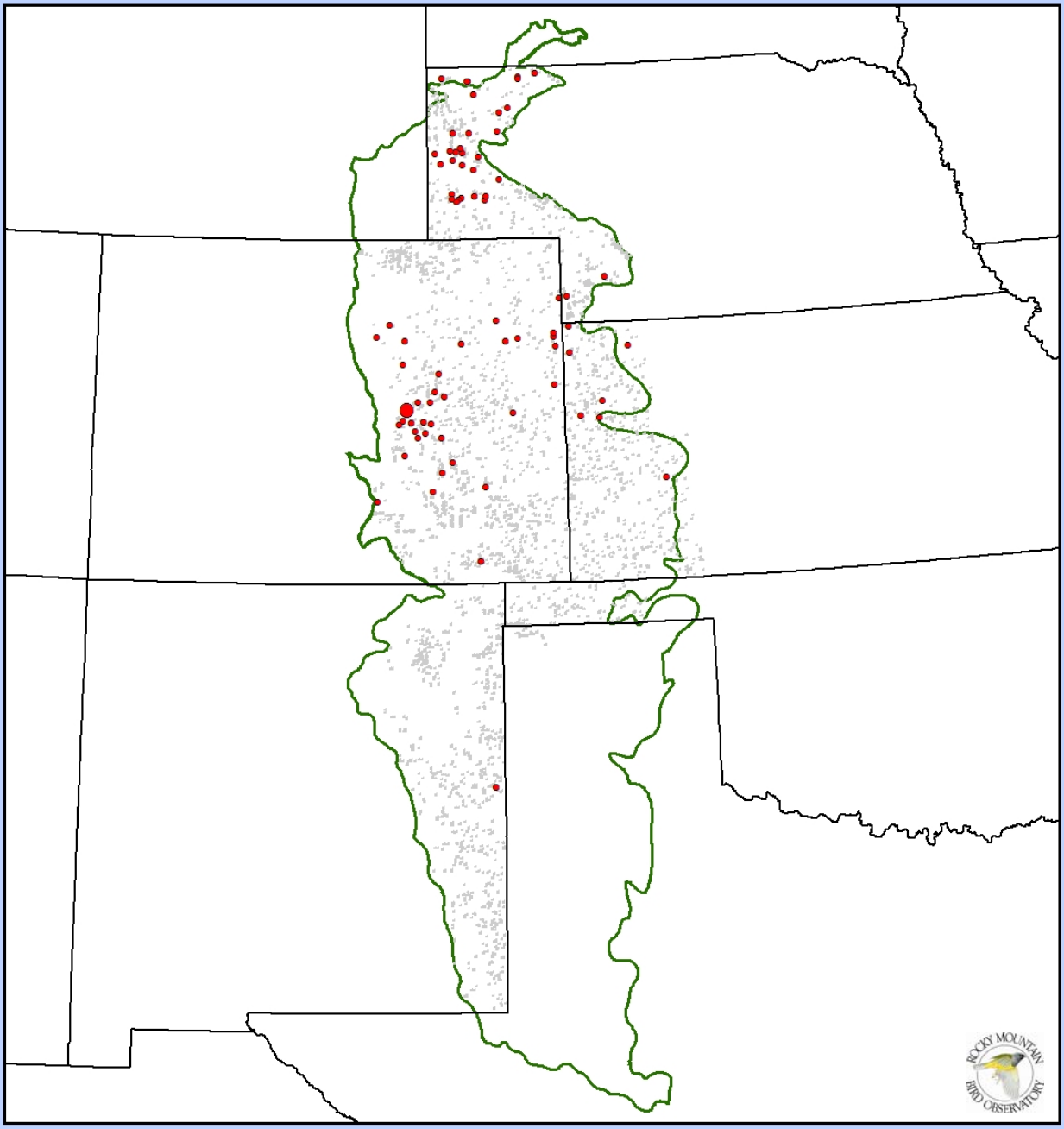
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

European Starling
(Sturnus vulgaris)

In 2003, we detected 283 individuals on 77 (3%) of the sections surveyed. The European Starling was mainly detected in the northern portion of the Shortgrass Prairie BCR. Management for this invasive species should be to conserve and create unfragmented grassland habitats, which this species tends to avoid.

European Starling

(Sturnus vulgaris)



LEGEND

Index of Bird Abundance*

- 0.33 - 5.89
- 5.90 - 11.44
- 11.45 - 17.00

Surveyed Sections

BCR 18**

States

0 50 100 Miles

N

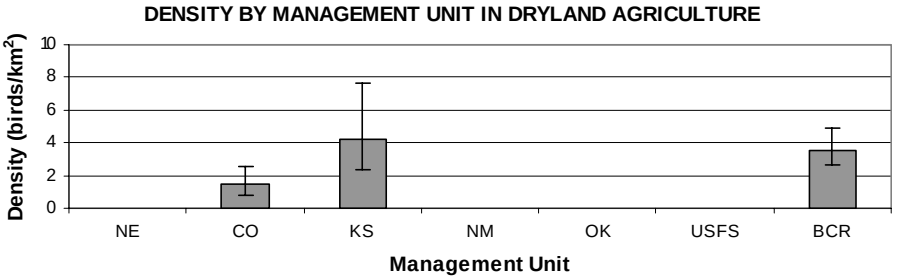
Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

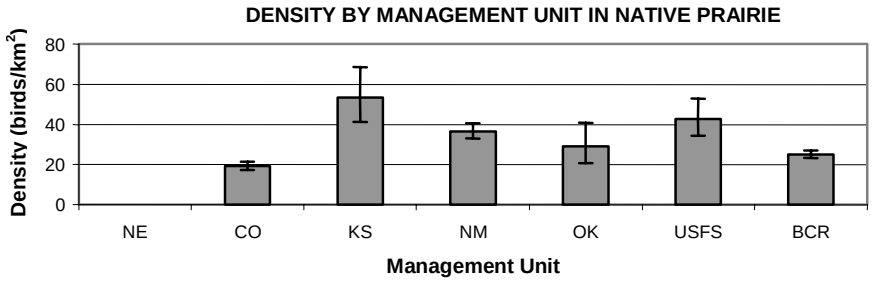
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

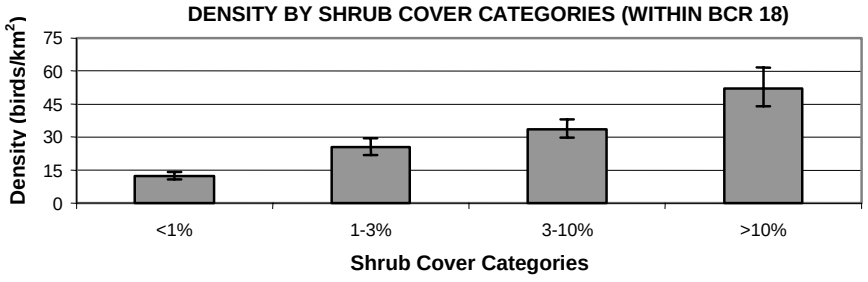
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

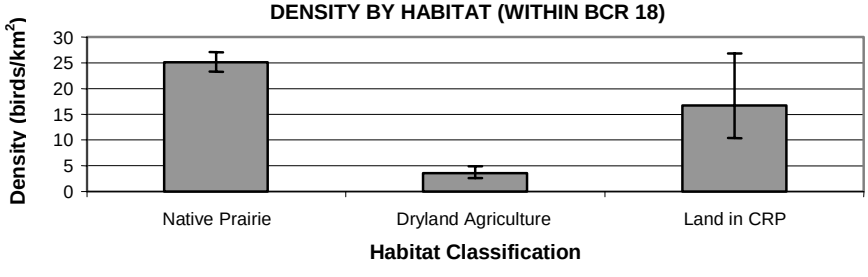
Cassin's Sparrow
(Aimophila cassinii)

In 2003, we detected 3,252 Cassin's Sparrows on 907 (30%) of the surveyed sections. This species was the fifth most abundant bird detected. Cassin's Sparrows were widely distributed across the study area expect for Nebraska where only a few individuals were detected. Across the study area, density was higher in native prairie habitat (D = 25.12 birds/km^2, CV = 4%, *n* = 2435) than in dryland agriculture habitat (D = 3.56 birds/km^2, CV = 16%, *n* = 66) or land in CRP (D = 16.69 birds/km^2, CV = 24%, *n* = 47). Highest densities in native prairie habitat occurred in Kansas (D = 53.25 birds/km^2, CV = 13%, *n* = 185) and in areas of > 10% shrub cover (D = 52.20 birds/km^2, CV = 9%, *n* = 477). Cassin's Sparrow is a Partners In Flight Tier I (high overall priority) species.



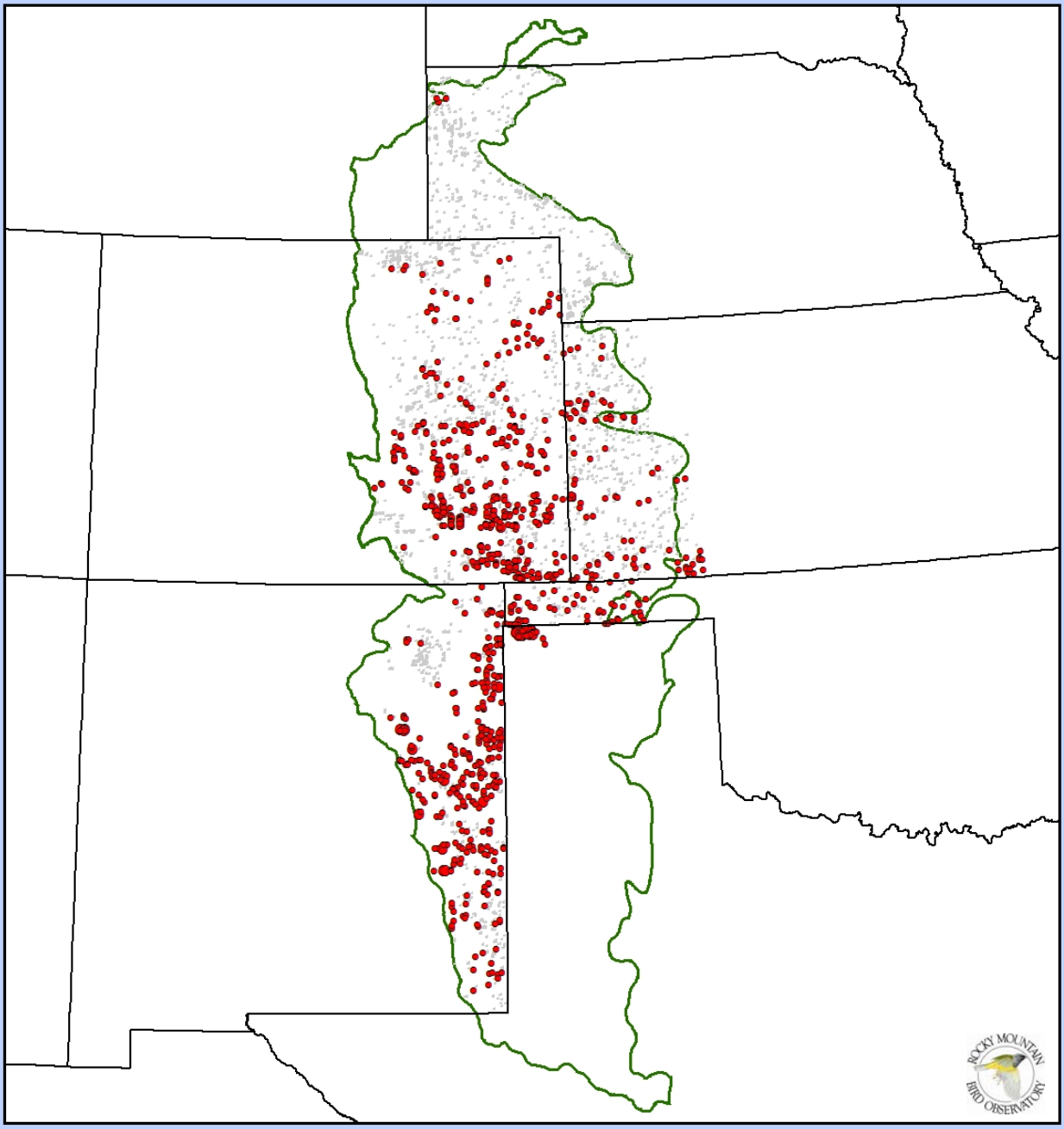






Cassin's Sparrow

(Aimophila cassinii)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

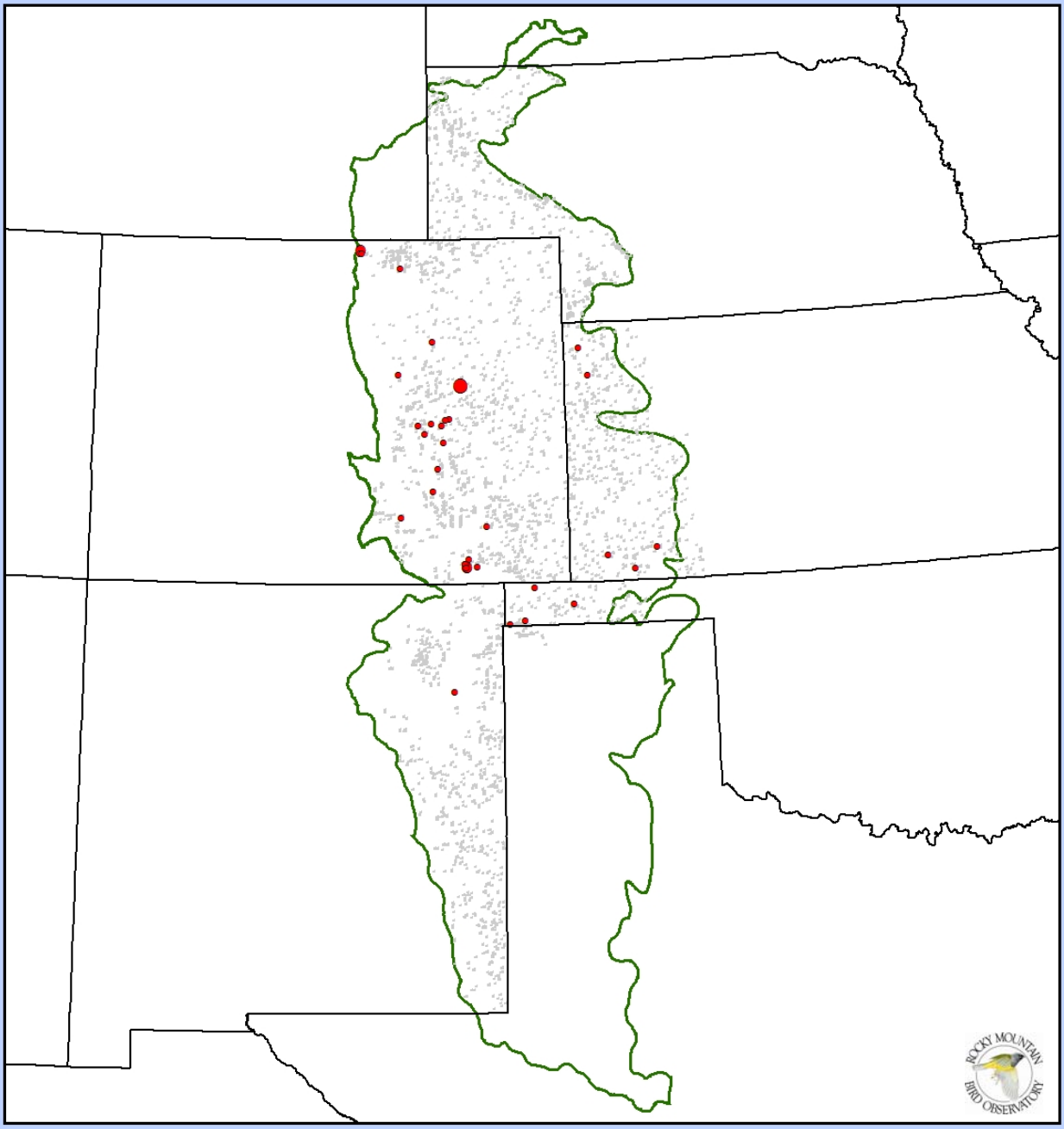
Brewer's Sparrow
(Spizella breweri)

In 2003, we detected 48 Brewer's Sparrows on 34 (1%) of the surveyed sections. This species was distributed across eastern Colorado, western Kansas and the panhandle of Oklahoma with one observation occurring in New Mexico. Density in native prairie habitat across the study area was 0.27 birds/km^2 (CV = 23%, n = 30). Brewer's Sparrow is a species of concern as follows:

- Partners In Flight – Tier III (additional watch list species)
- Nebraska – species of concern
- USFS R2 – proposed sensitive species.

