Monitoring Grassland Birds on Little Missouri, Sheyenne and Grand River National Grasslands

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ROCKY MOUNTAIN BIRD OBSERVATORY

Mission*: To conserve birds and their habitats*

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

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

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

RMBO accomplishes its mission by:

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

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

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

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

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

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

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

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

Bill Schmoker

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Executive Summary

Monitoring grassland birds is a valuable tool for effective management planning. The Forest Service and Rocky Mountain Bird Observatory (RMBO) recognized the need to monitor breeding bird populations in the Dakota grasslands, specifically on the Little Missouri, Sheyenne and Grand River National Grasslands. The objectives of this monitoring program are to use monitoring techniques to determine population trends and distributions for breeding birds on these National Grasslands.

In 2008 we conducted thirty-one transects on 17 blocks in Little Missouri, Sheyenne and Grand River National Grasslands using a point transect survey method developed by RMBO (Leukering 2000). Monitoring National Grasslands in the Dakotas provides density estimates for thirty-two bird species and abundance count data for 140 species. This report presents density estimate results and describes the goals and methodology of this bird monitoring program for 2008. Trend analyses were conducted for birds on USFS Region 1 sensitive species list and species on North Dakota's Game and Fish level I (species of greatest conservation need) list with sufficient detections to estimate density. These species were Upland Sandpiper, Sprague's Pipit, Lark Bunting, Grasshopper Sparrow and Chestnut-collared Longspur. Trend analysis was conducted at the individual grassland scale and at the global scale (combining grasslands). A significant decline in trend for Lark Bunting was found on Little Missouri. There were no other significant increases or decreases in trend.

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Introduction

The main bodies of North American prairie are among the continent's most endangered ecosystems (Sampson et al. 2004). Historically ecological drivers on the Great Plains included drought at the broad scale and grazing and fire at the landscape and local scales (Fuhlendorf and Engle 2001). In Bird Conservation Region (BCR) 11, 41% of upland breeding grassland bird species are declining and an additional 30% lack enough data to assess population trends and stability, while in BCR 17, 38% of upland breeding grassland bird species are declining and 31% lack enough data to assess population trends and stability (Partners in Flight Species Assessment Database 2004). Little Missouri National Grassland and Grand River National Grassland fall in BCR 17 (Badlands and Prairies) and Sheyenne National Grassland falls in BCR 11 (Prairie Potholes) as designated by the North American Bird Conservation Initiative.

Some managers have relied on data derived from the Breeding Bird Survey (BBS), currently most extensive bird-monitoring program, 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 maps, which provide reasonably good indications 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 (Sauer 2000). For these and other reasons, BBS data are generally insufficient to guide local and regional management decisions (Leukering et al. 2000), such as those by National Grassland managers.

There are social and economic benefits for sustaining bird populations because observing birds is an increasing popular activity. Forty six million birdwatchers in America spend more than $32 billion on birding and related activities (USFWS 2003).

In 2004, RMBO and the Forest Service initiated this study in response to the need for more comprehensive population trends and distributions for breeding within the Dakota Grasslands (Figure 1).

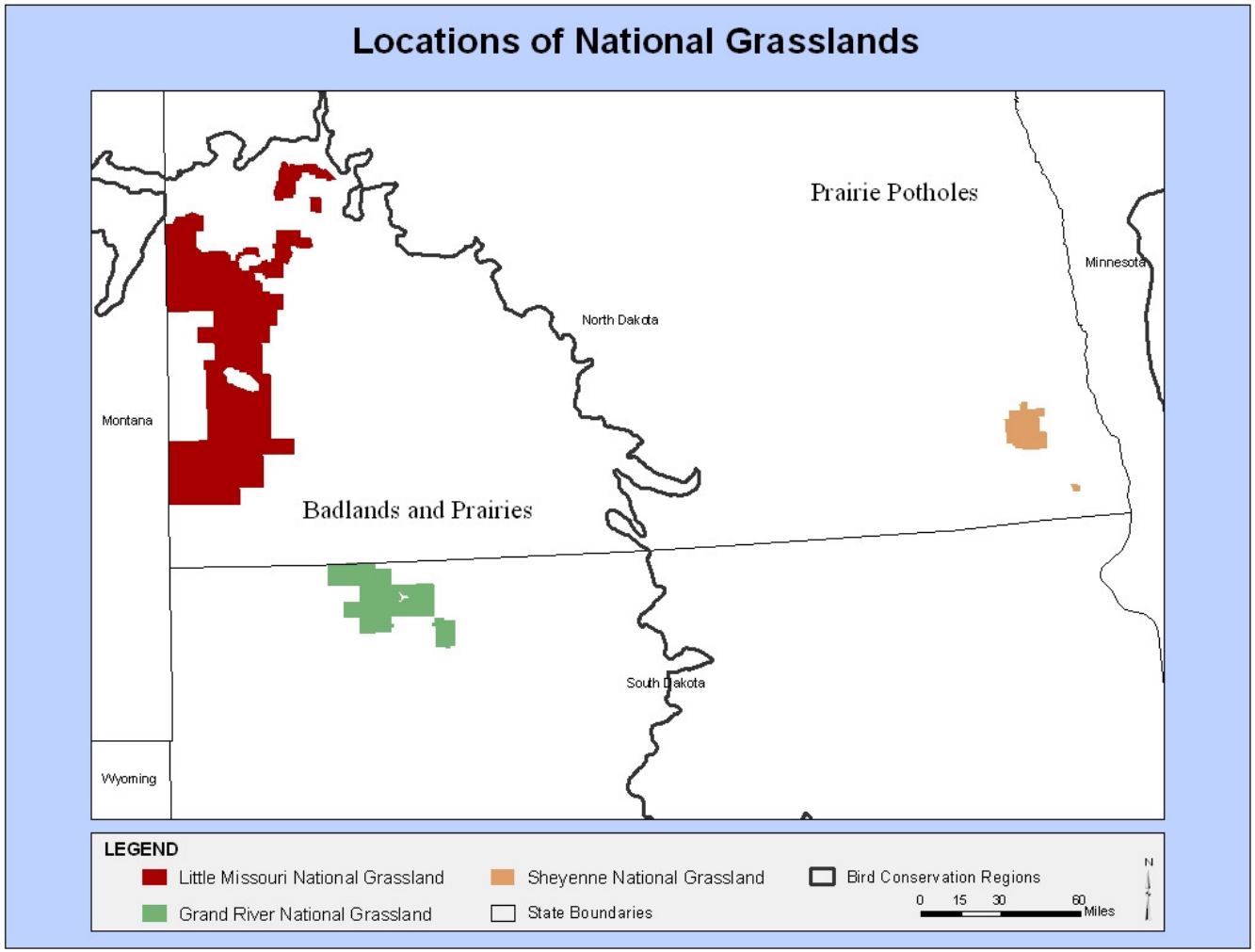

Figure 1. Study Area.

Methodology

In 2008 data were collected on three National Grasslands (Little Missouri, Sheyenne and Grand River) from June 21 to July 7. Experienced field biologists trained in bird identification and point transect methodology conducted all field work.

Block Selection

In spring 2003 the U.S. Forest Service investigated 24 randomly chosen blocks and selected the 17 blocks that best met design criteria (e.g., containing a minimum number of grouse leks, minimum road access network, etc.). The total acreage of all 17 blocks is 136,960 acres. Two point transects were established in each block. (Figure 2), with each transect starting point established systematically and subsequent points established along a random bearing.

Point Transect Protocol

RMBO surveyed bird populations in each block selected for monitoring using the point transect method (Buckland et al. 1993). Each transect was surveyed by one observer following protocol established by Leukering (2000). Observers conducted up to eight five-minute point counts at stations located at 250 meter intervals along each point transect, recording all bird detections on standardized forms. The observer began the point transect at the first count station and then continued along the pre-selected bearing for all remaining points if possible.