Brewer's Sparrow

(Spizella breweri)



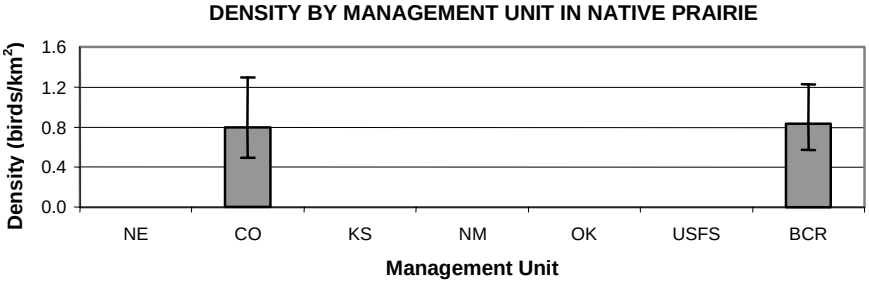
Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

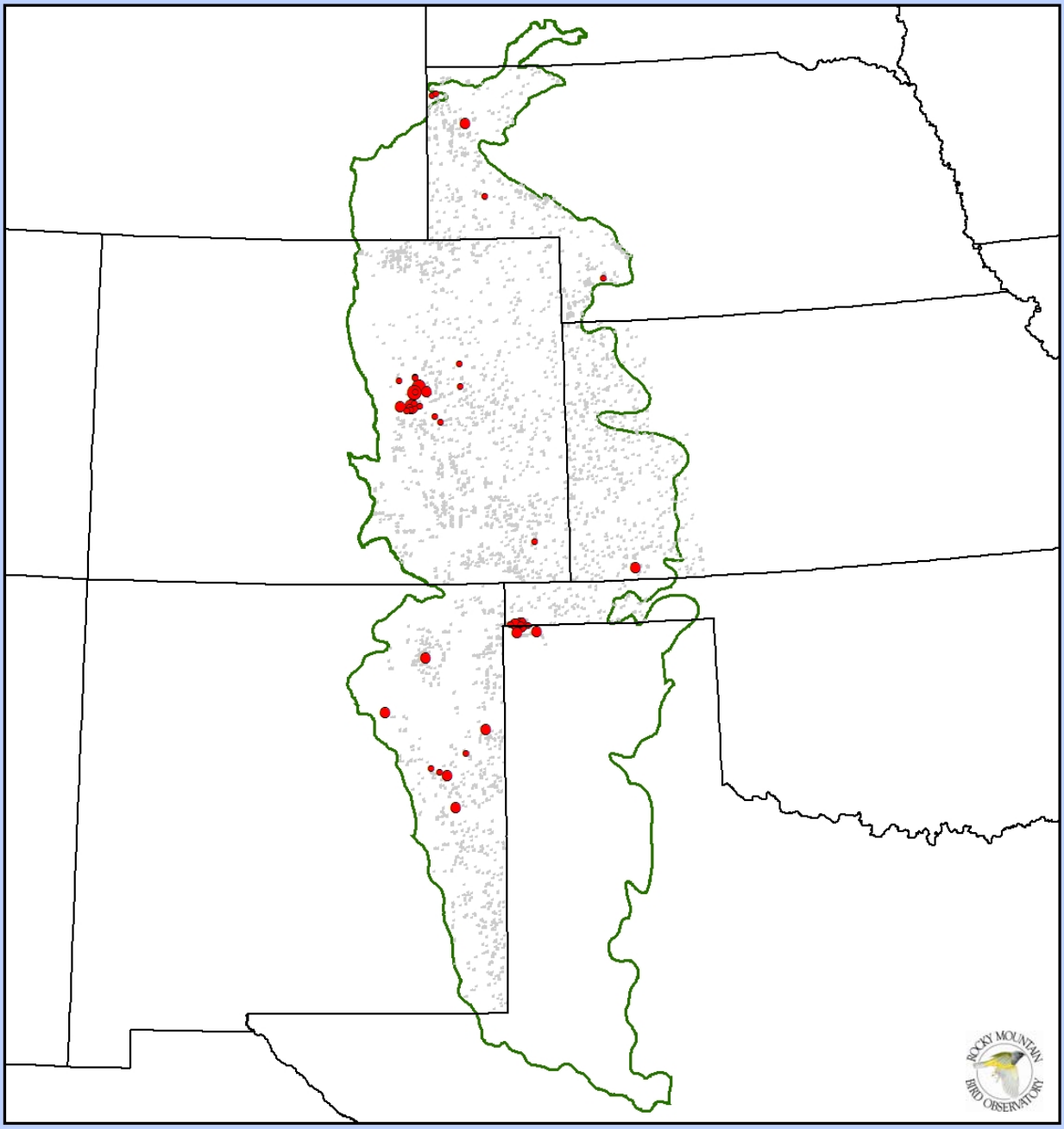
Vepser Sparrow
(Pooecetes gramineus)

In 2003, we detected 63 Vesper Sparrows on 41 (1%) of the surveyed sections. This species was scattered throughout the study area. Density in native prairie habitat across the study area was 0.84 birds/km^2 (CV = 20%, *n* = 54).



Vesper Sparrow

(Pooecetes gramineus)



LEGEND

Index of Bird Abundance*

- 0.33 - 0.66
- 0.67 - 1.00
- 1.01 - 1.33

Surveyed Sections

BCR 18**

States

0 50 100 Miles

N

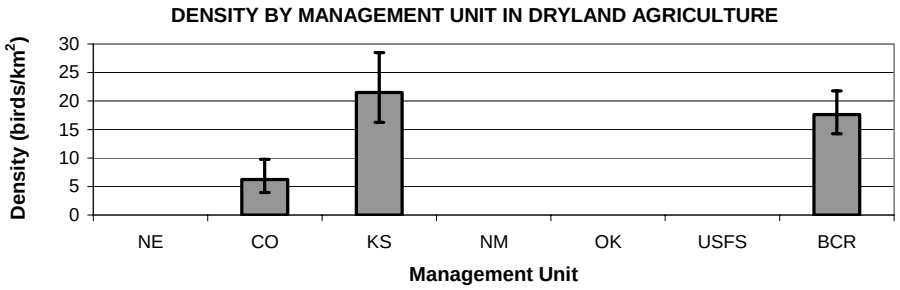
Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

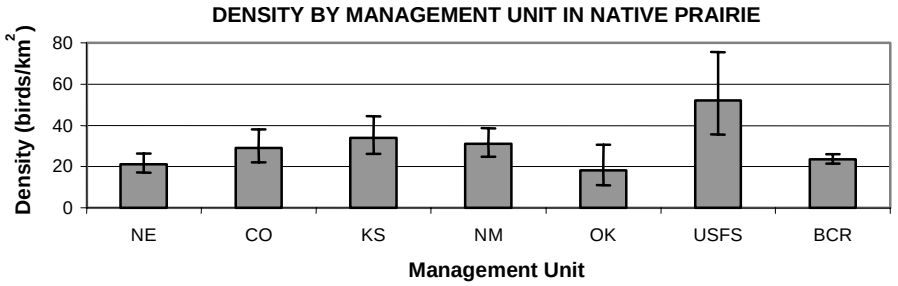
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

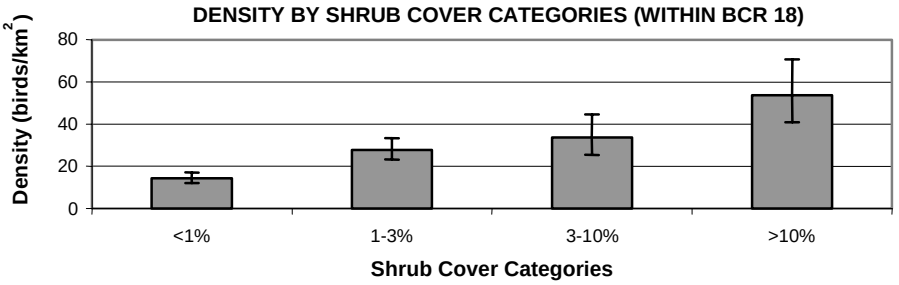
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

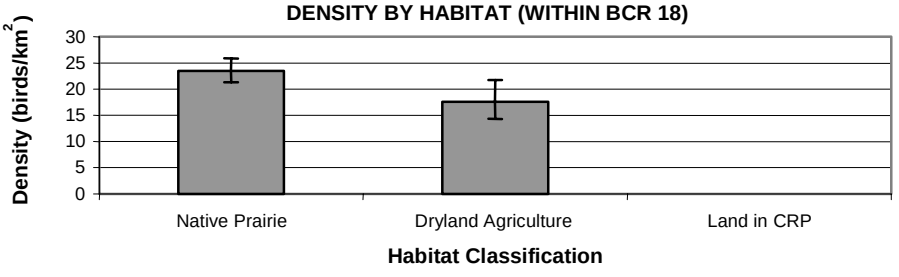
Lark Sparrow
(Chondestes grammacus)

In 2003, we detected 1,487 Lark Sparrows on 661(22%) of the surveyed sections. This species was widely distributed across the study area. Density was higher in native prairie habitat (D = 25.12 birds/km^2, CV = 4%, *n* = 2435) than in dryland agriculture habitat (D = 3.56 birds/km^2, CV = 16%, *n* = 66). Highest densities in native prairie habitat occurred on National Grasslands (D = 52.01 birds/km^2, CV = 19%, *n* = 107) and in areas of > 10% shrub cover (D = 53.76 birds/km^2, CV = 14%, *n* = 149). Lark Sparrow is a Partners In Flight Tier II (high regional priority) species and a species of moderate concern in Nebraska.



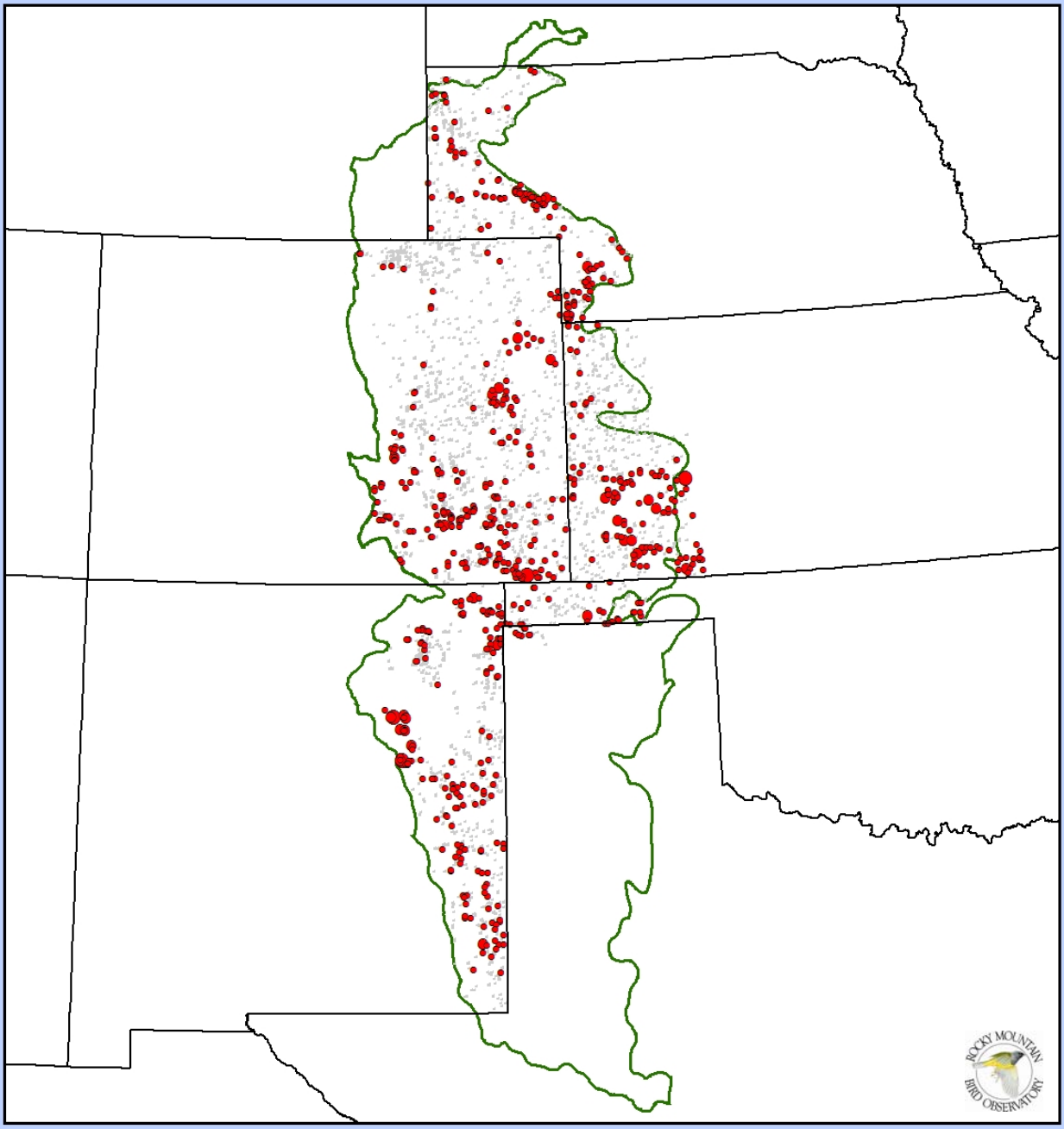






Lark Sparrow

(Chondestes grammacus)



LEGEND

Index of Bird Abundance*

- 0.33 - 1.78
- 1.79 - 3.22
- 3.23 - 4.67

Surveyed Sections

BCR 18**

States

0 50 100 Miles

N

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

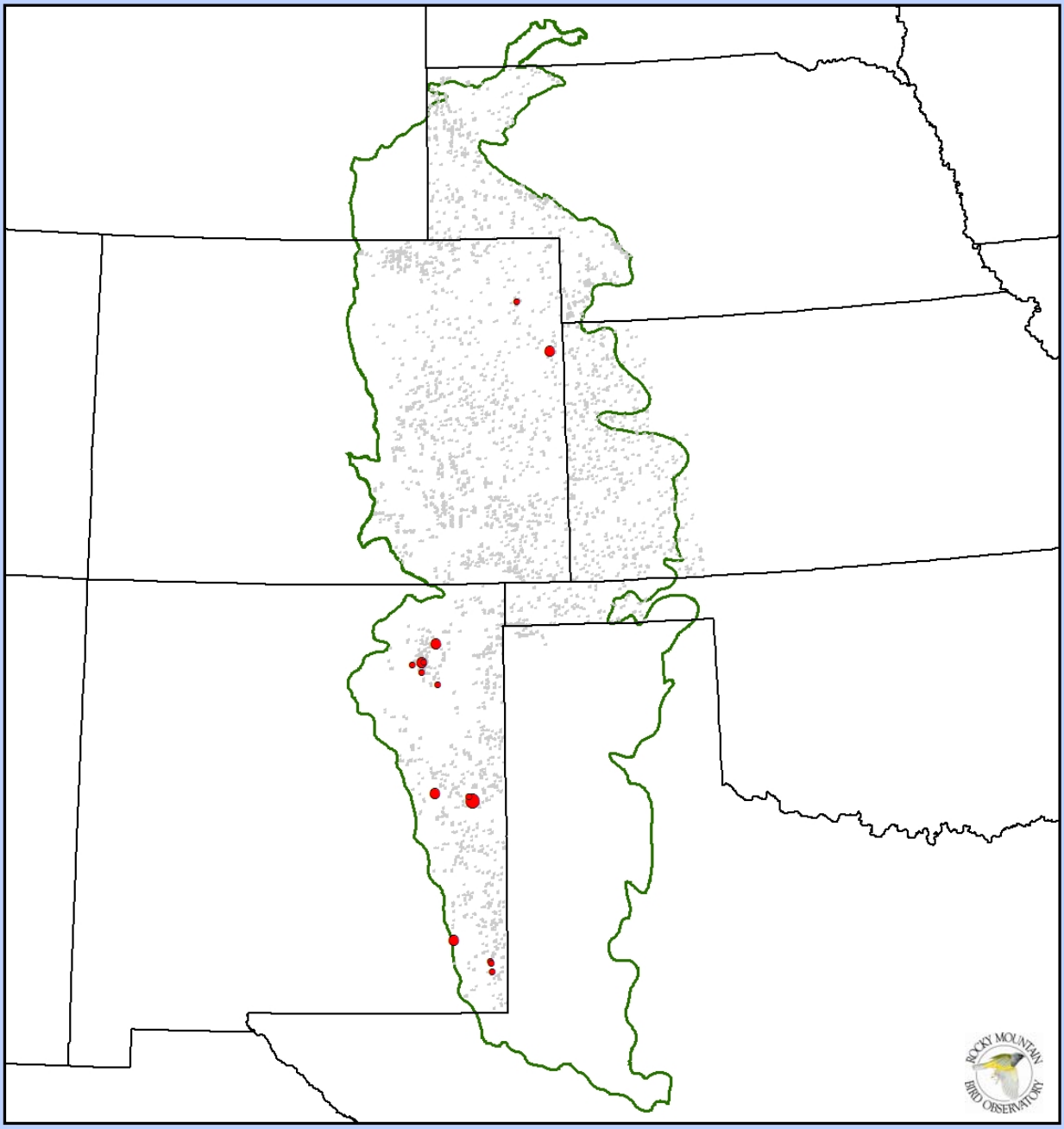
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Black-throated Sparrow
(Amphispiza bilineata)

In 2003, we detected 23 individuals on 15 (<1%) of the sections surveyed. This species occurs mainly in the New Mexico portion of the Shortgrass Prairie BCR. A few localized detections were made in native sand-sage habitats of northeast Colorado.