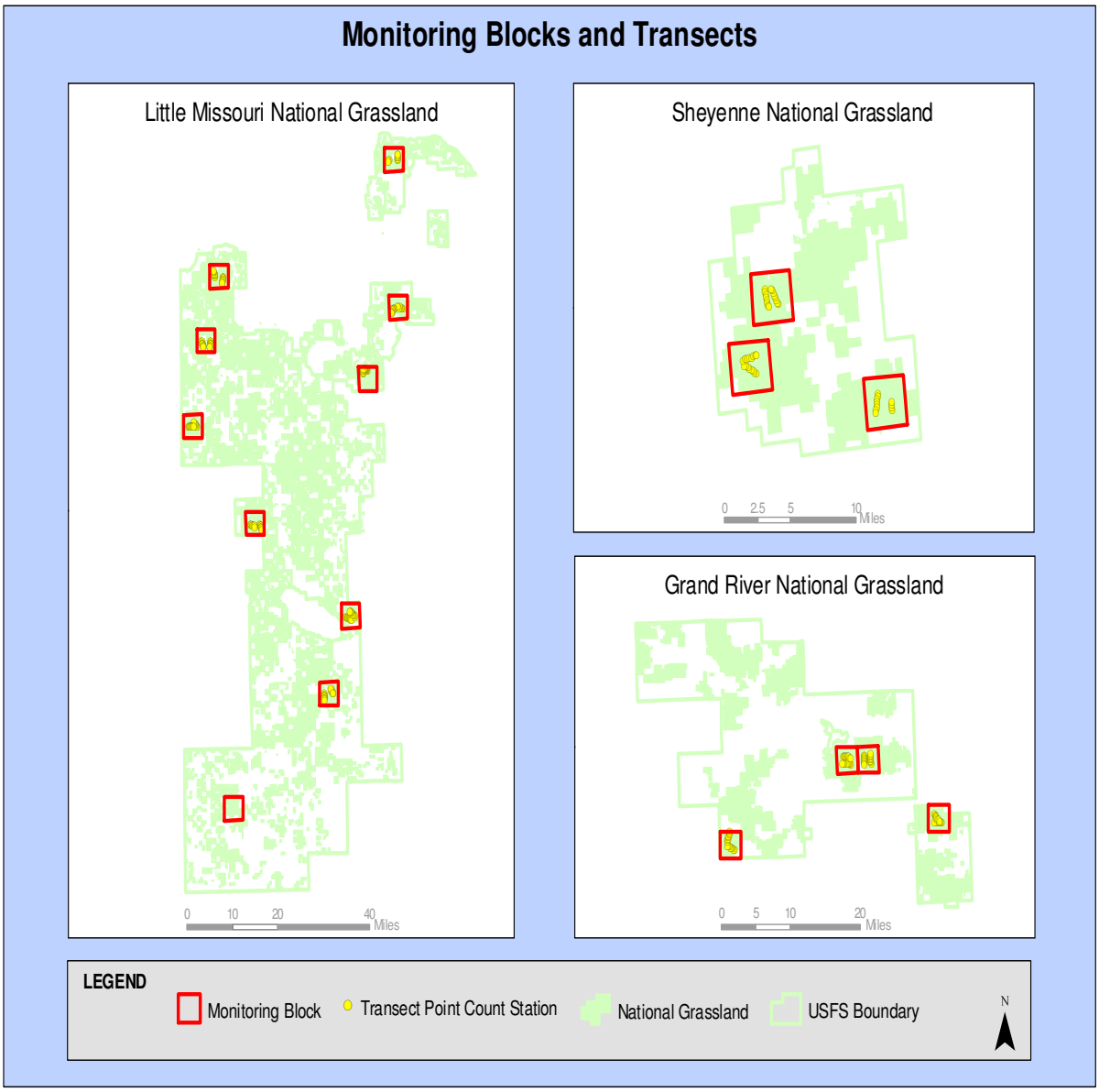

Figure 2. Monitoring blocks and transect locations.

We recorded distance from observer to the point of first detection for each bird observed using a Bushnell Yardage Pro 500 Rangefinder. Method of detection (e.g., visually, aurally), sex (if known), and habitat (e.g., shrub, ground, fence, etc.) were recorded. Birds flying over the section were tallied separately. Point locations were recorded using a Garmin *etrex* global positioning system (GPS) unit.

Observers conducted point counts from sunrise until no later than 1100 hrs when detectable activity typically slowed or ceased. Surveys were not conducted during times of rain or wind in excess of 18 mph. Observers recorded weather conditions such as percent cloud cover, wind speed (Beaufort Scale), and temperature in Fahrenheit. We also recorded survey "start" and "end" times.

In addition to point count data, we documented vegetation characteristics, and locations of raptor nests and black-tailed prairie dog colonies. We recorded vegetation characteristics within a 50- m radius of each point count. Vegetation data collected included the percent coverage and types of shrubs and percent coverage of ground cover.

Data Analysis

We used program DISTANCE version 5.0 (Thomas 1998-99) was d to analyze point count data. The notation, concepts, and analysis methods of DISTANCE were developed by Buckland et al. (1993). Density estimates (D) were calculated for species that had a minimum of 20 observations. In DISTANCE analysis, a unique detection function is fit to each distribution of distances associated with a species. Because the detection function is unique to each species, DISTANCE analysis avoids some serious problems inherent in traditional analyses of point count data (e.g., unquantifiable differences in detectability among habitats, species, and years). The three models that were used to find the most appropriate detection function were Half-normal Cosine, Uniform Cosine, and Hazard-rate Simple Polynomial. We pooled data from all years for each National Grassland and used Akaike's Information Criteria (AIC) to evaluate the three models and determine the most appropriate detection function for each species. Density estimates for species in individual grasslands were derived using this global detection function, with year as a stratum. We calculated the global density estimate (i.e. across years) for each grassland using the mean of the year estimates weighted by total effort. Analysis using program DISTANCE assumes that: 1) all birds at distance zero are detected, 2) distances of birds close to points or line are measured accurately, and 3) birds do not move in response to the observer's presence.

Trend analysis was conducted using program R. Three models were considered for trend analysis; intercept only, linear, and a log function on year. The inverse of the coefficient of variation was used as weights in the regression model to account for variance around the density estimate. These 3 models seem appropriate for 5 years of data with the parameterization of the models reflecting the possible functional forms of the trend line. The best model was selected using AICc (Burnham and Anderson, 1998) and presented if a significant (alpha level = 0.05) trend was found. Trend analyses were conducted for birds listed on USFS Region 1 sensitive species list and species on North Dakota's Game

and Fish level I species of greatest conservation need list with sufficient detections to estimate density.

The development of density surface distribution maps was tested using generalized additive models (gam) following methods outlined by Hedley and Buckland (2004). These gam models have the ability to incorporate density and its nuisance parameter detectability. Data collected in 2006 for Grasshopper Sparrow was used to test the use of gam models to create a distribution map.

Results

Density Estimates

We conducted 31 point transects in 2008; 19 on Little Missouri, 6 on Sheyenne and 6 on Grand River National Grasslands. We observed 88 species in 2008 (Appendix A, B); 35 species on Grand River (Table 1), 64 species on Little Missouri (Table 2), and 47 species on Sheyenne (Table 3). Sensitive species detected in USFS Region 1 over the duration of this monitoring program were; Sharp-tailed Grouse, Burrowing Owl, Loggerhead Shrike, Sprague's Pipit and Baird's Sparrow. Sharp-tailed Grouse was found in all three grasslands with the highest number of observations in Little Missouri. There were two Burrowing Owls detected on Little Missouri. Loggerhead Shrike was detected in low numbers in Grand River and Little Missouri. Sprague's Pipits were detected in higher numbers on Grand River followed by Little Missouri.
We were able to calculate density estimates for thirty-two species using a global detection function to estimate density per year.

Table 1. Grand River National Grassland density estimates of breeding birds by year with a global (years combined) estimate. D = Density estimate expressed in birds/ km^2, LCL & UCL = 90% lower and upper confidence limits of D, n = number of detections used to obtain density estimates, %CV = percent coefficient of variation.