Black-throated Sparrow

(Amphispiza bilineata)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

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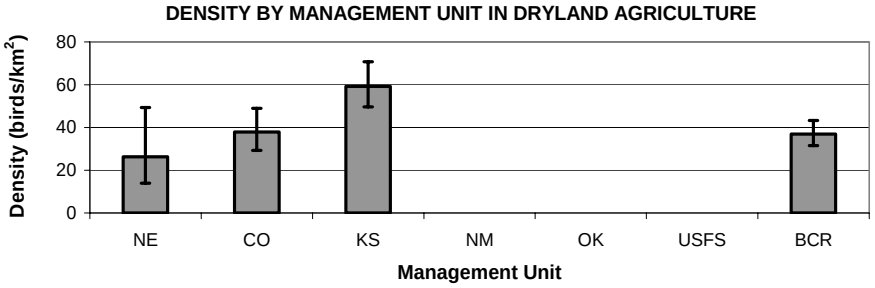
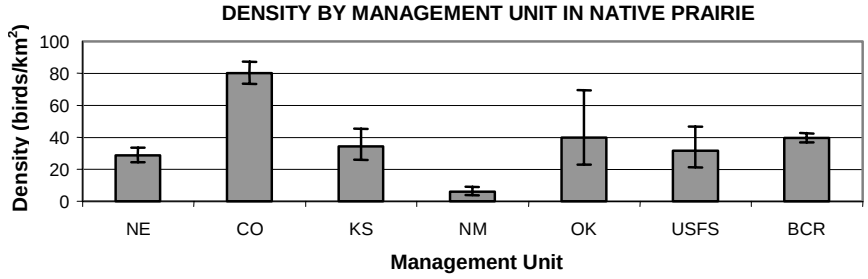
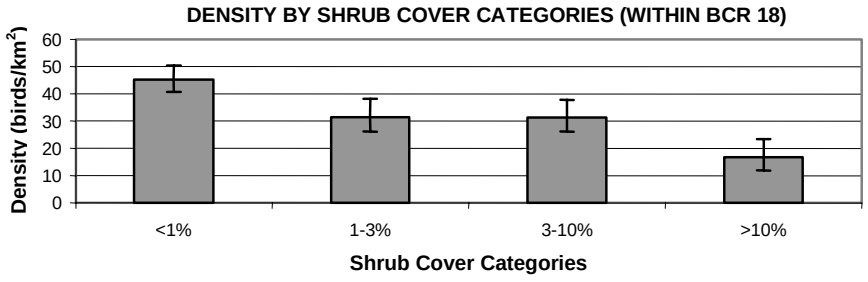
Lark Bunting

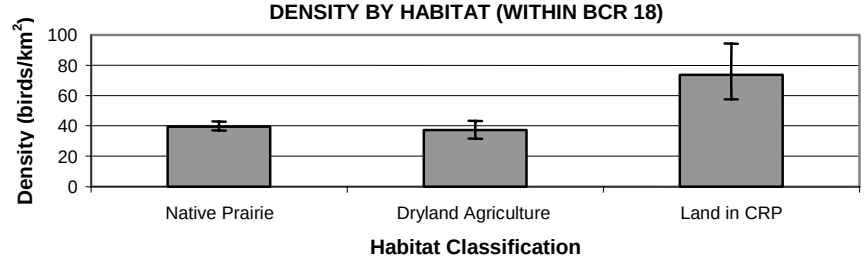
(Calamospiza melanocorys)

In 2003, we detected 8,095 Lark Buntings on 1,402 (47%) of the surveyed sections. This was the third most abundant species detected and it was widely distributed across the study area except for eastern New Mexico, where observations were uncommon and patchy and only in the north. Across the study area, density was higher on land in CRP (D = 73.64 birds/km^2, CV = 13%, *n* = 139) than in native prairie habitat (D = 39.70 birds/km^2, CV = 4%, *n* = 3137) or in dryland agriculture habitat (D = 36.93 birds/km^2, CV = 8%, *n* = 806). Highest densities in native prairie habitat occurred in Colorado (D = 80.22 birds/km^2, CV = 4%, *n* = 2751) and in areas of < 1% shrub cover (D = 45.30 birds/km^2, CV = 6%, *n* = 1651). Lark Bunting is a Partners In Flight Tier I (high overall priority) species and a species of high concern in Nebraska.



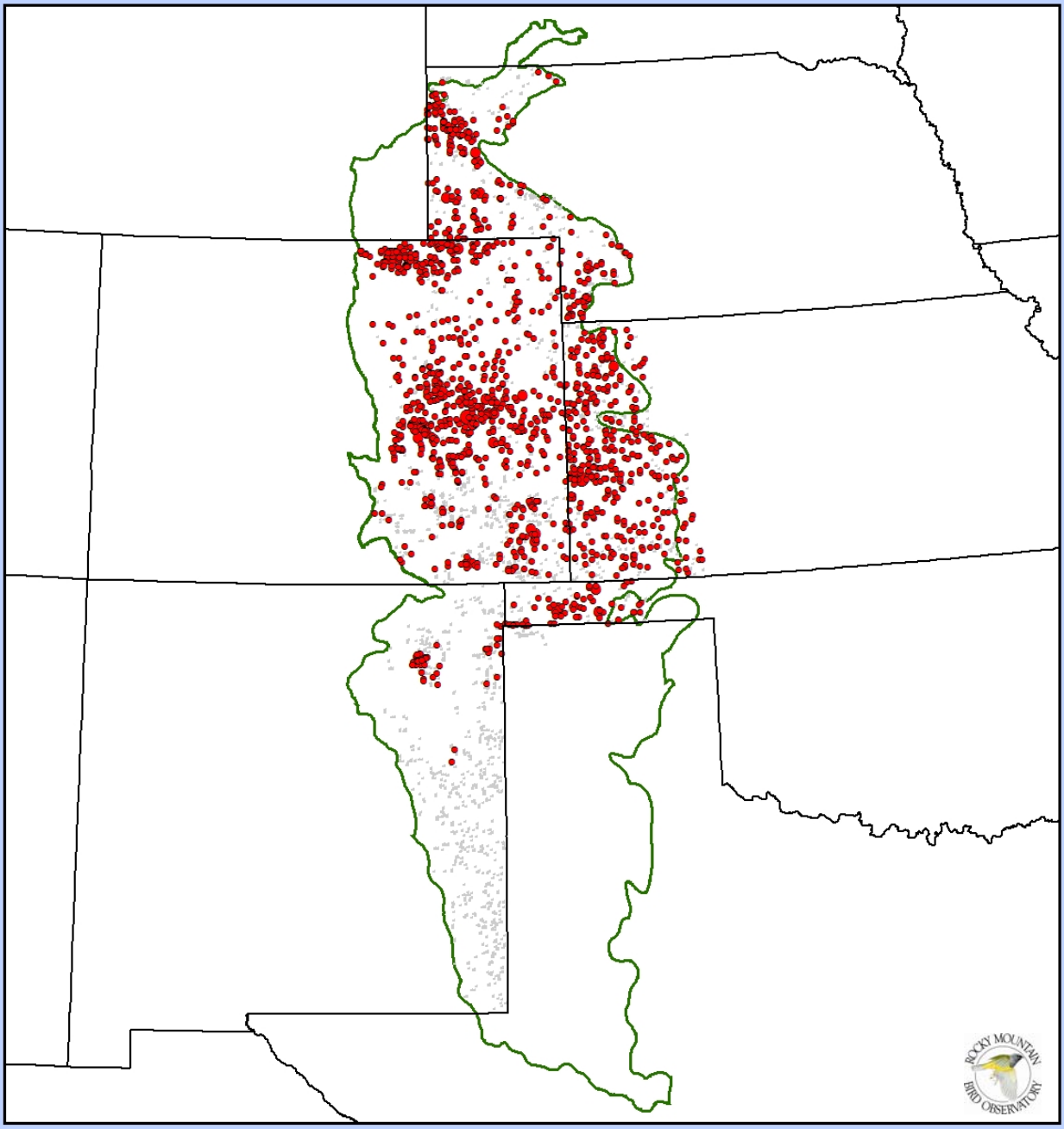






Lark Bunting

(Calamospiza melanocorys)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

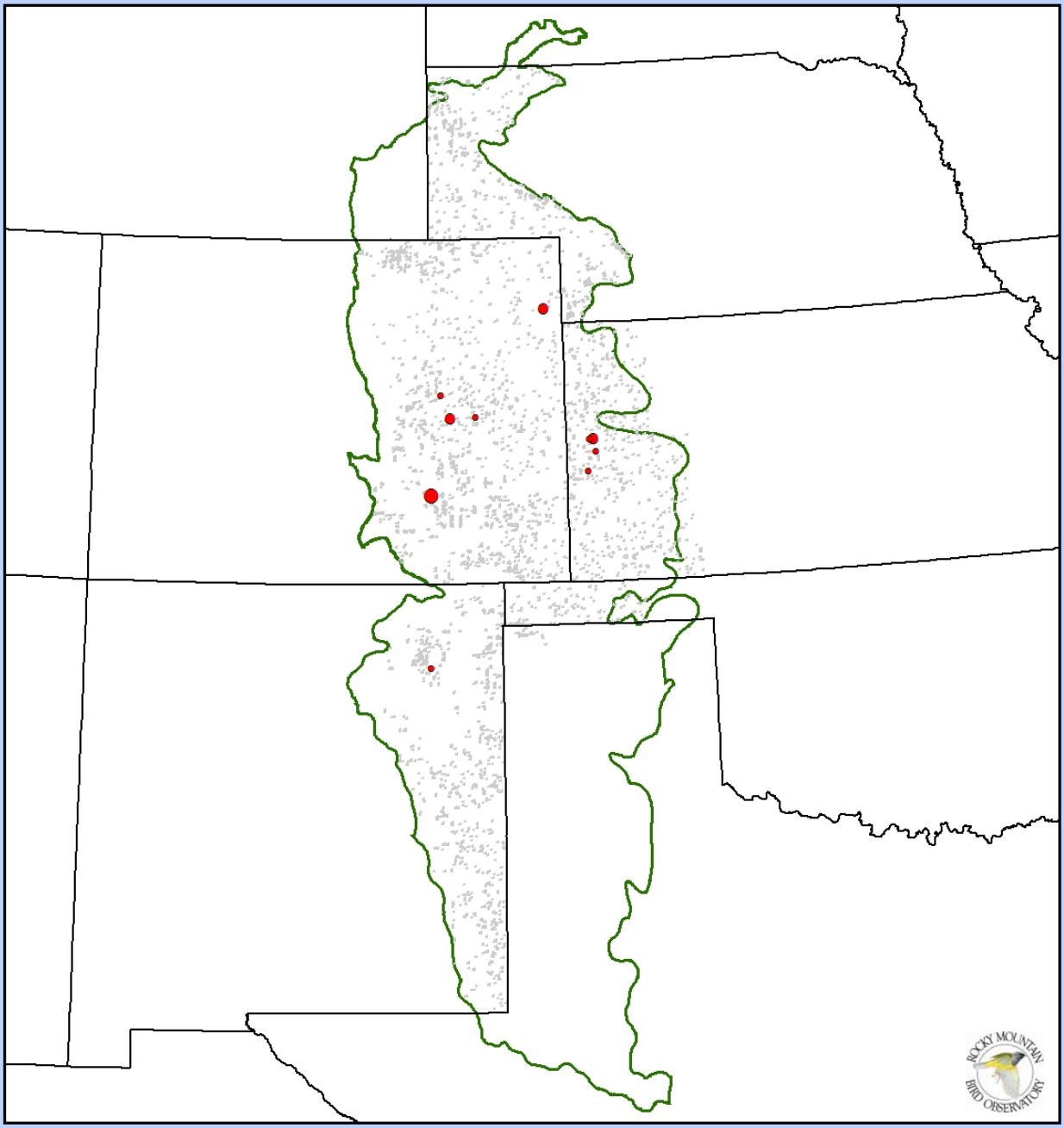
Savannah Sparrow

(Passerculus sandwichensis)

In 2003, we detected 16 individuals on 10 (<1%) of the sections surveyed. The Savannah Sparrow occurs rarely in the Shortgrass Prairie BCR. In more arid portions of their range, like BCR 18, this species prefers irrigated areas or edges of free water bodies.

Savannah Sparrow

(Passerculus sandwichensis)



LEGEND

Index of Bird Abundance*
- 0.33 - 0.66
- 0.67 - 1.00
- 1.01 - 1.33

Surveyed Sections

BCR 18**

States

0 50 100 Miles

N

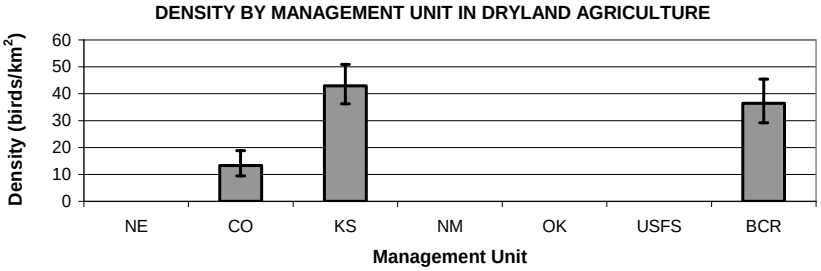
Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

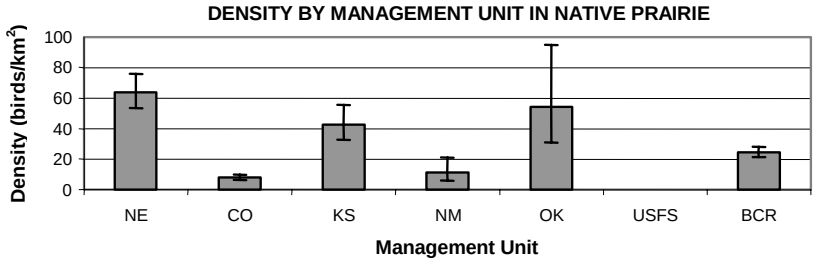
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

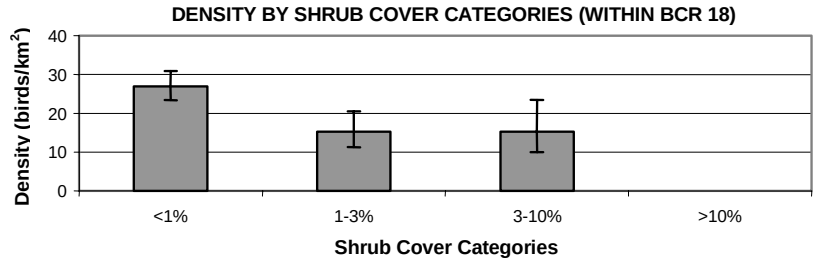
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

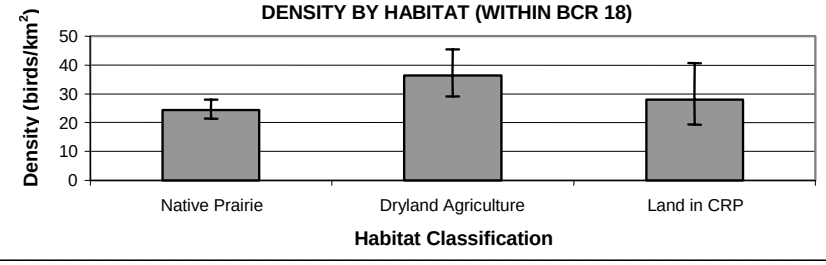
Grasshopper Sparrow
(Ammodramus savannarum)

In 2003, we detected 1364 individuals on 636 (21%) of the sections surveyed. The Grasshopper Sparrow was detected throughout the Shortgrass Prairie BCR. Due to some observers that were unable to detect the Grasshopper Sparrow, there are unanticipated gaps in northeastern Colorado and in the southern portion of Colorado and Kansas. This species occurred in large densities in native prairie (D = 24.52 birds/km^2, CV = 7%, *n* = 716), dryland agriculture (D = 36.43 birds/km^2, CV = 11%, *n* = 484) and CRP (D = 28.04 birds/km^2, CV = 19%, *n* = 67). The Grasshopper Sparrow was more abundant in <1% shrub cover (D = 26.87 birds/km^2, CV = 7%, *n* = 500) than the 1-3% (D = 15.17 birds/km^2, CV = 15%, *n* = 108) and 3-10% (D = 15.3 birds/km^2, CV = 22%, *n* = 55) categories. There were only 23 detections on 6360 points that were classified as the >10% shrub cover. Management for this species should consider the conservation and creation of native grassland habitats that contain <1% shrub cover with adequate vegetation structure. Grasshopper Sparrow is a Partners In Flight Tier II (high regional priority species, a species of moderate concern in Nebraska, and a proposed sensitive species in USFS Region 2.



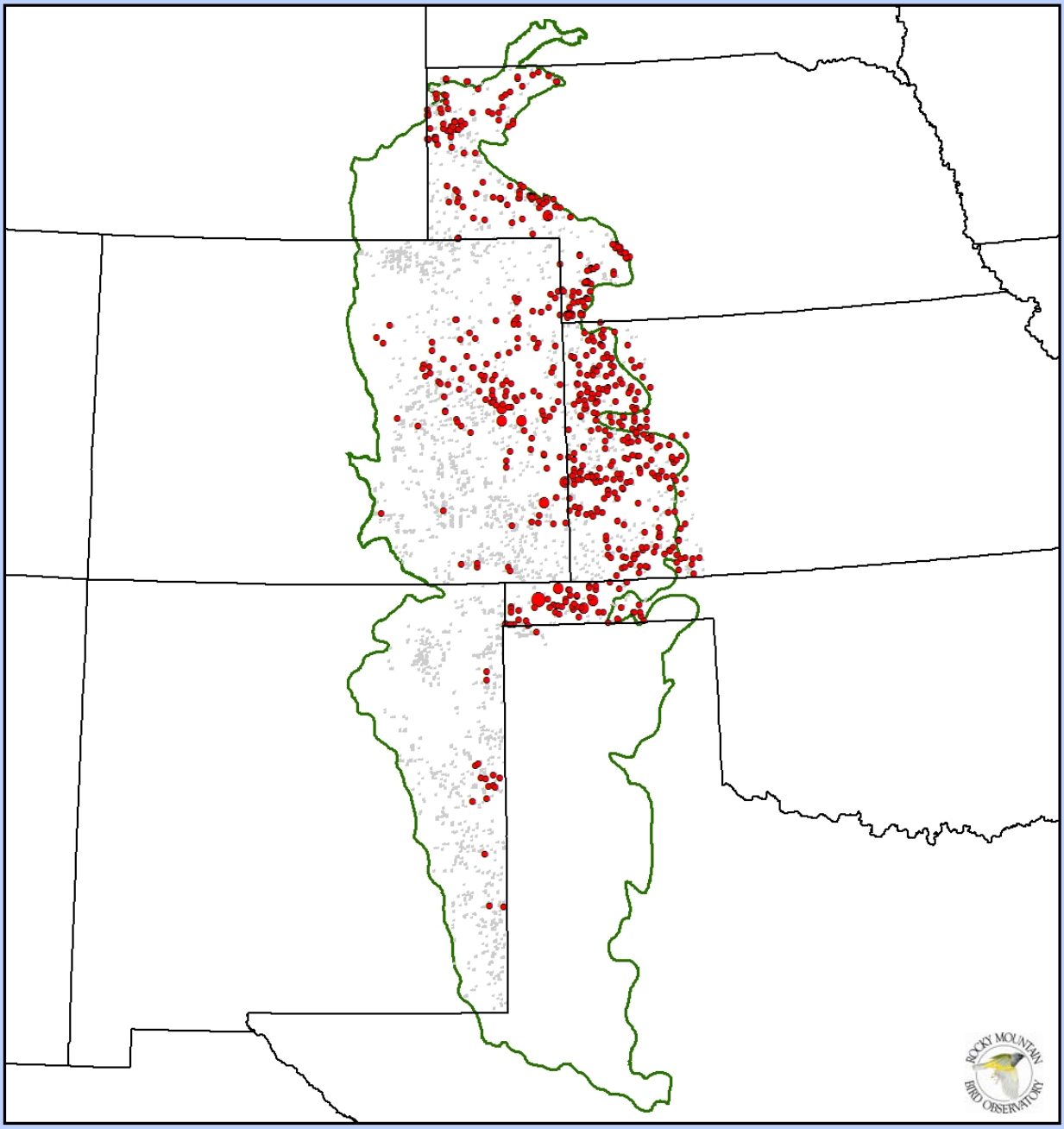






Grasshopper Sparrow

(Ammodramus savannarum)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

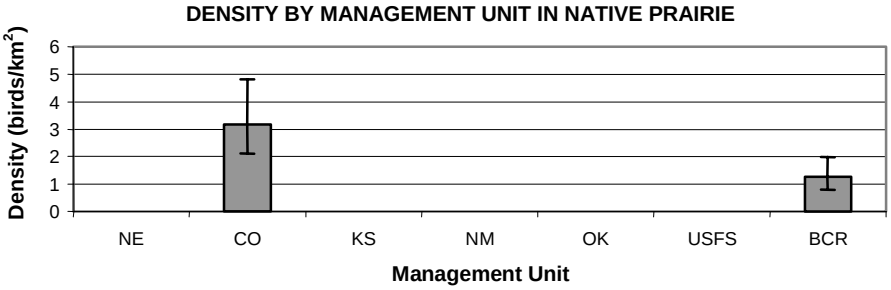
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

McCown's Longspur
(Calcarius mccownii)

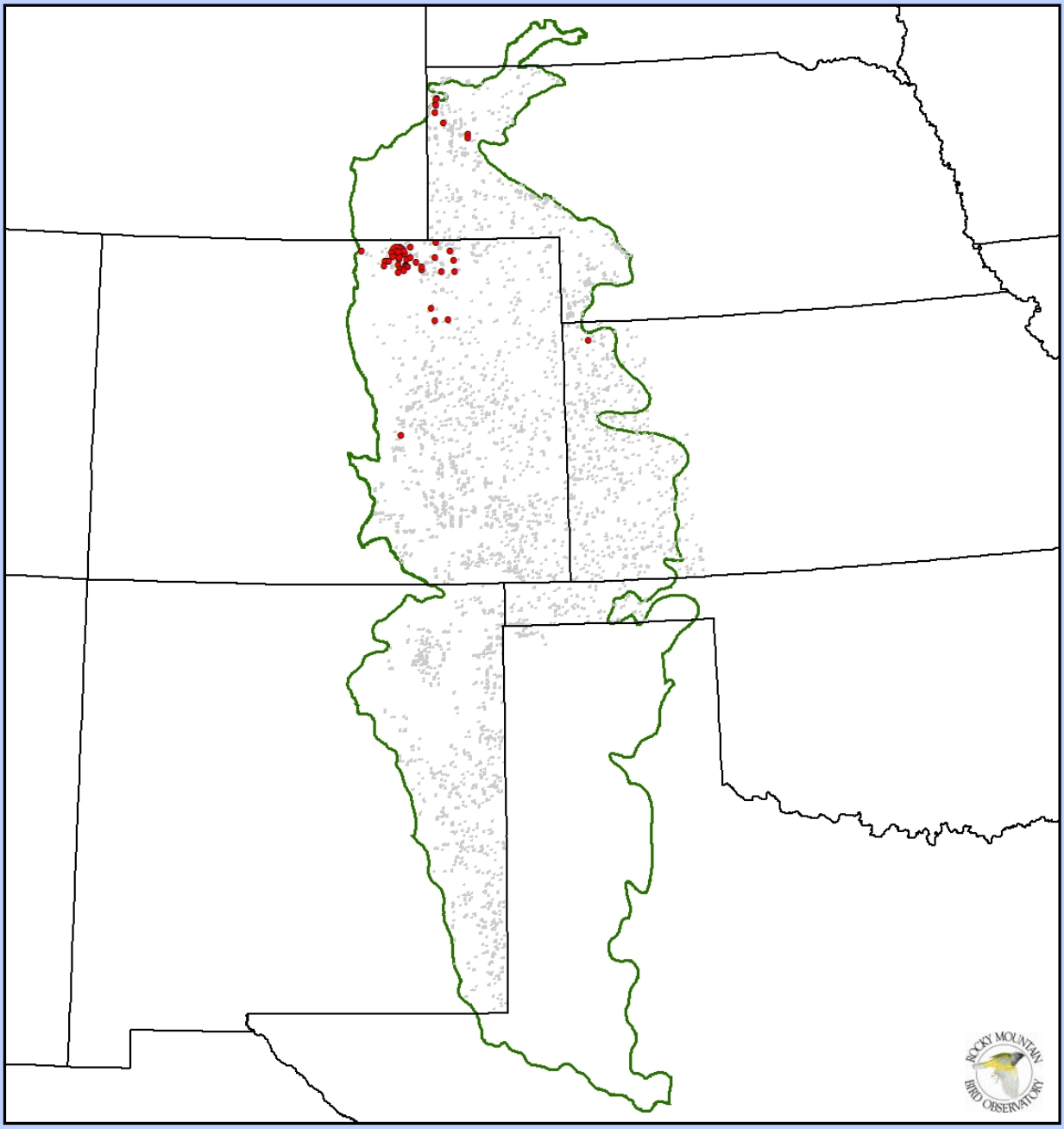
In 2003, we detected 92 individuals on 52 (2%) of the sections surveyed. The McCown's Longspur was strictly distributed in the northern portion of the Shortgrass Prairie BCR, mainly in short structured grasslands. This species occurred in largest densities in native habitats (D = 1.26 birds/km^2, CV = 23%, n = 49) and in areas that were categorized less than 1% shrub cover. Management for this species should focus on conserving and creating native prairie with less than 1% shrub cover. McCown's Longspur is a species of concern as follows:

- Partners In Flight – Tier I (high overall priority)
- Nebraska – species of high concern
- USFS R2 – proposed sensitive species.



McCown's Longspur

(Calcarius mccownii)



LEGEND

Index of Bird Abundance*

- 0.33 - 1.22
- 1.23 - 2.11
- 2.12 - 3.00

Surveyed Sections

BCR 18**

States

0 50 100 Miles

N

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Chestnut-collared Longspur

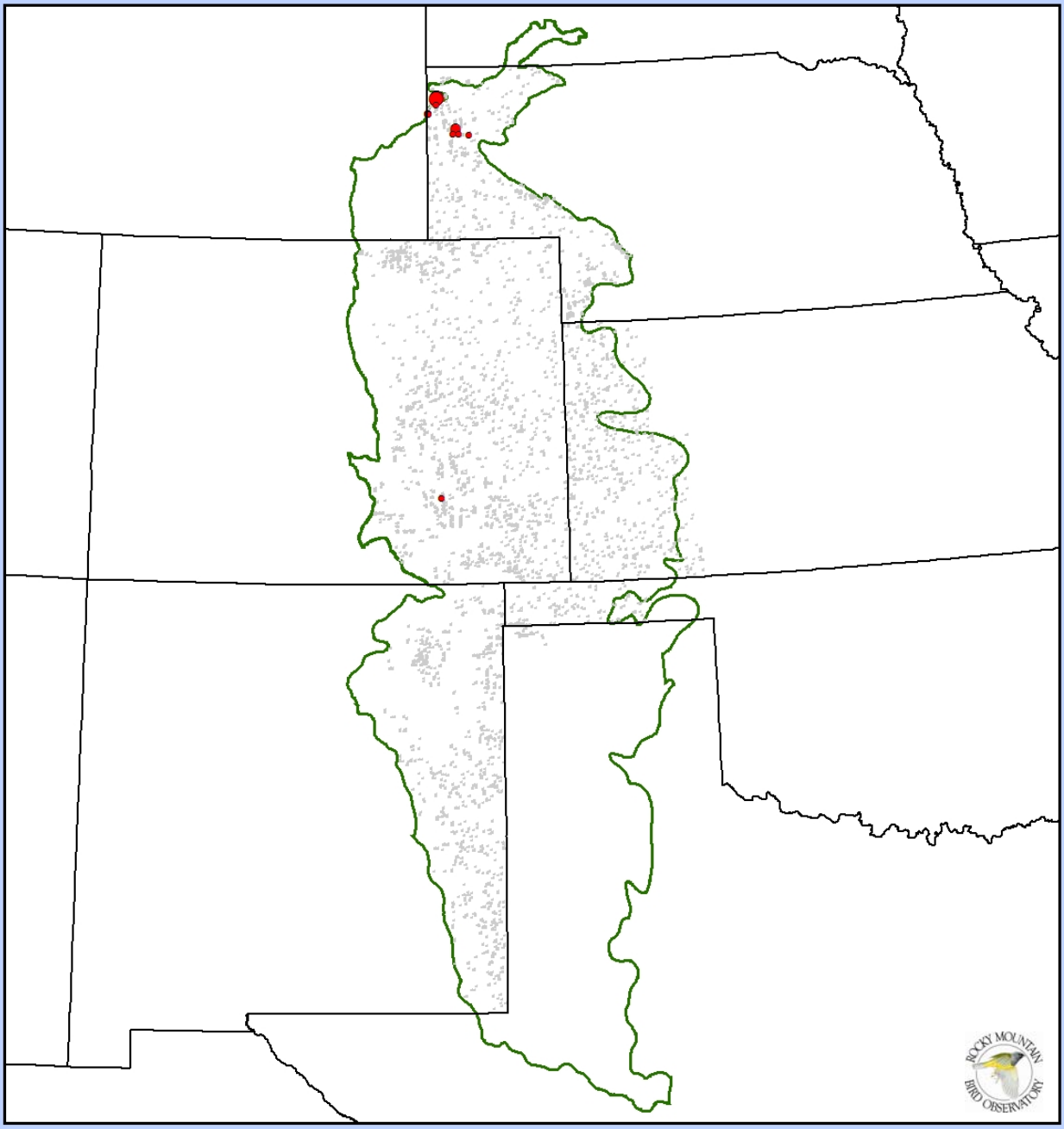
(Calcarius ornatus)

In 2003, we detected 25 individuals on 12 (<1%) of the sections surveyed. The Chestnut-collared Longspur was strictly distributed in the northern portion of the Shortgrass Prairie BCR. However, in Otero county, Colorado we surprisingly detected two individuals. Chestnut-collared Longspur is a species of concern as follows:

- Partners In Flight – Tier I (high overall priority)
- Nebraska – species of high concern
- USFS R2 – proposed sensitive species.

Chesnut-collared Longspur

(Calcarius ornatus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

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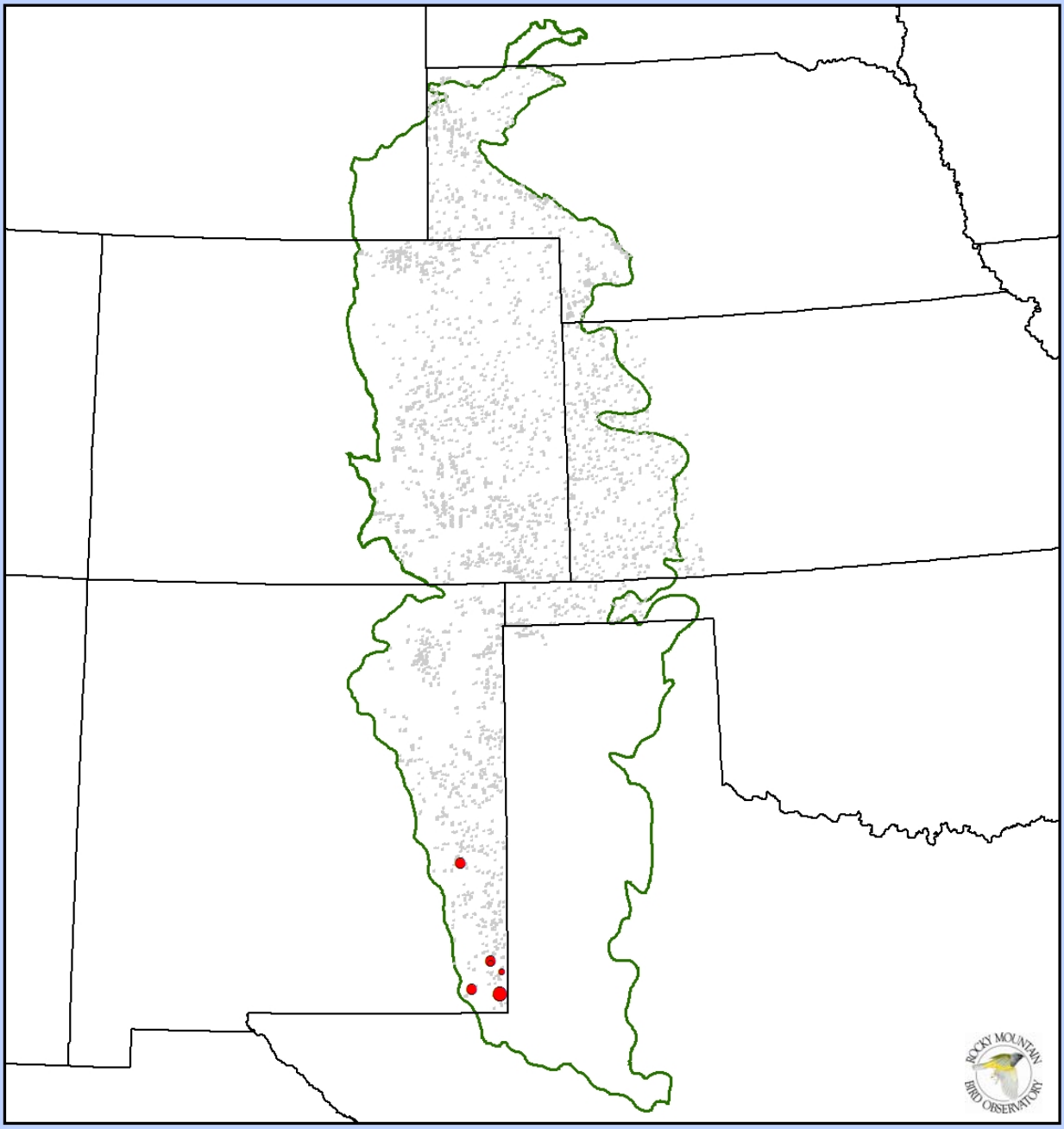
Pyrrhuloxia

(Cardinalis sinuatus)

In 2003, we detected 11 individuals on six (<1%) of the sections surveyed. The Pyrrhuloxia was distributed throughout the extreme southern tip of the Shortgrass Prairie BCR, mainly in mesquite grasslands.