Common Name	Year	D	%CV	LCI	UCI	n
Ring-necked Pheasant	2004	1.28	64	0.44	3.74	5
Ring-necked Pheasant	2005	0.00				0
Ring-necked Pheasant	2006	0.00				0
Ring-necked Pheasant	2007	4.34	47	1.96	9.64	17
Ring-necked Pheasant	2008	4.56	49	1.93	10.79	12
Ring-necked Pheasant	Global	1.91	35	1.07	3.41	34
Killdeer	2004	1.41	65	0.48	4.16	5
Killdeer	2005	1.29	69	0.40	4.14	4
Killdeer	2006	5.79	59	2.17	15.42	18
Killdeer	2007	3.67	45	1.76	7.66	11
Killdeer	2008	3.14	36	1.74	5.67	46
Killdeer	Global	3.36	55	1.28	8.82	8
Upland Sandpiper	2004	22.54	27	14.24	35.68	50
Upland Sandpiper	2005	10.31	50	4.24	25.03	20
Upland Sandpiper	2006	31.56	23	21.57	46.17	62
Upland Sandpiper	2007	31.56	23	21.29	46.80	70
Upland Sandpiper	2008	43.62	41	20.82	91.39	65
Upland Sandpiper	Global	27.27	20	19.56	38.01	267
Mourning Dove	2004	9.25	47	4.28	19.97	21
Mourning Dove	2005	6.10	43	2.96	12.57	13
Mourning Dove	2006	7.82	48	3.52	17.37	19

Common Name	Year	D	%CV	LCI	UCI	n
Mourning Dove	2007	13.51	41	6.80	26.84	34
Mourning Dove	2008	7.41	53	3.00	18.31	12
Mourning Dove	Global	8.99	30	5.49	14.74	99
Western Kingbird	2004	8.14	116	1.72	38.61	5
Western Kingbird	2005	3.72	122	0.74	18.74	2
Western Kingbird	2006	8.14	118	1.68	39.39	4
Western Kingbird	2007	19.54	107	4.47	85.39	12
Western Kingbird	2008	26.66	117	5.57	127.52	9
Western Kingbird	Global	12.53	106	2.88	54.45	32
Eastern Kingbird	2004	5.85	39	2.95	11.61	14
Eastern Kingbird	2005	0.96	67	0.30	3.03	2
Eastern Kingbird	2006	1.67	56	0.64	4.40	4
Eastern Kingbird	2007	8.36	36	4.44	15.73	20
Eastern Kingbird	2008	1.99	88	0.45	8.78	3
Eastern Kingbird	Global	3.97	27	2.54	6.20	43
Horned Lark	2004	26.21	59	9.76	70.42	23
Horned Lark	2005	46.89	39	24.53	89.62	29
Horned Lark	2006	90.03	31	54.69	148.21	75
Horned Lark	2007	136.76	35	77.35	241.78	112
Horned Lark	2008	40.71	36	22.41	73.96	21
Horned Lark	Global	70.68	28	44.88	111.32	260
Sprague's Pipit	2004	1.82	52	0.75	4.46	6
Sprague's Pipit	2005	12.86	36	6.87	24.07	37
Sprague's Pipit	2006	3.04	52	1.23	7.52	10
Sprague's Pipit	2007	1.82	52	0.75	4.46	6
Sprague's Pipit	2008	1.36	68	0.40	4.57	3
Sprague's Pipit	Global	4.15	27	2.62	6.57	62
Lark Bunting	2004	10.76	66	3.44	33.59	36
Lark Bunting	2005	29.23	35	15.66	54.58	64
Lark Bunting	2006	15.99	37	8.19	31.21	51
Lark Bunting	2007	44.47	20	31.17	63.45	141
Lark Bunting	2008	8.65	60	2.83	26.41	20
Lark Bunting	Global	22.57	16	17.14	29.72	312
Grasshopper Sparrow	2004	36.86	20	26.46	51.34	36
Grasshopper Sparrow	2005	98.28	24	65.56	147.34	84
Grasshopper Sparrow	2006	58.36	21	40.78	83.51	57
Grasshopper Sparrow	2007	81.90	21	57.13	117.41	80
Grasshopper Sparrow	2008	70.93	17	53.30	94.38	313
Grasshopper Sparrow	2008	88.38	37	45.25	172.60	56
Chestnut-collared Longspur	2004	13.78	80	3.90	48.76	11

Common Name	Year	D	%CV	LCI	UCI	n
Chestnut-collared Longspur	2005	22.91	70	7.47	70.25	13
Chestnut-collared Longspur	2006	11.28	95	2.65	48.07	8
Chestnut-collared Longspur	2007	105.26	46	50.28	220.35	81
Chestnut-collared Longspur	2008	29.84	67	9.85	90.44	16
Chestnut-collared Longspur	Global	37.48	42	19.11	73.52	129
Red-winged Blackbird	2004	5.85	55	2.26	15.15	16
Red-winged Blackbird	2005	5.43	69	1.69	17.51	9
Red-winged Blackbird	2006	3.66	42	1.74	7.68	10
Red-winged Blackbird	2007	5.85	40	2.96	11.57	13
Red-winged Blackbird	2008	4.90	48	2.07	11.60	8
Red-winged Blackbird	Global	5.15	28	3.25	8.15	56
Western Meadowlark	2004	53.87	13	42.51	68.27	141
Western Meadowlark	2005	54.25	12	43.71	67.33	124
Western Meadowlark	2006	101.34	12	82.26	124.85	256
Western Meadowlark	2007	60.28	13	47.59	76.34	156
Western Meadowlark	2008	88.03	13	69.13	112.10	157
Western Meadowlark	Global	70.84	7	62.77	79.95	834
Brown-headed Cowbird	2004	69.69	23	47.48	102.28	72
Brown-headed Cowbird	2005	22.53	54	8.80	57.66	19
Brown-headed Cowbird	2006	104.39	18	76.95	141.64	103
Brown-headed Cowbird	2007	67.57	18	50.28	90.83	78
Brown-headed Cowbird	2008	35.62	23	23.80	53.32	31
Brown-headed Cowbird	Global	62.75	14	49.71	79.20	303

Table 2. Little Missouri National Grassland density estimates of breeding birds by year with a global (years combined) estimate. D = Density estimate expressed in birds/ km^2, LCL & UCL = 90% lower and upper confidence limits of D, n = number of detections used to obtain density estimates, %CV = percent coefficient of variation.

Common Name	Year	D	%CV	LCI	UCI	n
Ring-necked Pheasant	2004	2.71	45	1.29	5.70	12
Ring-necked Pheasant	2005	9.63	24	6.46	14.35	3
Ring-necked Pheasant	2006	1.61	51	0.70	3.67	0
Ring-necked Pheasant	2007	3.10	72	0.93	10.29	5
Ring-necked Pheasant	2008	3.14	45	1.49	6.61	27
Ring-necked Pheasant	Global	4.13	19	3.01	5.67	47
Killdeer	2004	0.29	68	0.10	0.83	2
Killdeer	2005	1.12	62	0.42	2.98	9
Killdeer	2006	1.53	47	0.71	3.29	11

Common Name	Year	D	%CV	LCI	UCI	n
Killdeer	2007	0.56	91	0.13	2.36	2
Killdeer	2008	0.69	48	0.32	1.51	4
Killdeer	Global	0.89	33	0.52	1.53	28
Upland Sandpiper	2004	0.94	53	0.40	2.22	13
Upland Sandpiper	2005	0.50	48	0.23	1.08	7
Upland Sandpiper	2006	1.54	34	0.87	2.74	24
Upland Sandpiper	2007	0.71	55	0.28	1.81	5
Upland Sandpiper	2008	2.54	36	1.40	4.59	29
Upland Sandpiper	Global	1.26	22	0.87	1.82	78
Mourning Dove	2004	1.23	34	0.70	2.17	11
Mourning Dove	2005	1.54	52	0.67	3.52	10
Mourning Dove	2006	4.19	23	2.86	6.16	39
Mourning Dove	2007	4.62	36	2.46	8.66	20
Mourning Dove	2008	2.03	29	1.25	3.31	14
Mourning Dove	Global	2.58	18	1.91	3.48	94
Western Kingbird	2004	0.56	64	0.21	1.55	4
Western Kingbird	2005	1.66	55	0.68	4.01	11
Western Kingbird	2006	0.49	81	0.14	1.67	4
Western Kingbird	2007	0.83	103	0.17	3.98	3
Western Kingbird	2008	0.75	46	0.35	1.59	5
Western Kingbird	Global	0.86	34	0.50	1.48	27
Eastern Kingbird	2004	3.64	47	1.68	7.88	0
Eastern Kingbird	2005	1.53	45	0.73	3.19	21
Eastern Kingbird	2006	3.70	41	1.87	7.31	20
Eastern Kingbird	2007	6.11	40	3.04	12.31	4
Eastern Kingbird	2008	1.88	64	0.68	5.19	9
Eastern Kingbird	Global	3.13	23	2.16	4.55	54
Red-eyed Vireo	2004	1.22	53	0.51	2.90	7
Red-eyed Vireo	2005	3.07	48	1.41	6.70	18
Red-eyed Vireo	2006	2.79	47	1.29	6.02	18
Red-eyed Vireo	2007	4.78	63	1.64	13.88	14
Red-eyed Vireo	2008	2.10	49	0.94	4.72	10
Red-eyed Vireo	Global	2.60	27	1.68	4.04	67
American Crow	2004	0.37	46	0.17	0.78	11
American Crow	2005	1.08	30	0.65	1.77	31
American Crow	2006	0.59	37	0.32	1.09	17
American Crow	2007	1.04	39	0.53	2.07	16
American Crow	2008	0.76	34	0.43	1.35	17
American Crow	Global	0.74	20	0.53	1.03	92
Horned Lark	2004	1.30	48	0.60	2.85	7

Common Name	Year	D	%CV	LCI	UCI	n
Horned Lark	2005	3.47	42	1.73	6.94	18
Horned Lark	2006	6.96	43	3.44	14.05	42
Horned Lark	2007	6.93	50	2.89	16.63	19
Horned Lark	2008	8.55	32	4.97	14.71	37
Horned Lark	Global	5.19	22	3.60	7.49	123
Rock Wren	2004	0.74	84	0.21	2.63	5
Rock Wren	2005	0.58	64	0.21	1.59	4
Rock Wren	2006	2.12	42	1.08	4.16	16
Rock Wren	2007	0.87	75	0.26	2.95	3
Rock Wren	2008	0.72	69	0.24	2.11	4
Rock Wren	Global	1.06	33	0.62	1.80	32
House Wren	2004	2.19	32	1.28	3.74	10
House Wren	2005	3.86	32	2.27	6.56	18
House Wren	2006	9.74	29	6.04	15.70	50
House Wren	2007	9.44	35	5.10	17.47	22
House Wren	2008	4.23	29	2.61	6.86	16
House Wren	Global	5.66	19	4.17	7.68	116
Sprague's Pipit	2004	2.71	45	1.29	5.70	24
Sprague's Pipit	2005	9.63	24	6.46	14.35	87
Sprague's Pipit	2006	1.61	51	0.70	3.67	16
Sprague's Pipit	2007	3.10	72	0.93	10.29	14
Sprague's Pipit	2008	3.14	45	1.49	6.61	22
Sprague's Pipit	Global	4.13	19	3.01	5.67	163
Yellow Warbler	2004	7.50	34	4.21	13.38	30
Yellow Warbler	2005	11.76	29	7.22	19.15	46
Yellow Warbler	2006	13.13	21	9.15	18.84	59
Yellow Warbler	2007	15.68	36	8.17	30.11	32
Yellow Warbler	2008	13.60	21	9.45	19.58	45
Yellow Warbler	Global	11.94	13	9.67	14.75	212
Ovenbird	2004	0.42	70	0.14	1.27	6
Ovenbird	2005	1.24	51	0.54	2.84	16
Ovenbird	2006	0.75	61	0.29	1.98	12
Ovenbird	2007	0.41	73	0.12	1.39	3
Ovenbird	2008	1.19	49	0.53	2.67	14
Ovenbird	Global	0.83	30	0.51	1.36	51
Yellow-breasted Chat	2004	2.50	41	1.27	4.93	19
Yellow-breasted Chat	2005	3.49	38	1.86	6.52	27
Yellow-breasted Chat	2006	7.39	26	4.80	11.36	63
Yellow-breasted Chat	2007	10.59	25	6.84	16.38	41
Yellow-breasted Chat	2008	5.89	30	3.53	9.83	37

Common Name	Year	D	%CV	LCI	UCI	n
Yellow-breasted Chat	Global	5.50	16	4.22	7.15	187
Spotted Towhee	2004	17.76	30	10.63	29.68	60
Spotted Towhee	2005	14.21	28	8.84	22.85	49
Spotted Towhee	2006	46.35	21	32.57	65.96	171
Spotted Towhee	2007	43.51	27	26.63	71.08	75
Spotted Towhee	2008	32.55	30	19.58	54.10	90
Spotted Towhee	Global	29.78	13	24.03	36.92	445
Clay-colored Sparrow	2004	0.00				0
Clay-colored Sparrow	2005	5.12	48	2.34	11.19	21
Clay-colored Sparrow	2006	4.42	46	2.09	9.37	20
Clay-colored Sparrow	2007	1.95	58	0.73	5.19	4
Clay-colored Sparrow	2008	2.70	66	0.96	7.65	9
Clay-colored Sparrow	Global	3.00	31	1.82	4.93	54
Field Sparrow	2004	1.16	52	0.49	2.70	9
Field Sparrow	2005	8.06	24	5.35	12.14	64
Field Sparrow	2006	12.23	17	9.12	16.40	106
Field Sparrow	2007	18.89	22	12.65	28.19	75
Field Sparrow	2008	16.15	24	10.81	24.12	102
Field Sparrow	Global	10.29	12	8.43	12.57	356
Vesper Sparrow	2004	7.36	30	4.49	12.05	39
Vesper Sparrow	2005	17.56	24	11.75	26.24	95
Vesper Sparrow	2006	28.02	20	20.18	38.91	163
Vesper Sparrow	2007	24.39	26	15.60	38.13	65
Vesper Sparrow	2008	14.81	22	10.24	21.43	64
Vesper Sparrow	Global	18.18	15	14.12	23.40	426
Lark Sparrow	2004	1.84	56	0.75	4.53	9
Lark Sparrow	2005	0.80	59	0.31	2.05	4
Lark Sparrow	2006	4.74	42	2.39	9.40	23
Lark Sparrow	2007	13.24	36	7.00	25.05	33
Lark Sparrow	2008	1.98	47	0.92	4.27	8
Lark Sparrow	Global	3.65	24	2.46	5.42	77
Lark Bunting	2004	4.68	59	1.82	12.06	26
Lark Bunting	2005	2.55	79	0.75	8.70	6
Lark Bunting	2006	1.39	69	0.48	4.04	6
Lark Bunting	2007	0.34	103	0.07	1.63	1
Lark Bunting	2008	0.42	74	0.13	1.31	2
Lark Bunting	Global	2.09	41	1.08	4.06	41
Savannah Sparrow	2004	2.31	51	1.01	5.31	5
Savannah Sparrow	2005	4.53	53	1.92	10.69	9
Savannah Sparrow	2006	1.65	65	0.59	4.60	4