Pyrrhuloxia

(Cardinalis sinuatus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

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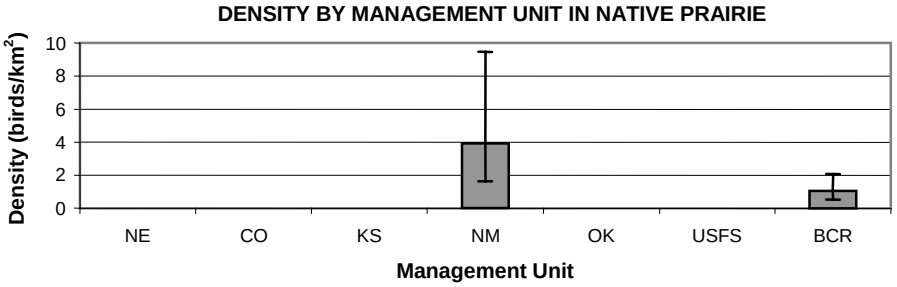
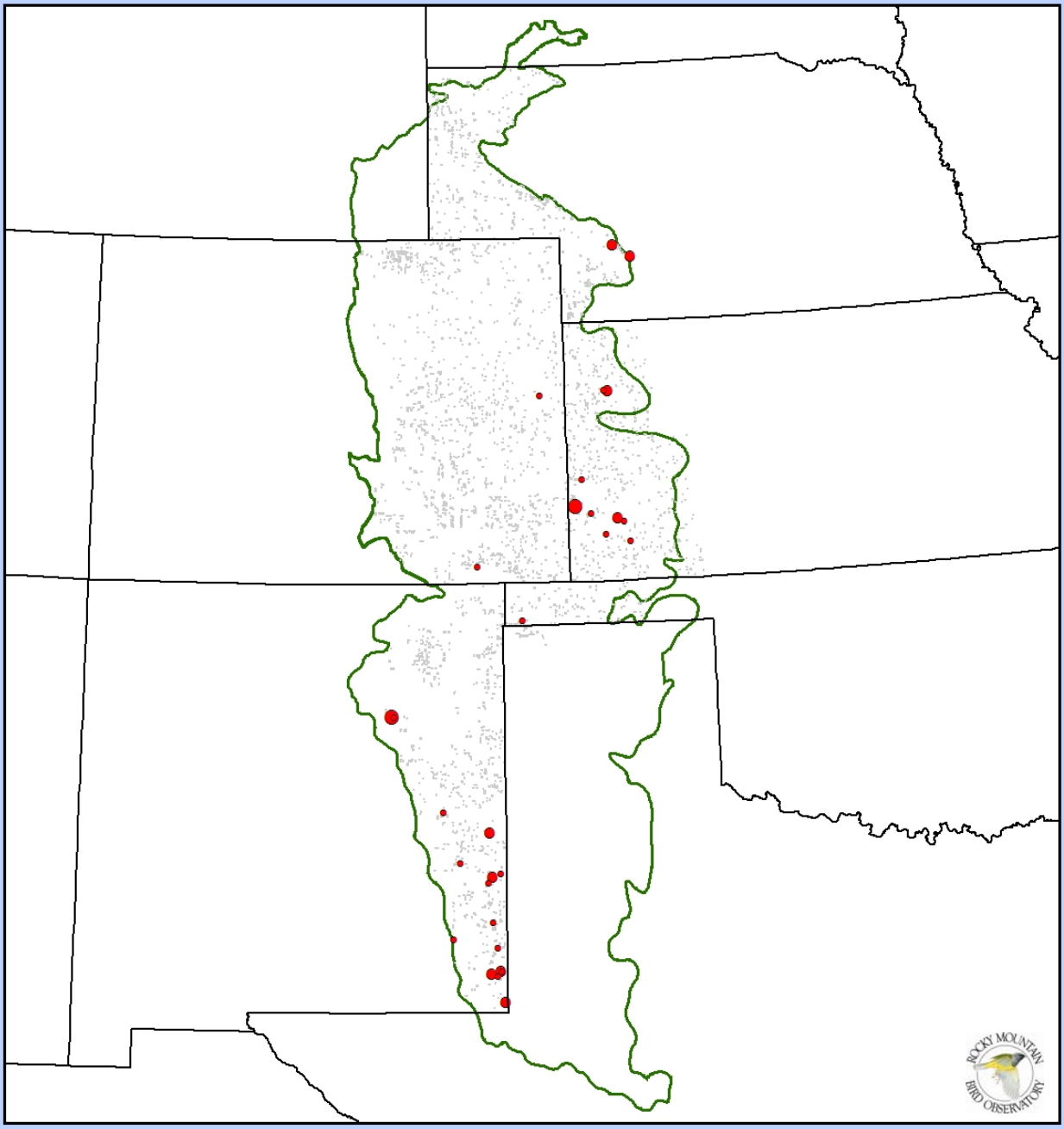
Blue Grosbeak
(Passerina caerulea)

In 2003, we detected 45 individuals on 30 (1%) of the sections surveyed. The Blue Grosbeak was sparsely distributed throughout grassland habitats in the Shortgrass Prairie BCR. The largest density of this species occurs in native habitats of New Mexico (D = 3.92 birds/km^2, CV = 46%, n = 19).



Blue Grosbeak

(Passerina caerulea)



LEGEND

Index of Bird Abundance*
- 0.33 - 0.66
- 0.67 - 1.00
- 1.01 - 1.33

Surveyed Sections
BCR 18**
States

0 50 100 Miles

N

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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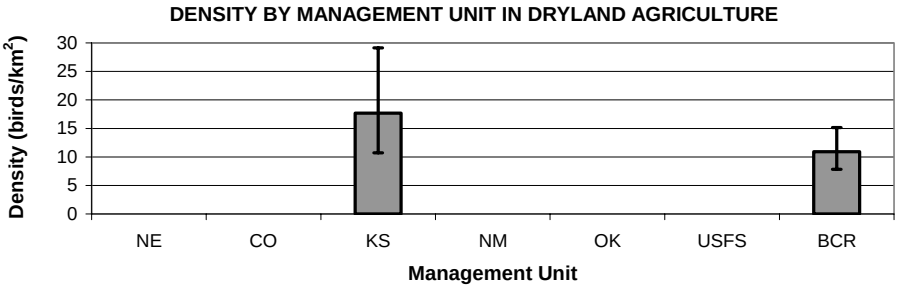
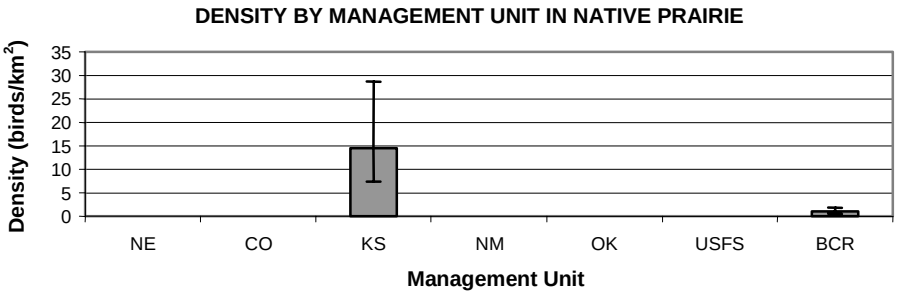
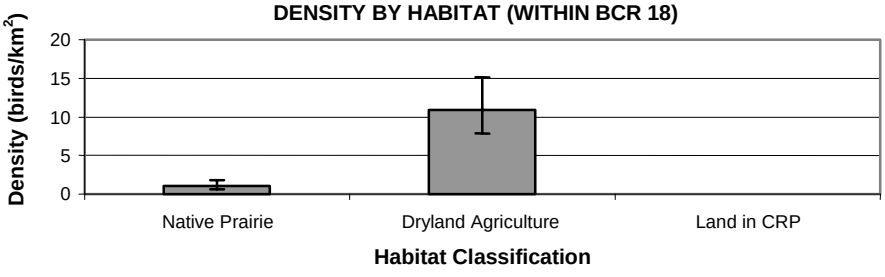
Dickcissel

(Spiza americana)

In 2003, we detected 155 individuals on 65 (2%) of the sections surveyed. The Dickcissel was distributed across the eastern portion of the Shortgrass Prairie BCR in dryland agriculture habitats, mainly in southern Kansas. The largest densities of this species within the BCR occurred in Kansas (D = 14.54 birds/km^2, CV = 35%, n = 24). Large density estimates in dryland agriculture habitats (D = 10.9 birds/km^2, CV = 17%, n = 98) suggest that this species prefers agricultural fields during the breeding season in BCR 18. Dickcissel is a Partners In Flight Tier II (high regional priority) species and a species of high concern in Nebraska.

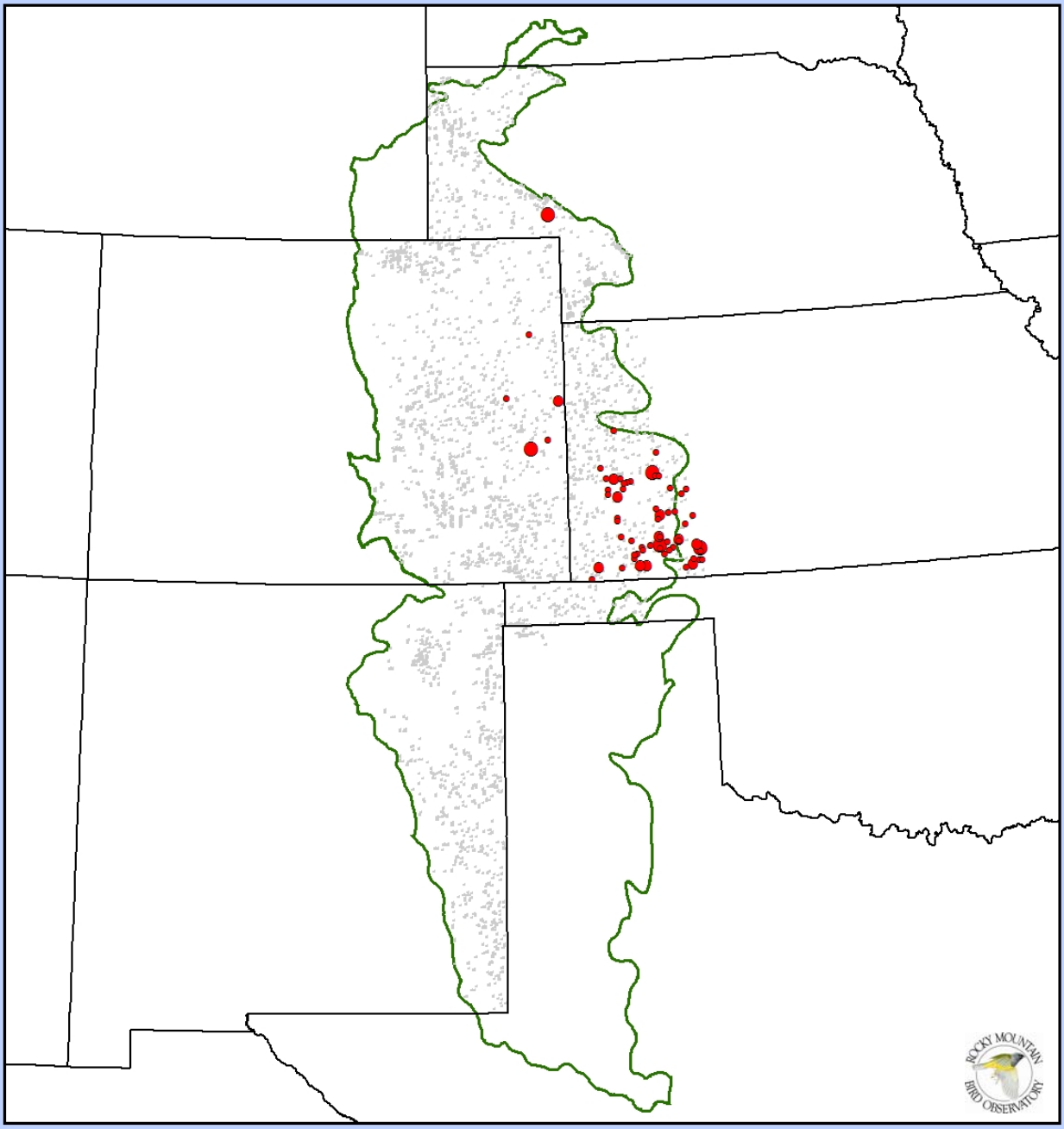






Dickcissel

(Spiza americana)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

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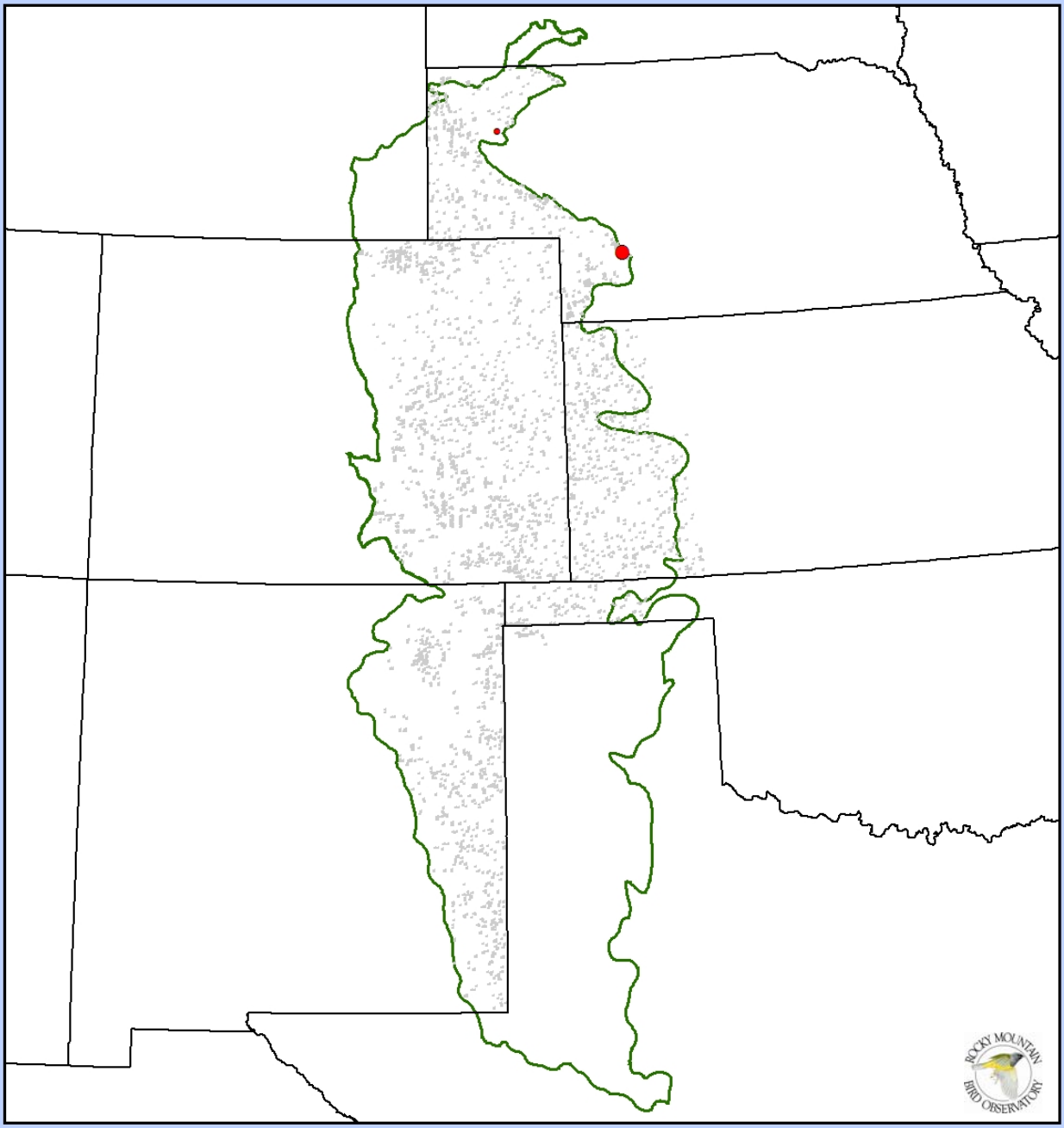
Bobolink

(Dolichonyx oryzivorus)

The Bobolink rarely occurs within the Shortgrass Prairie BCR. During the 2003 field season, we detected three individuals in Nebraska. Bobolink is a specie so high concern in Nebraska and a species in need of conservation (SINC) in Kansas.

Bobolink

(Dolichonyx oryzivorus)



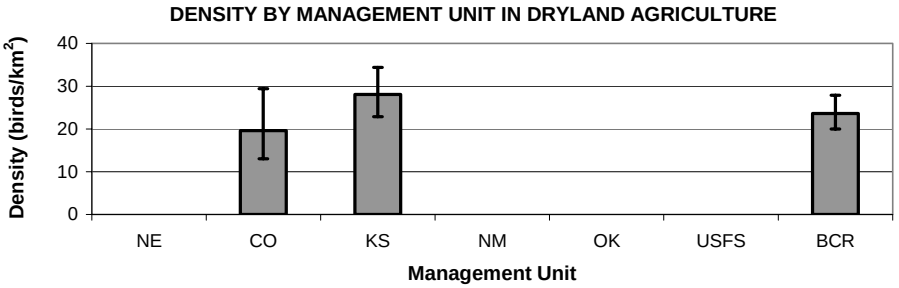
Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

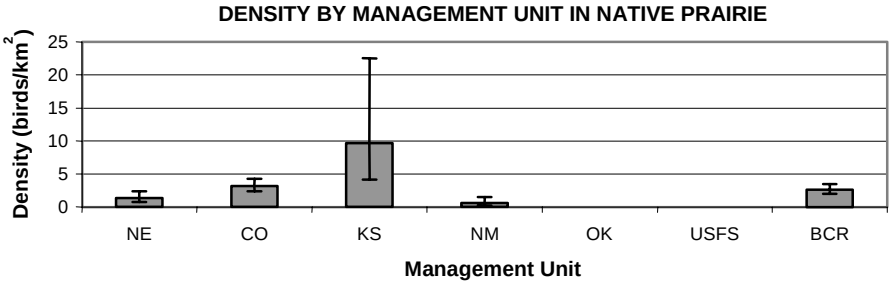
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

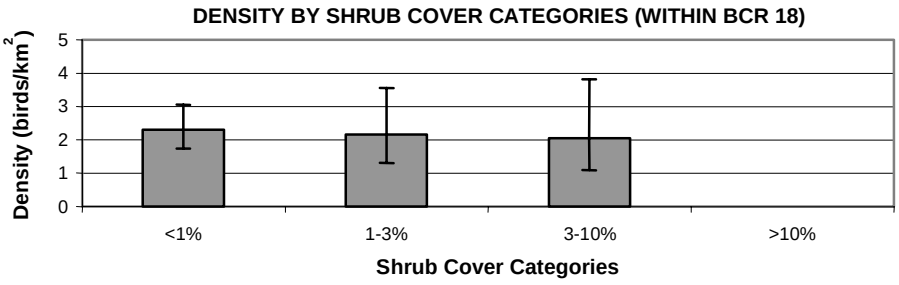
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

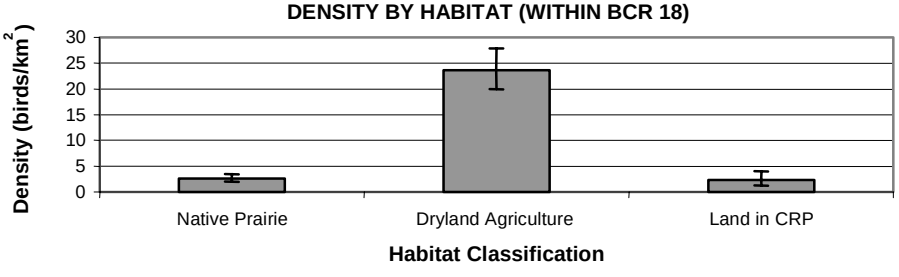
Red-winged Blackbird
(Agelaius phoeniceus)

In 2003, we detected 1,678 individuals on 512 (17%) of the sections surveyed. The Red-winged Blackbird was distributed mainly in anthropogenic habitat types throughout the Shortgrass Prairie BCR. The highest densities of this species in native prairie occurred in Kansas (D = 9.61 birds/km^2, CV = 45%, *n* = 23). However, when analyzed by habitat, much larger densities were encountered in dryland agriculture (D = 23.6 birds/km^2, CV = 9%, *n* = 549).



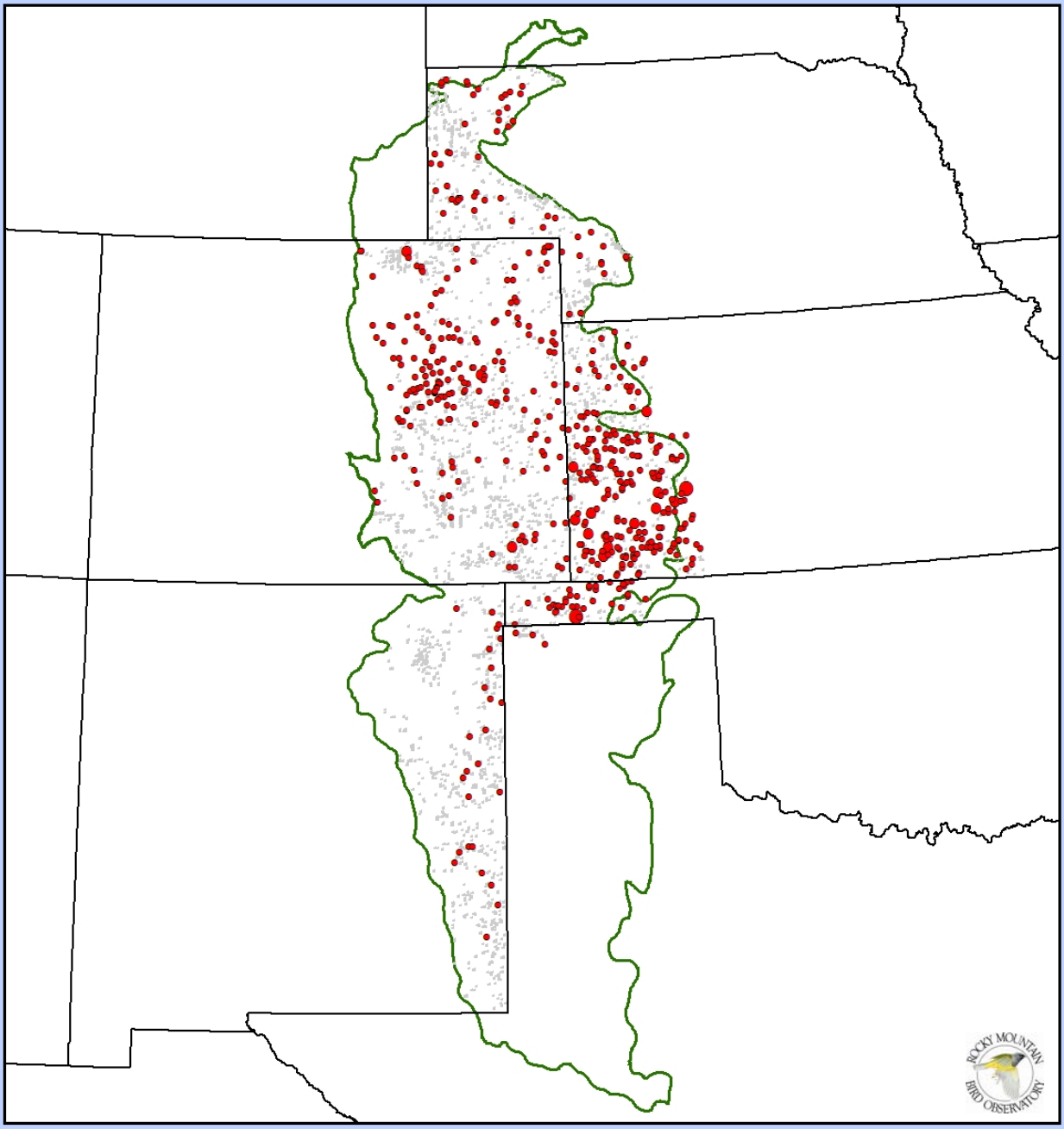






Red-winged Blackbird

(Agelaius phoeniceus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

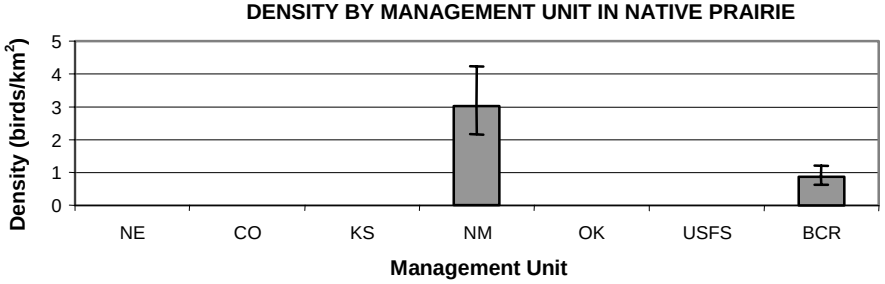
**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

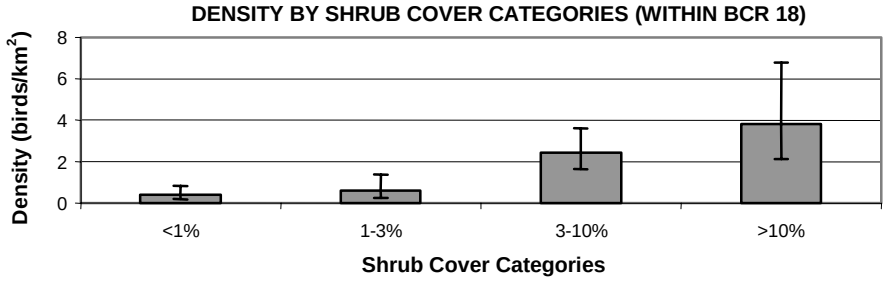
***BCR 18 is the Shortgrass Prairie Bird Conservation Region*

Eastern Meadowlark

(Sturnella magna)

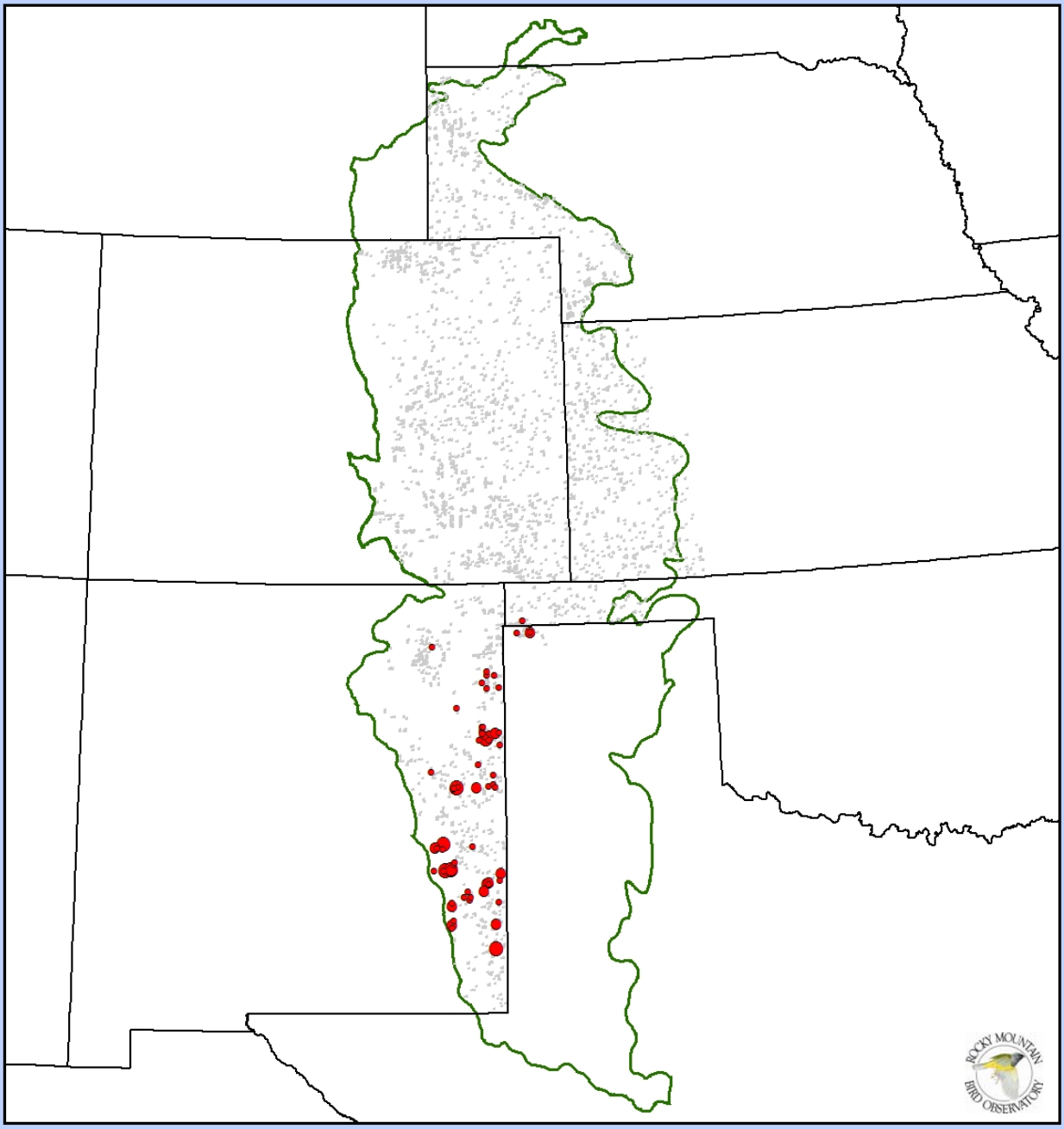
In 2003, we detected 141 individuals on 65 (2%) of the sections surveyed. The Eastern Meadowlark was strictly found in grassland habitats located in the southern portion of the Shortgrass Prairie BCR. This species exhibited highest densities in the native prairie of New Mexico (D = 3.03 birds/km^2, CV = 17%, *n* = 109). This species also occurred in higher densities in areas with >10% shrub cover (D = 3.81 birds/km^2, CV = 30%, *n* = 21). Management for this species in the BCR 18 portion of New Mexico should focus on generating and conserving habitat with a shrub component of >10%. Eastern Meadowlark is a species of moderate concern in Nebraska.





Eastern Meadowlark

(Sturnella magna)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

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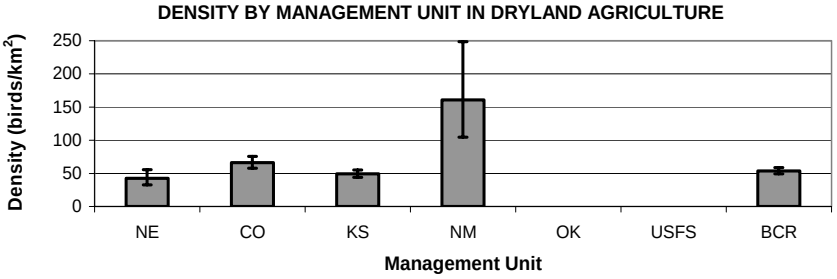
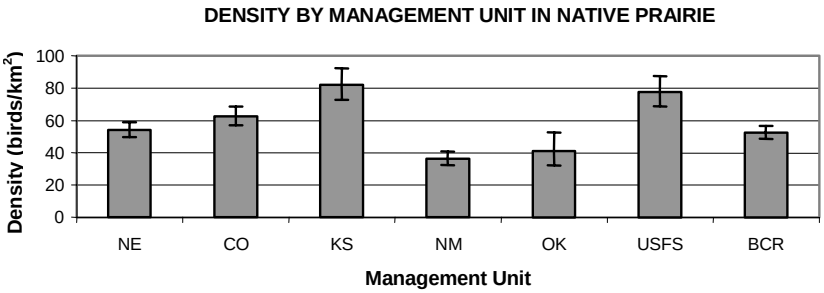
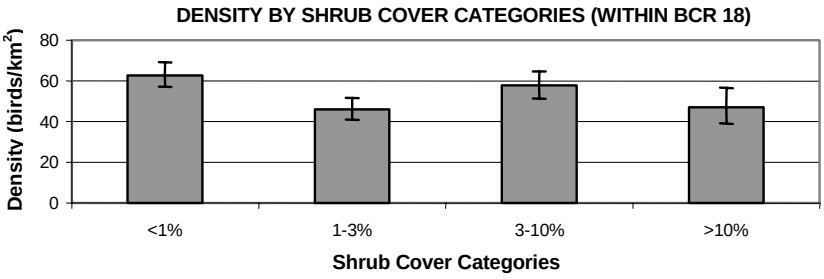
Western Meadowlark

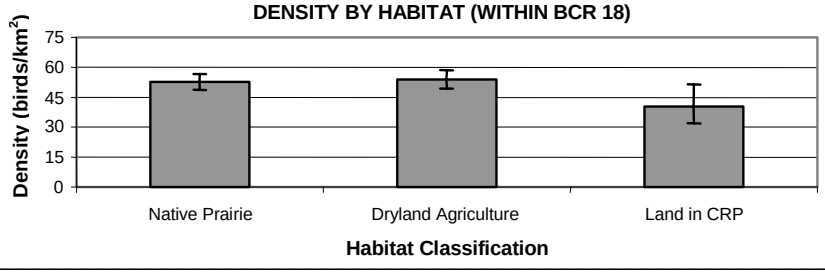
(Sturnella neglecta)

In 2003, we detected 9,883 individuals on 2507 (83%) of the sections surveyed. The Western Meadowlark ranked second in the total number of individuals detected, and was commonly distributed throughout the Shortgrass Prairie BCR. This species was found to occur in highest densities in the native prairie of Kansas (D = 82.06 birds/km^2, CV = 6%, n = 460) and lands managed by the USFS (D = 77.62 birds/km^2 CV = 6%, n = 669), both of which may have more available vegetative cover preferred by this species. The Western Meadowlark showed no preference for percent shrub cover or habitat classification. All of the habitats sampled appeared to provide the necessary cover required by the Western Meadowlark during the breeding season. Western Meadowlark is a Partners In Flight Tier III (additional watch list) species.