Common Name	Year	D	%CV	LCI	UCI	n
Savannah Sparrow	2007	2.72	91	0.65	11.39	3
Savannah Sparrow	2008	6.15	92	1.58	23.99	11
Savannah Sparrow	Global	3.41	40	1.78	6.52	32
Grasshopper Sparrow	2004	39.77	20	28.19	56.12	93
Grasshopper Sparrow	2005	75.84	17	56.83	101.21	181
Grasshopper Sparrow	2006	64.30	18	47.18	87.62	169
Grasshopper Sparrow	2007	56.15	32	31.76	99.27	64
Grasshopper Sparrow	2008	51.16	26	32.73	79.97	98
Grasshopper Sparrow	Global	58.10	12	47.88	70.51	605
Lazuli Bunting	2004	0.93	75	0.29	2.98	3
Lazuli Bunting	2005	1.22	79	0.37	4.04	4
Lazuli Bunting	2006	1.38	84	0.39	4.89	5
Lazuli Bunting	2007	9.76	67	3.23	29.44	16
Lazuli Bunting	2008	2.63	50	1.18	5.88	7
Lazuli Bunting	Global	2.43	39	1.27	4.64	35
Bobolink	2004	0.63	91	0.16	2.41	4
Bobolink	2005	0.15	100	0.04	0.65	1
Bobolink	2006	1.96	63	0.72	5.30	14
Bobolink	2007	4.31	84	1.12	16.56	14
Bobolink	2008	0.00				0
Bobolink	Global	1.16	48	0.53	2.51	33
Western Meadowlark	2004	24.87	17	18.55	33.34	161
Western Meadowlark	2005	43.38	13	34.61	54.38	291
Western Meadowlark	2006	48.02	18	35.43	65.08	341
Western Meadowlark	2007	28.23	24	18.12	43.97	94
Western Meadowlark	2008	36.55	25	24.01	55.63	191
Western Meadowlark	Global	37.43	10	31.96	43.83	1078
Brown-headed Cowbird	2004	14.29	30	8.67	23.55	36
Brown-headed Cowbird	2005	8.14	32	4.77	13.89	25
Brown-headed Cowbird	2006	31.92	22	22.00	46.31	81
Brown-headed Cowbird	2007	14.32	34	7.87	26.06	20
Brown-headed Cowbird	2008	7.23	24	4.84	10.79	18
Brown-headed Cowbird	Global	16.01	16	12.35	20.75	180
American Goldfinch	2004	2.77	99	0.62	12.31	3
American Goldfinch	2005	3.73	54	1.58	8.77	11
American Goldfinch	2006	2.77	51	1.24	6.19	9
American Goldfinch	2007	12.20	39	6.45	23.05	18
American Goldfinch	2008	4.83	54	2.07	11.25	10
American Goldfinch	Global	4.44	36	2.49	7.91	51

Table 3. Sheyenne National Grassland density estimates of breeding birds by year with a global (years combined) estimate. D = Density estimate expressed in birds/ km^2, LCL & UCL = 90% lower and upper confidence limits of D, n = number of detections used to obtain density estimates, %CV = percent coefficient of variation.

Common Name	Year	D	%CV	LCI	UCI	n
Killdeer	2004	1.40	112	0.27	7.25	1
Killdeer	2005	10.50	84	2.95	37.34	8
Killdeer	2006	6.43	70	2.21	18.70	4
Killdeer	2007	18.00	69	6.25	51.80	13
Killdeer	2008	13.71	110	2.75	68.44	6
Killdeer	Global	9.96	66	3.63	27.36	32
Eastern Kingbird	2004	4.35	55	1.58	11.94	5
Eastern Kingbird	2005	21.17	31	12.29	36.45	24
Eastern Kingbird	2006	14.35	25	9.32	22.09	16
Eastern Kingbird	2007	19.93	27	12.28	32.34	25
Eastern Kingbird	2008	9.57	46	4.20	21.79	6
Eastern Kingbird	Global	14.24	20	10.25	19.79	76
Sedge Wren	2004	0.00				0
Sedge Wren	2005	0.00				0
Sedge Wren	2006	42.31	40	20.12	88.99	46
Sedge Wren	2007	70.22	41	32.75	150.57	78
Sedge Wren	2008	33.61	29	19.68	57.39	28
Sedge Wren	Global	29.65	27	18.60	47.27	152
Clay-colored Sparrow	2004	11.79	41	5.42	25.64	21
Clay-colored Sparrow	2005	18.92	36	9.60	37.29	36
Clay-colored Sparrow	2006	12.86	30	7.25	22.82	25
Clay-colored Sparrow	2007	30.87	29	17.85	53.41	60
Clay-colored Sparrow	2008	23.33	39	11.11	48.96	34
Clay-colored Sparrow	Global	19.49	18	14.35	26.47	176
Vesper Sparrow	2004	0.26	105	0.05	1.31	1
Vesper Sparrow	2005	0.49	79	0.14	1.72	2
Vesper Sparrow	2006	2.86	64	1.02	8.00	12
Vesper Sparrow	2007	3.10	72	0.98	9.76	13
Vesper Sparrow	2008	0.32	101	0.07	1.53	1
Vesper Sparrow	Global	1.49	55	0.62	3.55	29
Grasshopper Sparrow	2004	50.15	28	30.98	81.19	38
Grasshopper Sparrow	2005	112.96	21	79.09	161.32	91
Grasshopper Sparrow	2006	48.39	23	32.77	71.45	40
Grasshopper Sparrow	2007	53.23	30	31.27	90.60	44
Grasshopper Sparrow	2008	45.16	53	16.92	120.53	28
Grasshopper Sparrow	Global	62.86	19	45.70	86.47	241

Common Name	Year	D	%CV	LCI	UCI	n
Dickcissel	2004	1.03	97	0.21	5.15	1
Dickcissel	2005	0.00				0
Dickcissel	2006	32.03	42	15.09	67.98	32
Dickcissel	2007	6.59	33	3.73	11.65	7
Dickcissel	2008	0.00				0
Dickcissel	Global	8.52	36	4.50	16.10	40
Red-winged Blackbird	2004	18.20	54	6.65	49.82	32
Red-winged Blackbird	2005	20.43	35	10.51	39.69	38
Red-winged Blackbird	2006	48.95	24	31.26	76.67	69
Red-winged Blackbird	2007	61.06	22	40.88	91.19	92
Red-winged Blackbird	2008	57.55	28	34.16	96.95	67
Red-winged Blackbird	Global	40.87	15	32.08	52.05	298
Brown-headed Cowbird	2004	29.50	27	18.34	47.46	34
Brown-headed Cowbird	2005	13.81	54	5.16	36.96	17
Brown-headed Cowbird	2006	42.95	22	29.67	62.17	34
Brown-headed Cowbird	2007	39.77	34	21.59	73.24	37
Brown-headed Cowbird	2008	13.79	42	6.67	28.48	9
Brown-headed Cowbird	2008	28.76	19	20.96	39.47	131

Table 4. Global density estimates for USFS Region 1 sensitive species and North Dakota's Game and Fish level I species of greatest conservation need lists. Global density estimates were calculated by combining Little Missouri, Grand River and Sheyenne detections. D = Density estimate expressed in birds/ km^2, LCL & UCL = 90% lower and upper confidence limits of D, n = number of detections used to obtain density estimates, %CV = percent coefficient of variation.

Common Name	Year	D	%CV	LCI	UCI	n
Upland Sandpiper	2004	8.30	27	5.34	12.92	74
Upland Sandpiper	2005	4.30	36	2.39	7.72	38
Upland Sandpiper	2006	11.04	23	7.59	16.07	98
Upland Sandpiper	2007	10.38	28	6.45	16.68	68
Upland Sandpiper	2008	16.40	27	10.39	25.87	115
Sprague's Pipit	2004	2.05	38	1.10	3.80	30
Sprague's Pipit	2005	8.54	21	6.00	12.16	124
Sprague's Pipit	2006	1.63	37	0.89	3.01	26
Sprague's Pipit	2007	2.04	50	0.92	4.57	22
Sprague's Pipit	2008	1.99	39	1.05	3.78	22
Lark Bunting	2004	4.94	46	2.36	10.34	62
Lark Bunting	2005	8.01	43	4.00	16.07	70
Lark Bunting	2006	4.55	43	2.28	9.05	57
Lark Bunting	2007	16.06	34	9.06	28.50	141

Common Name	Year	D	%CV	LCI	UCI	n
Lark Bunting	2008	2.16	59	0.86	5.43	22
Chestnut-collared Longspur	2004	5.19	56	2.16	12.47	11
Chestnut-collared Longspur	2005	4.94	64	1.83	13.30	13
Chestnut-collared Longspur	2006	10.34	78	3.22	33.17	8
Chestnut-collared Longspur	2007	30.97	45	15.02	63.83	81
Chestnut-collared Longspur	2008	11.36	48	5.32	24.24	16
Grasshopper Sparrow	2004	39.97	14	31.87	50.13	168
Grasshopper Sparrow	2005	85.30	12	69.99	103.95	355
Grasshopper Sparrow	2006	58.22	13	46.89	72.31	266
Grasshopper Sparrow	2007	61.17	16	46.83	79.89	186
Grasshopper Sparrow	2008	56.86	20	40.89	79.09	185

Trend Analysis

Trend analyses were conducted for birds on USFS Region 1 sensitive species and species on North Dakota's Game and Fish level I (species of greatest conservation need) list with sufficient detections to estimate density. There were 5 species with sufficient data; Upland Sandpiper, Sprague's Pipit, Lark Bunting, Grasshopper Sparrow and Chestnut-collared Longspur. Trend analyses were carried out at the grassland level and combining grasslands (global).

Upland Sandpiper trend analysis results showed no significant trend at grassland or global levels. Grand River had significantly higher density estimates for most years compared to Little Missouri (Figure 3).

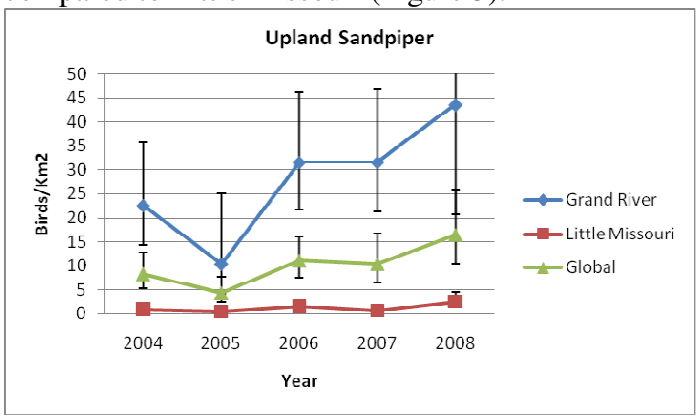

Figure 3. Upland Sandpiper density estimates.

Sprague's Pipit showed no significant trend. Highest density estimates occurred in Grand River (Figure 4).

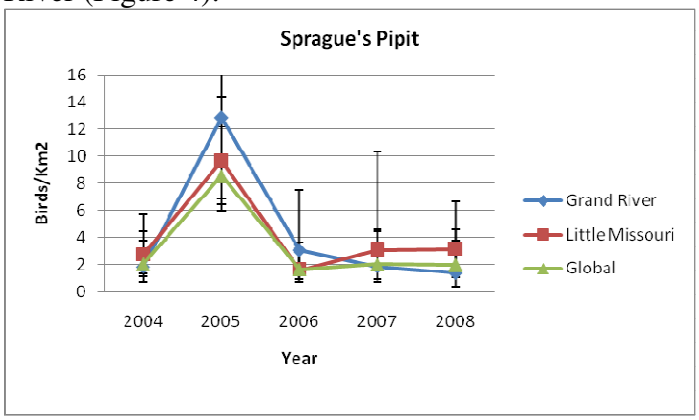

Figure 4. Sprague's Pipit density estimates.

Trend analyses showed no significant trends for Lark Bunting at the global level or in Grand River. There was a significant decrease in trend on Little Missouri (Table 6, Figure 6). Densities were significantly higher in Grand River than Little Missouri (Figure 5). There were insufficient detections on Sheyenne for trend analysis as this grassland is on the eastern limit of Lark Bunting's range.

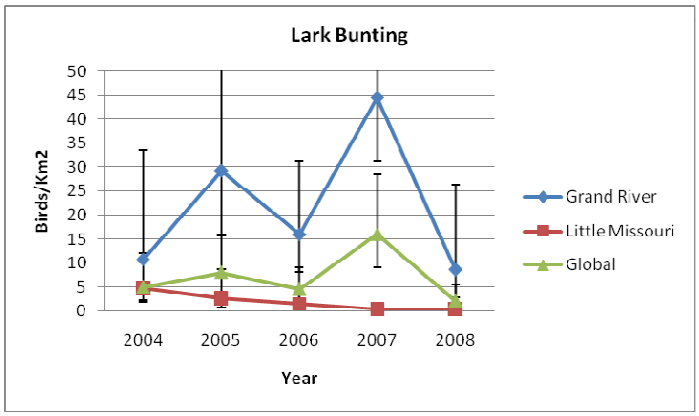

Figure 5. Lark Bunting density estimates.

Table 5. Lark Bunting trend results for Little Missouri National Grassland. The best model, based on AICc values, contained log of year.

Model	K	-2 XLoglik	AICc
Log	**2**	**-0.74**	**9.25**
Linear	2	8.47	18.46
Intercept	1	19.48	22.81

K= # of parameters, -2 X Loglik = negative 2 X the log likelihood

Table 6. Lark Bunting trend results for the best model (Density~log(Year). There was an average decrease of 2 birds per kilometer square per log(year).

	Estimate	SE	t value	P value
(Intercept)	4.58	0.23	19.80	0.000281
log(Year)	-2.80	0.22	-12.97	0.000989

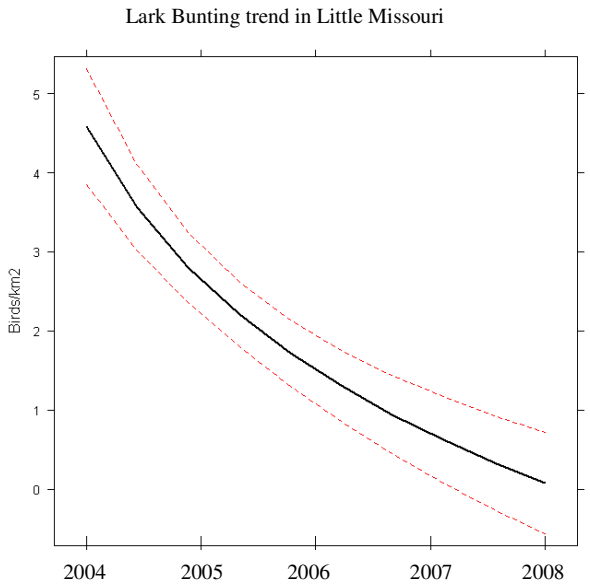

Figure 6. Lark Bunting trend line with 95% confidence interval band.

Grasshopper Sparrow showed no significant trend at the grassland level or at the global level (Figure 7).

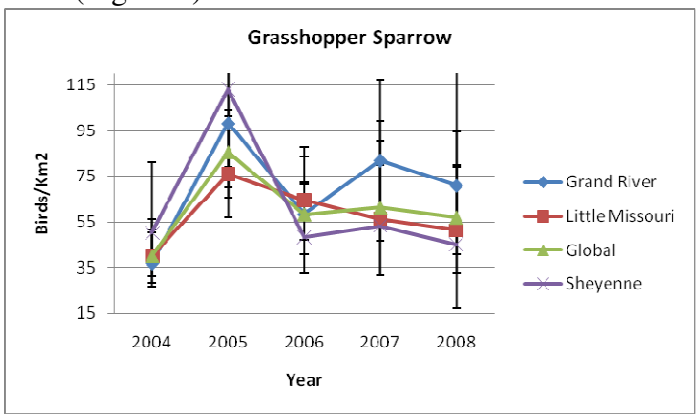

Figure 7. Grasshopper Sparrow density estimates.

Chestnut-collared Longspur showed no significant trends. Highest densities of this species occurred in Grand River (Figure 8). On Little Missouri there was an average of 11 birds detected per year.

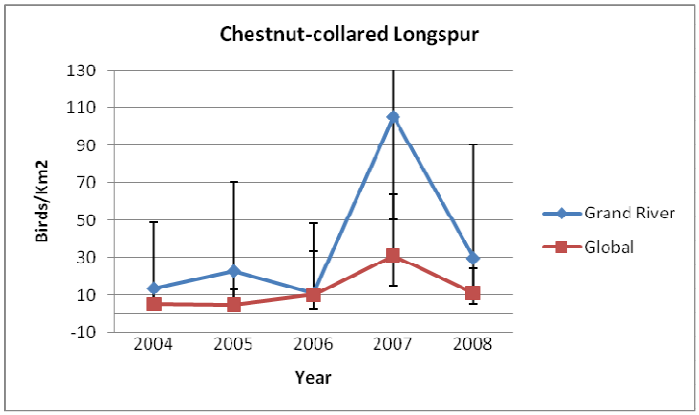

Figure 8. Chestnut-collared Longspur density estimates.