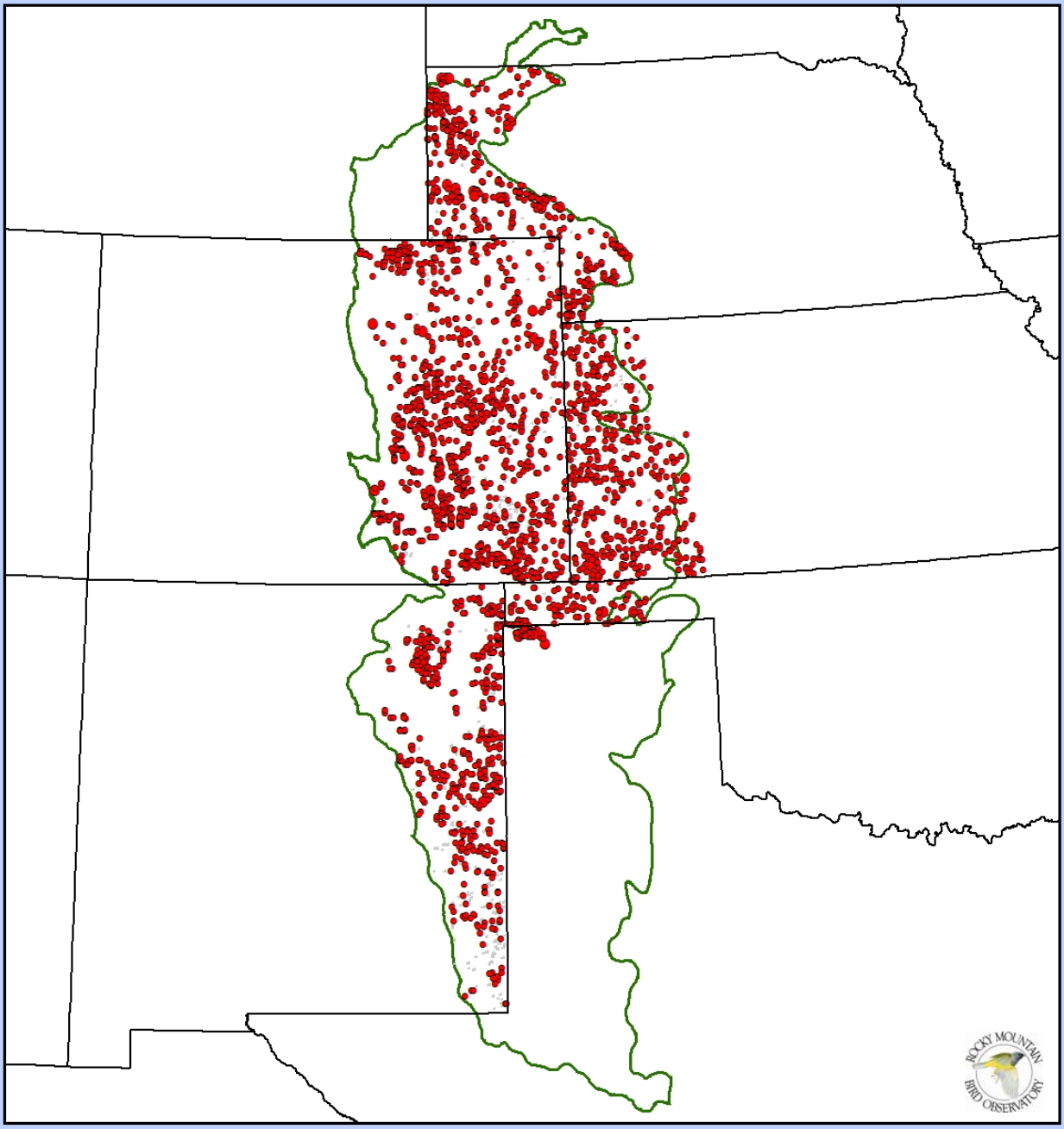






Western Meadowlark

(Sturnella neglecta)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

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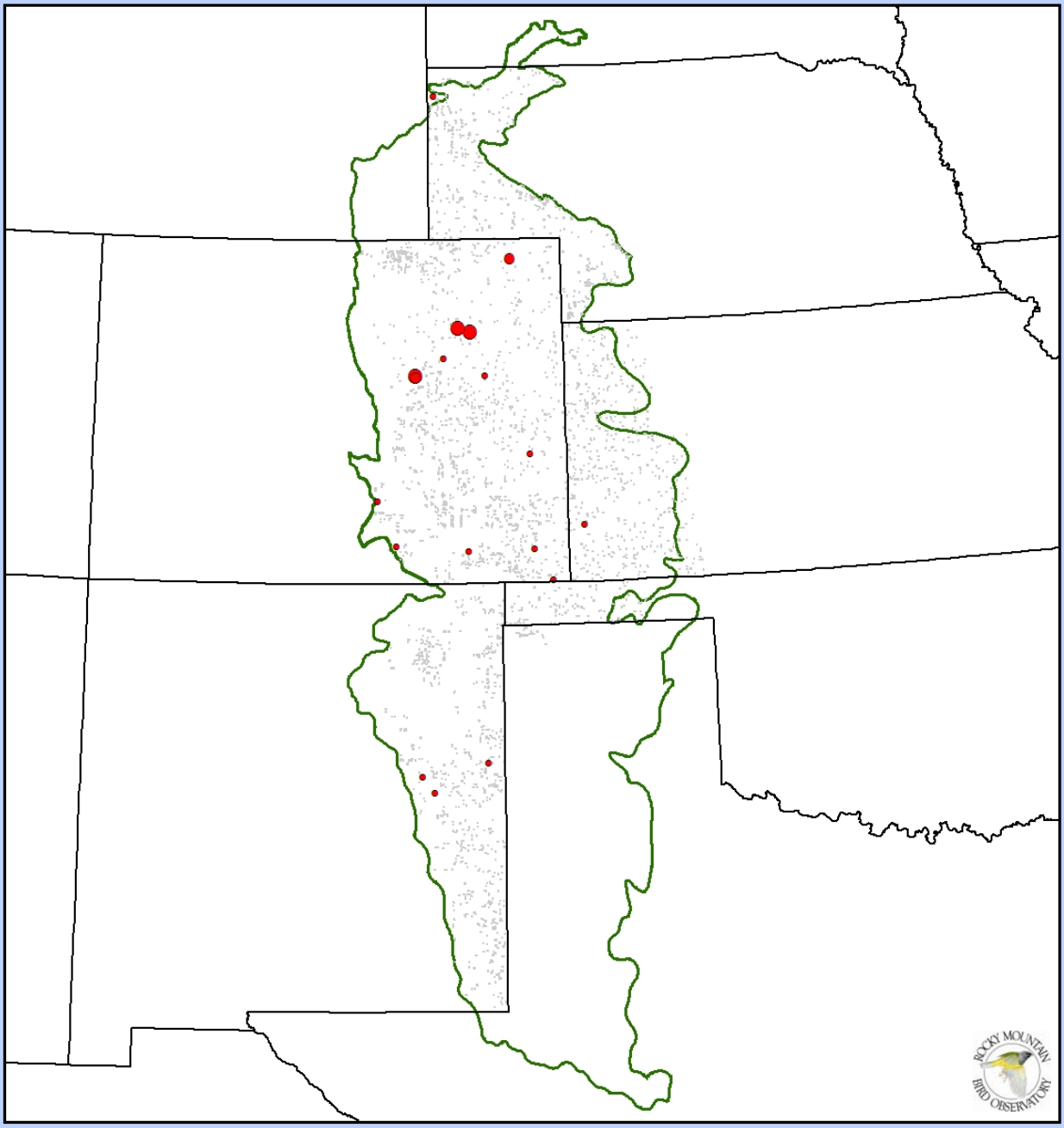
Brewer's Blackbird

(Euphagus cyancephalus)

In 2003, we detected 40 individuals on 18 (<1%) of the sections surveyed. The Brewer's Blackbird was mainly distributed in Colorado within the Shortgrass Prairie BCR. This species was found mainly in native prairie (D = 0.43 birds/km^2, CV = 38%, n = 19) most likely around anthropogenic features.

Brewer's Blackbird

(Euphagus cyancephalus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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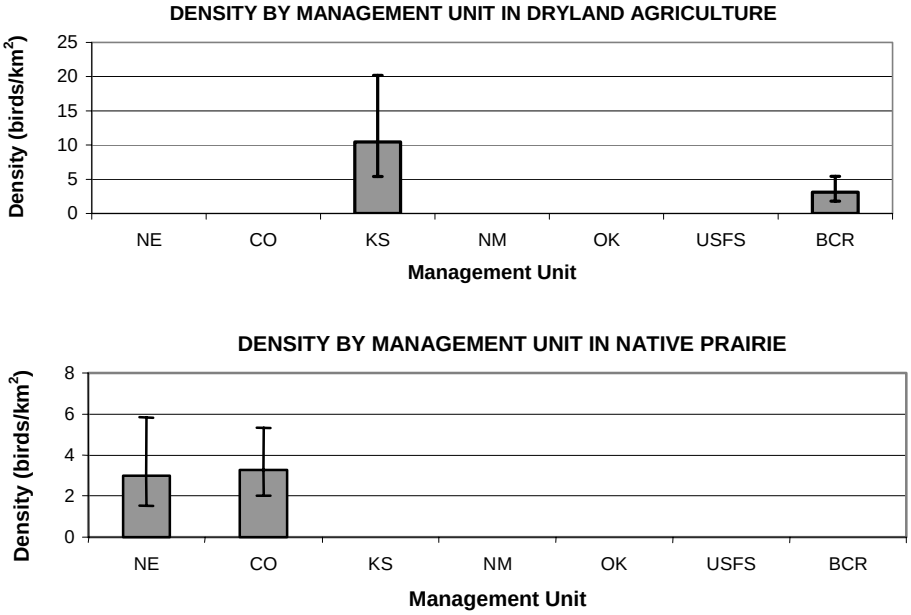
Common Grackle

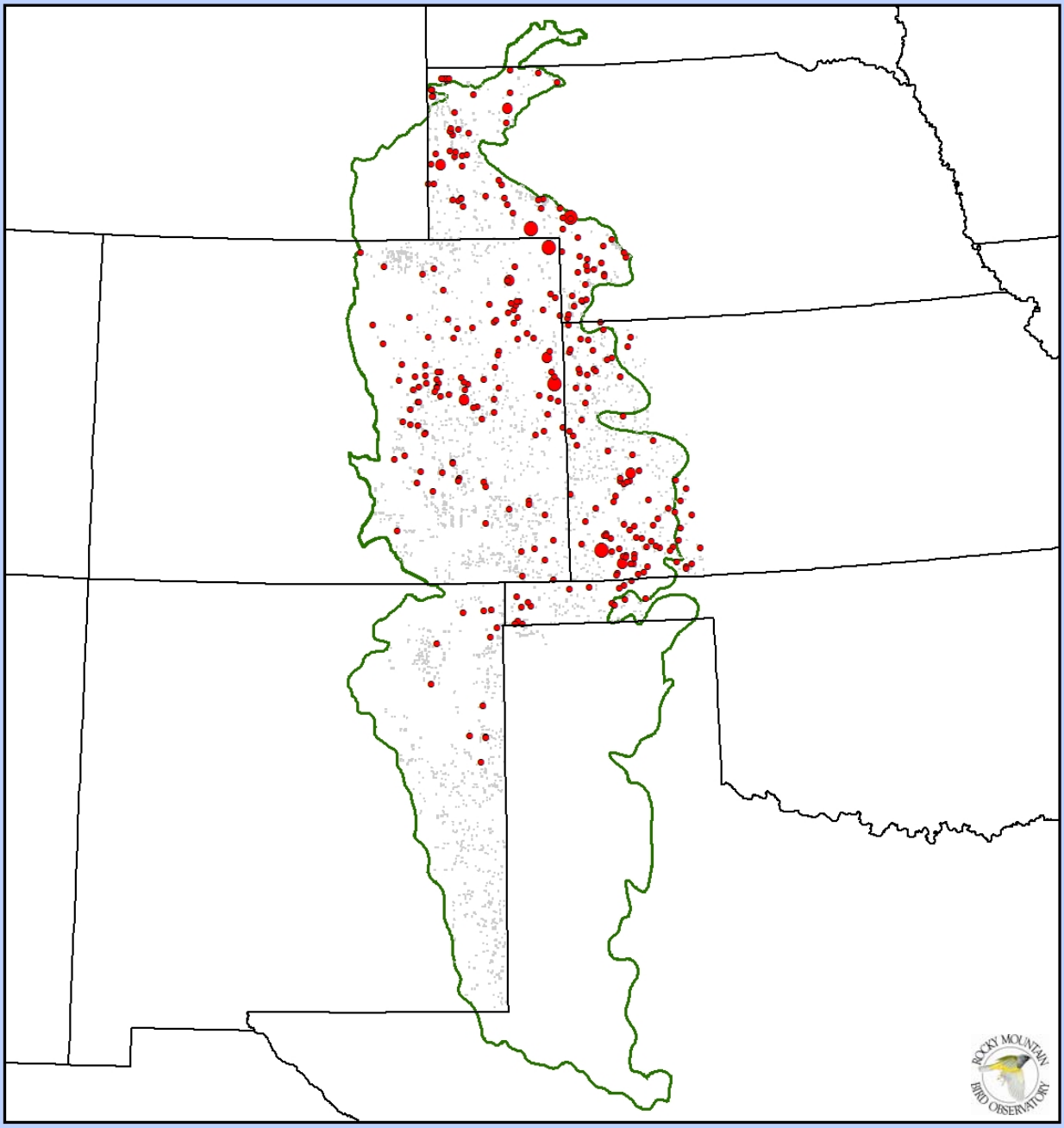
(Quiscalus quiscula)

In 2003, we detected 766 individuals on 295 (10%) of the sections surveyed. The Common Grackle was mainly distributed in agricultural habitats throughout the northern portion of the Shortgrass Prairie BCR. This species was found to be most abundant in agricultural habitats (D = 3.13 birds/km^2, CV = 29%, *n* = 107).