Density Surface Map

The exploratory density surface map using 2006 Grasshopper Sparrow data (Figure 9) shows areas of high density around the periphery of Little Missouri. This corresponds roughly to elevation on the grassland with ravines cutting through the middle.

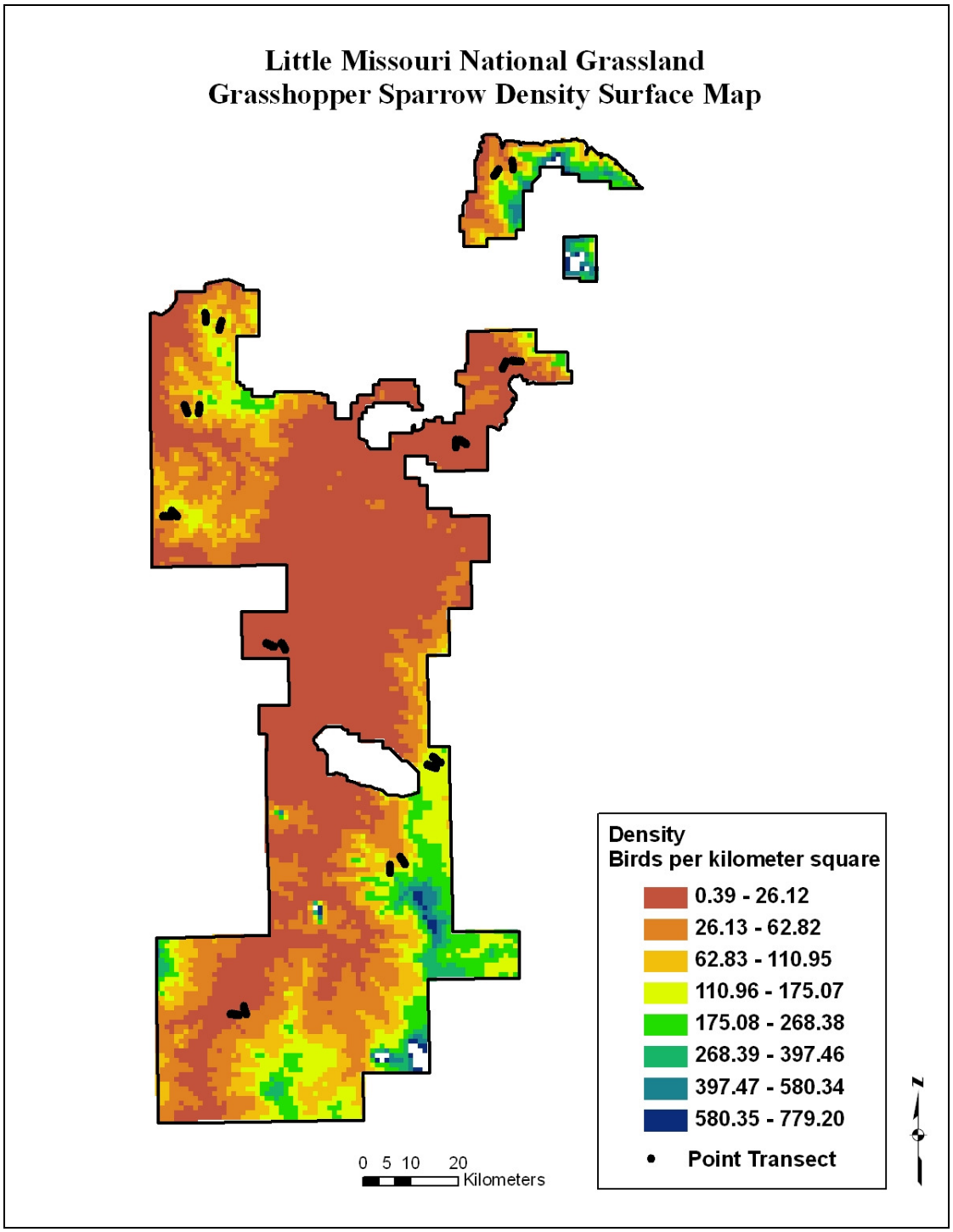

Figure 9. Grasshopper Sparrow density surface map for Little Missouri National Grassland.

Discussion

Monitoring National Grasslands in the Dakotas provides density estimates for 32 bird species and location data for 140 bird species. Density estimates describe population trends over time and count data characterize bird diversity on these National Grasslands. This data can be used to develop management actions needed to sustain healthy bird populations and ecosystem integrity. Trend analyses revealed a significant decrease in trend for Lark Bunting on Little Missouri. This decrease occurred over a five year period, a short period considering that bird populations fluctuate from year to year. Even though the coefficient of variation was included as weights in the trend analysis, there needs to be more detections to be confident of this result. However there should be concern for this species within Little Missouri if density continues to decrease over the next couple of years.

The density surface model for Grasshopper Sparrow is a tool that reveals spatial patterns that will help understand bird distribution and bird response to management actions. This tool helps to identify areas of high density and tracks abundance spatially over time. The density surface model would be more accurate if at least 10 new transects were established within Little Missouri. Density surface models require complex statistical modeling techniques and covariates need to be available throughout the study area.

The North American Bird Conservation Initiative (NABCI) monitoring subcommittee made recommendations for improving monitoring programs (NABCI 2007). The first recommendation is to integrate an adaptive management approach to monitoring so management and conservation priorities are incorporated in the monitoring process. This approach can be implemented within the Dakotas grassland bird monitoring program using a control and experiment aspect of the study design so that the effects of management can be observed. Adaptive management monitoring can be incorporated in a more efficient manner with a spatially balanced study design. The second recommendation is to develop coordinated bird monitoring among organizations to make conservation more effective, with the perspective that monitoring at different spatial scales is important in understanding population trends. The third and fourth recommendations are to improve statistical design and create a database where monitoring information resides. Rocky Mountain Bird Observatory is involved in coordinated monitoring and has taken the steps to meet all of the recommendations put forth in the NABCI report. RMBO is monitoring birds at regional scales using a spatially balanced study design and has developed an online database available to managers. Monitoring grassland birds on the Dakota grasslands is a valuable program filling important gaps on trend and distribution information for many priority grassland species.

North American Landbird Conservation Plan (Rich et al. 2004) lists three species we were able to calculate density estimates for – Sprague's Pipit, Lark Bunting, and Grasshopper Sparrow. These are species of Continental Importance within the Prairie Avifaunal Biome. This plan was developed by Partners in Flight and serves as a

blueprint for continental habitat conservation under the North American Bird Conservation Initiative (Rich et al. 2004).

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APPENDIX A – Listof Priority Species detected in 2008.

Common Name	BCR 17	BCR 11	NDGFD	USFS R1
Northern Pintail			LII	
Sharp-tailed Grouse	CS,RS	RC,CS,RS	LII	S
American Bittern			LI	
Northern Harrier	RC	RC,RS	LII	
Swainson's Hawk	CC	CC,RC,RS	LI	
Upland Sandpiper			LI	
Marbled Godwit			LI	
Wilson's Phalarope			LI	
Black Tern			LI	
Northern Flicker		RC		
Willow Flycatcher	CC	CC		
Say's Phoebe	RS			
Pinyon Jay	CC,RC			
Black-billed Magpie	RC			
Horned Lark		RC,RS		
Sedge Wren			LII	
Mountain Bluebird	RC			
Brown Thrasher		RC		
Sprague's Pipit	CC,RC	CC,RC,CS,RS	LI	S
Clay-colored Sparrow		RC,RS		
Vesper Sparrow	RC			
Lark Bunting	RC,CS,RS	RC	LI	
Grasshopper Sparrow	RC,CS,RS	RC	LI	
Baird's Sparrow	CC,RC	CC,RC,CS,RS	LI	S
Le Conte's Sparrow	RC	RC	LII	
Chestnut-collared Longspur	RC,CS,RS	RC,CS,RS	LI	
Bobolink			LII	
Western Meadowlark		RC		

BCR 17 and 11 (PIF); cc= continental concern, rc =regional concern, cs= continental stewardship, rs = regional stewardship. North Dakota Game and Fish (NDGFD); LI= Level 1 (Species in greatest need of conservation), LII=Level 2 (Species in need of conservation, but that have had support from other wildlife programs), USFS Region 1 (USFS R1); S= sensitive species.

APPENDIX B - Species List. Number of detections by year of all species recorded on Grand River, Little Missouri and Sheyenne National Grasslands.

	Grand River						Little Missouri						Sheyenne						
Common Name	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**Grand Total**
Canada Goose							28	6		1		35	33	12				45	80
Wood Duck				1		1								1				1	2
Gadwall	4		2	4	3	13	2	4		4		10		4		1		5	28
American Wigeon									12	3		15							15
Mallard	3			4	2	9	5		1	1		7		3	1	4		8	24
Blue-winged Teal	2	2	2		2	8	7	1	2			10				4	1	5	23
Northern Shoveler							2	2				4		1				1	5
Northern Pintail	4					4				2		2					1	1	7
Canvasback								2		1		3				1		1	4
Lesser Scaup																1		1	1
Common Merganser		1				1													1
Ruddy Duck								2	3	1		6							6
Gray Partridge									2		2	4							4
Ring-necked Pheasant	5			17	15	37	11	8	1	7	28	55	2	6	9	21	14	52	144
Sharp-tailed Grouse	2		1	3		6	2	11	8	2	15	38	2	1	2	6	2	13	57
Wild Turkey							1	1		1		3							3
Pied-billed Grebe							2		2			4							4
Eared Grebe								21	6			27							27
American White Pelican								1				1							1
American Bittern																2	1	3	3
Great Blue Heron	1					1													1
Great Egret															10			10	10

	Grand River						Little Missouri						Sheyenne						
Common Name	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**Grand Total**
Turkey Vulture				2		2		1	2	1	1	5							7
Northern Harrier	1	2		2	2	7	2	1	2	6	1	12				1		1	20
Cooper's Hawk											1	1				1		1	2
Swainson's Hawk		3	4	1		8			3	2	1	6							14
Red-tailed Hawk		2			1	3	5	12	6	3	6	32	2	1	6	3	3	15	50
Ferruginous Hawk		1	1	2		4				1		1	1					1	6
Golden Eagle				1		1													1
American Kestrel		1	1		1	3		1	7	8	7	23	1	2	2	3	2	10	36
Prairie Falcon							1	1				2							2
Sora																4	3	7	7
American Coot							15		3	1		19				1		1	20
Killdeer	5	5	25	15	8	58	2	11	12	13	5	43	1	8	5	14	8	36	137
Greater Yellowlegs										1		1							1
Lesser Yellowlegs																1	2	3	3
Solitary Sandpiper																1	1	2	2
Willet								5	1	5		11							11
Spotted Sandpiper		1				1													1
Upland Sandpiper	50	20	70	84	65	289	13	8	24	6	32	83	13	15	16	32	24	100	472
Marbled Godwit			3		1	4	2	4		2		8	3	12			5	20	32
Wilson's Snipe							1	3	1			5	1	6	5	31	11	54	59
Wilson's Phalarope								11	1	4		16		3			4	7	23
Ring-billed Gull							1					1							1
Black Tern								1		1		2		1	11	17	1	30	32
Rock Pigeon				1		1				3		3							4

	Grand River						Little Missouri						Sheyenne						
Common Name	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**Grand Total**
Mourning Dove	26	17	23	40	14	120	11	18	42	25	15	111	8	26	21	63	6	124	355
Black-billed Cuckoo																1		1	1
Yellow-billed Cuckoo																1		1	1
Great Horned Owl														1		1		2	2
Burrowing Owl								1		1		2							2
Short-eared Owl															1			1	1
Common Nighthawk	6	1	3	3	3	16	6	2	16		2	26	2			9		11	53
Red-headed Woodpecker													1			2		3	3
Yellow-bellied Sapsucker														1		9		10	10
Downy Woodpecker			1			1			1	1		2		1	9	3	1	14	17
Hairy Woodpecker										1		1	1	1		2	2	6	7
Northern Flicker	3	4	4	8	4	23	3	4	24	12	11	54	2	4	16	15	4	41	101
Pileated Woodpecker																1		1	1
Western Wood-Pewee							2					2							2
Eastern Wood-Pewee							1					1	2	1	2	6	3	14	15
Willow Flycatcher			3	1		4			1		1	2	6			3	3	12	18
Least Flycatcher	2			1		3	1	3		1	3	8	6	7	4	15		32	43
Eastern Phoebe														1				1	1
Say's Phoebe				2		2	3	3			3	9							11
Cassin's Kingbird									1			1							1
Western Kingbird	6	2	5	13	11	37	4	12	6	4	8	34		2		1	2	5	76
Eastern Kingbird	14	2	4	20	5	45	14	7	16	14	6	57	5	26	18	25	9	83	185
Loggerhead Shrike		1		1		2	2		1			3							5
Warbling Vireo							1			1		2		6		18	1	25	27

	Grand River						Little Missouri						Sheyenne						
Common Name	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**Grand Total**
Red-eyed Vireo							7	18	18	14	10	67		1			1	2	69
Blue Jay														3	3	2		8	8
Pinyon Jay											1	1							1
Black-billed Magpie				2		2	1	2	2	5	4	14							16
American Crow					1	1	11	40	20	24	20	115		3	1	7		11	127
Common Raven							2					2							2
Horned Lark	23	36	79	135	24	297	6	19	42	29	38	134			2	2		4	435
Tree Swallow								1				1	2	1		4	3	10	11
Northern Rough-winged Swallow	1	4	4	3		12	6			7		13		1				1	26
Bank Swallow		1	2			3										1	5	6	9
Cliff Swallow	1		4			5			2			2		1	2	6		9	16
Barn Swallow	1			1	1	3	2	9	12	10	6	39				18		18	60
Black-capped Chickadee							2	3	22	3	1	31			1	2		3	34
White-breasted Nuthatch										1	1	2				3		3	5
Rock Wren		5	4	8		17	5	5	16	7	4	37							54
Bewick's Wren															6			6	6
House Wren			1	4		5	10	21	52	29	16	128	2	1	12	27	1	43	176
Sedge Wren															47	78	28	153	153
Marsh Wren															3	17	6	26	26
Blue-gray Gnatcatcher											3	3							3
Eastern Bluebird					1	1	6	1	1		1	9	1		5	2		8	18
Western Bluebird								1				1							1
Mountain Bluebird							7	11	35	6	8	67							67
Swainson's Thrush										1		1							1

	Grand River						Little Missouri						Sheyenne						
Common Name	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**Grand Total**
American Robin			2	3	1	6	2	13		8	3	26	3	3	3	14	1	24	56
Gray Catbird								2	6	1		9				4		4	13
Sage Thrasher										1		1							1
Brown Thrasher	1		2	4	1	8			5	2	1	8	1	2	6	1		10	26
European Starling			1	4		5	3	1		1	4	9		1		5		6	20
Sprague's Pipit	6	38	10	8	3	65	24	94	16	53	31	218							283
Cedar Waxwing							2	11		7	1	21		15		8		23	44
Yellow Warbler	1		9	7	2	19	31	59	60	45	47	242	7	8	6	5	1	27	288
Black-and-white Warbler								5	10	2	5	22							22
American Redstart							3	5	4	5		17							17
Ovenbird							6	18	12	3	14	53	2					2	55
Northern Waterthrush																1		1	1
Common Yellowthroat			1			1	4	4	4		3	15	13	22	39	48	47	169	185
Yellow-breasted Chat							19	29	63	51	37	199		1	1	1		3	202
Spotted Towhee			1	2	1	4	60	56	183	101	94	494							498
Cassin's Sparrow								4				4							4
American Tree Sparrow							3					3							3
Chipping Sparrow		3				3	5	14	21	6	8	54		1	1	3		5	62
Clay-colored Sparrow				1		1		23	21	6	9	59	21	36	25	60	34	176	236
Brewer's Sparrow							1			1		2							2
Field Sparrow	1			5	2	8	9	67	112	102	104	394	5	1	5	10		21	423
Vesper Sparrow	5	4		9		18	39	112	168	102	65	486	1	2	12	13	1	29	533
Lark Sparrow	3			3		6	9	6	26	42	8	91			4	3		7	104
Lark Bunting	