Common Grackle

(Quiscalus quiscula)



LEGEND

Index of Bird Abundance*
- 0.33 - 3.00
- 3.01 - 5.66
- 5.67 - 8.33

Surveyed Sections

BCR 18**

States

0 50 100 Miles

N

Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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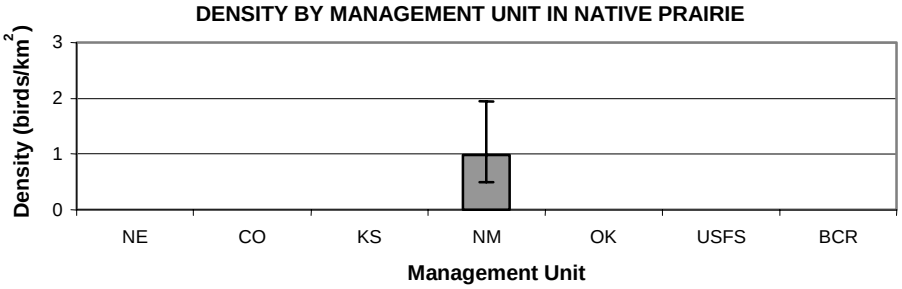
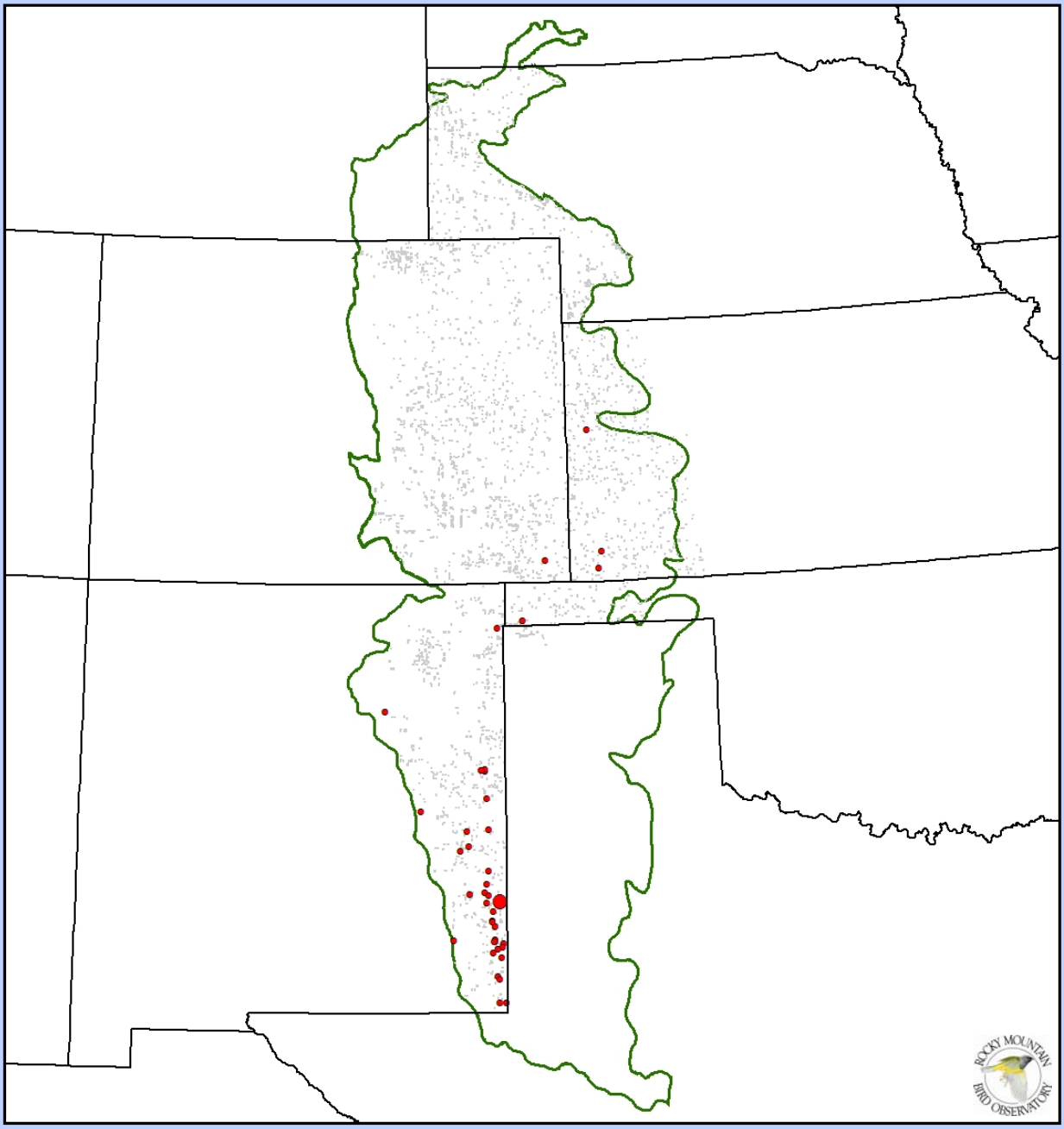
Great-tailed Grackle
(Quiscalus mexicanus)

In 2003, we detected 242 individuals on 51 (2%) of the sections surveyed. The Great-tailed Grackle was mainly distributed throughout the southern portion of the Shortgrass Prairie BCR in a diverse group of habitats, mostly anthropogenic. The highest densities of this species were found in native habitats of New Mexico (D = 0.98 birds/km^2, CV = 36%, *n* = 31).



Great-tailed Grackle

(Quiscalus mexicanus)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

**Index of abundance is the number of individual birds observed on a 1-mi^2 section divided by the number of point counts conducted on that section.*

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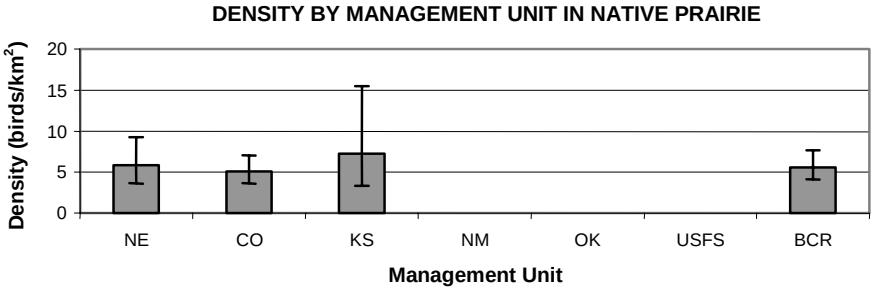
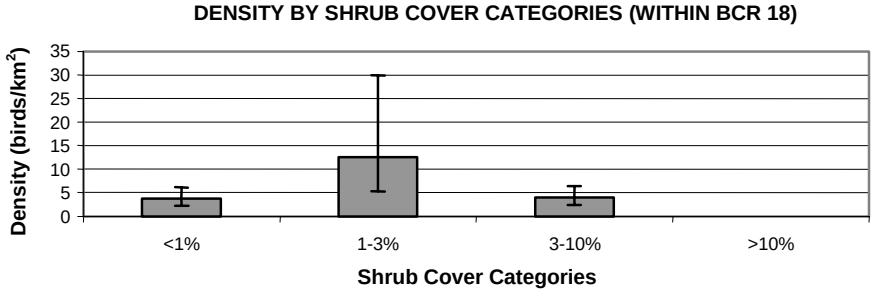
Brown-headed Cowbird
(Molothrus ater)

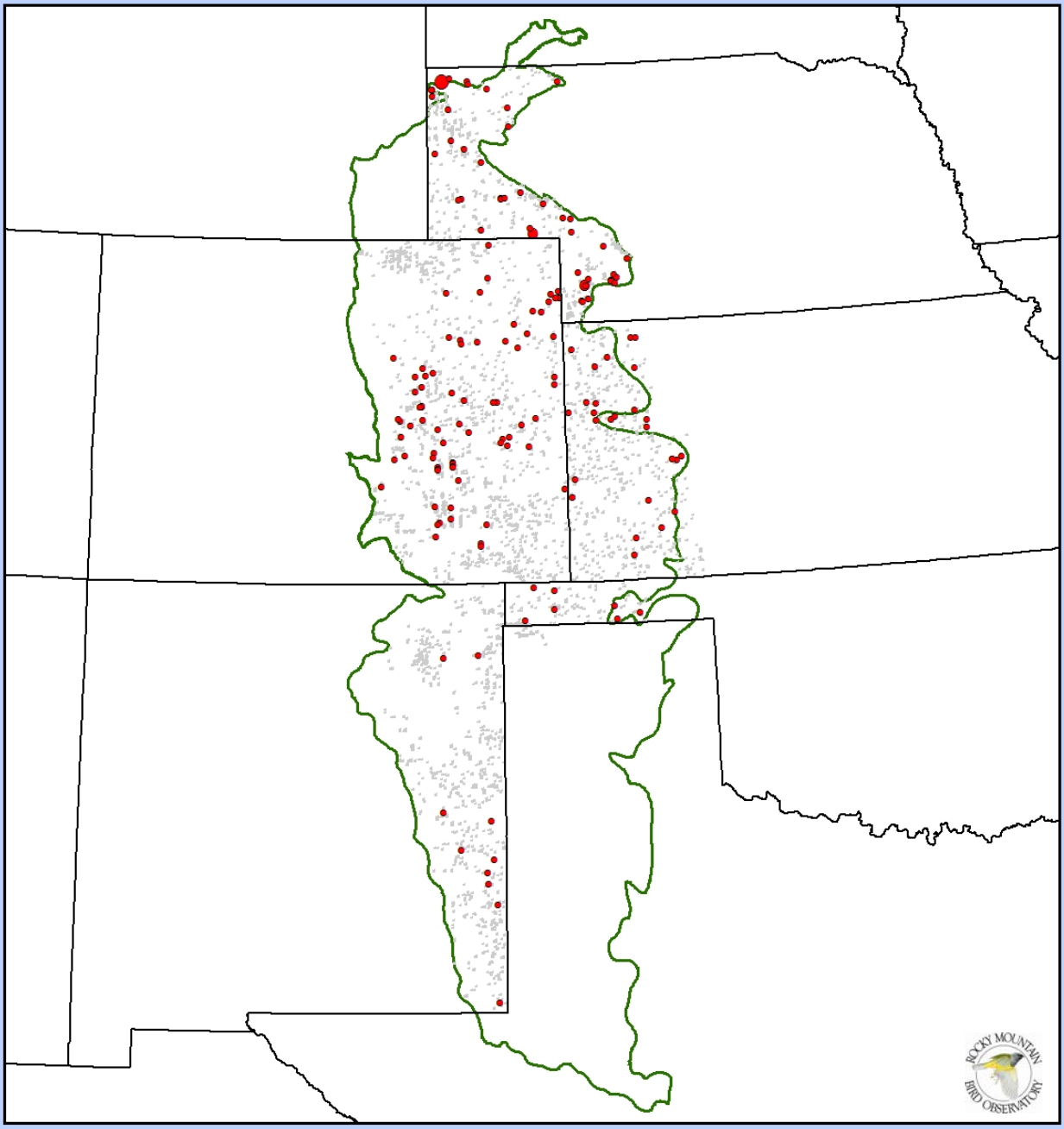
In 2003, we detected 295 individuals on 161 (5%) of the sections surveyed. The Brown-headed Cowbird was distributed throughout the Shortgrass Prairie BCR. It is associated mainly with grasslands with scattered vegetation and anthropogenic habitat types, such as edges. The highest densities for this species were found in native habitats (D = 5.6 birds/km^2, CV = 16%, *n* = 176) with shrub cover between 1-3% (D = 12.54 birds/km^2, CV = 46%, *n* = 39).





Brown-headed Cowbird

(Molothrus ater)



Distribution and index of abundance of the indicated species throughout the study area. Section-based surveys were conducted 16 May – 3 July 2003.

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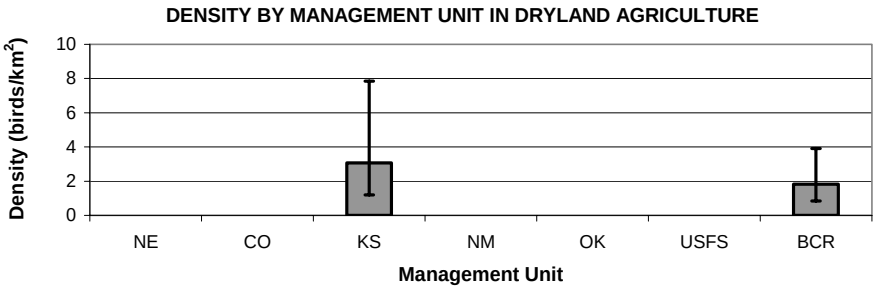
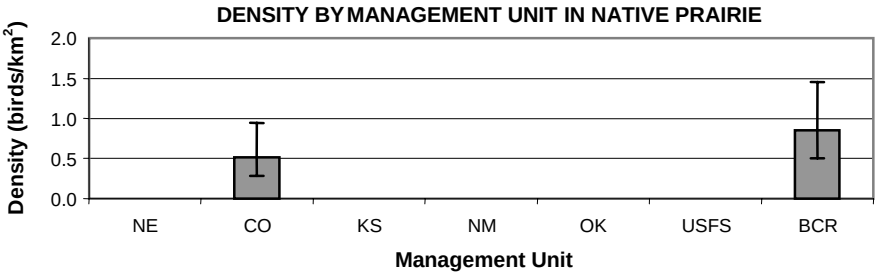
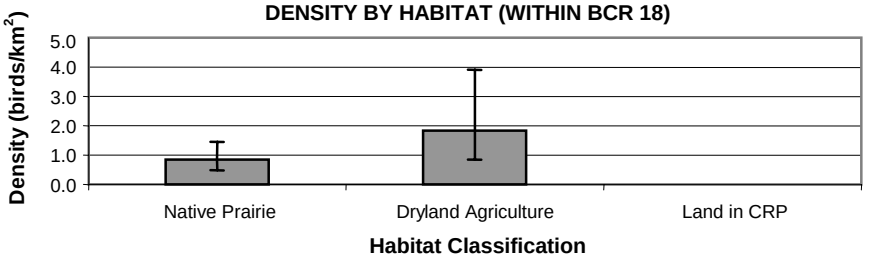
House Sparrow
(Passer domesticus)

In 2003, we detected 137 individuals on 55 (2%) of the sections surveyed. The House Sparrow was dispersed throughout the Shortgrass Prairie BCR. It is associated mainly with anthropogenic habitats such as homesteads and farmlands. This is indicated by the highest densities of the House Sparrow occurring on sections containing dryland agriculture (D = 1.83 birds/km^2, CV = 40%, n = 47). Based on this information, management for this invasive species should include the conversion of dryland agriculture back to native prairie and conservation of large tracts of unfragmented habitats.

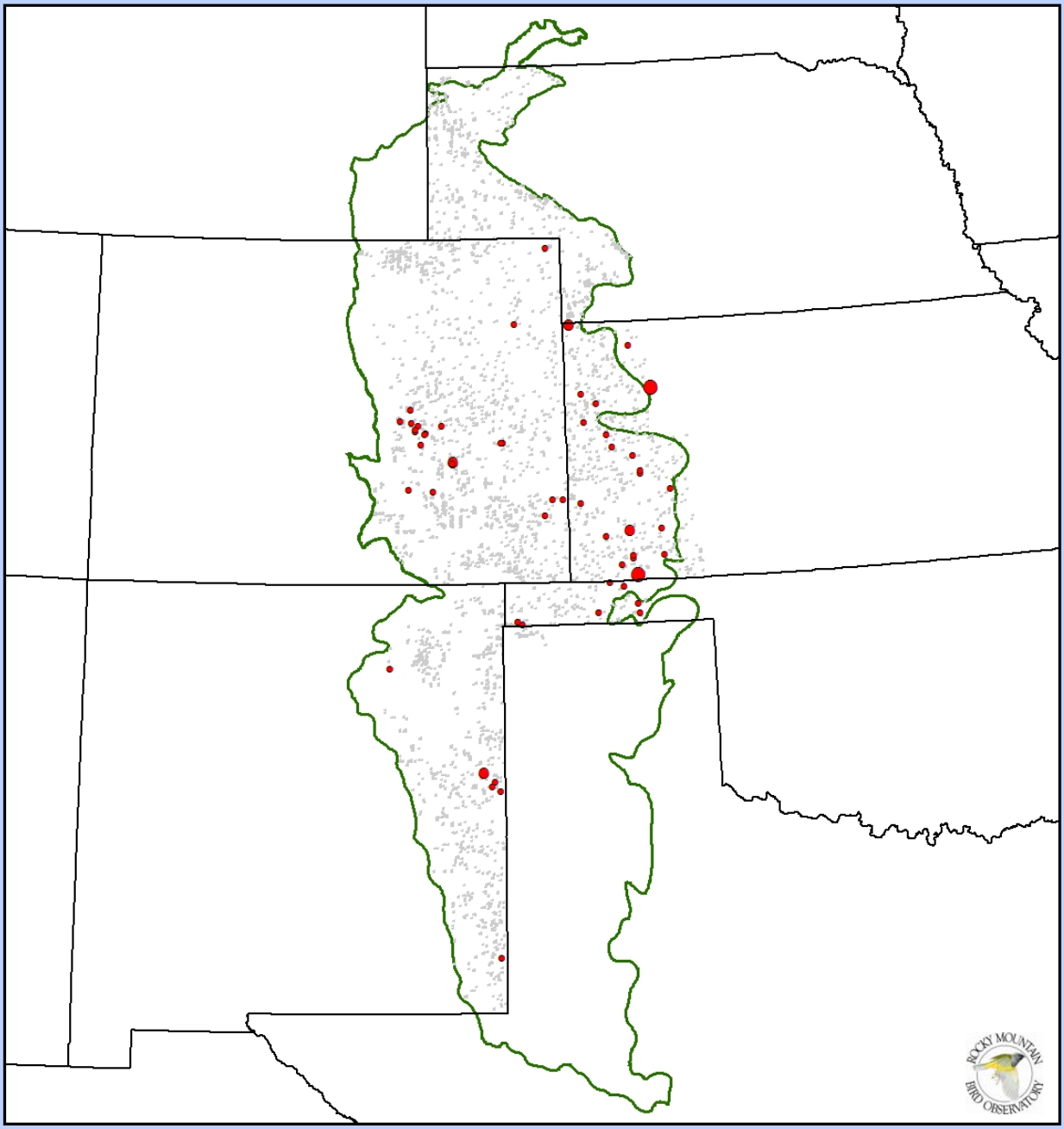






House Sparrow

(Passer domesticus)



LEGEND

Index of Bird Abundance*

- 0.33 - 1.78
- 1.79 - 3.22
- 3.23 - 4.67

Surveyed Sections

BCR 18**

States

0 50 100 Miles

N

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COLORADO
DIVISION OF WILDLIFE


KANSAS
WILDLIFE
&PARKS


Nebraska
Game and Parks Commission


ROCKY MOUNTAIN
BIRD OBSERVATORY


NEW MEXICO
GAME & FISH


OKLAHOMA
DEPARTMENT OF
WILDLIFE CONSERVATION


FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE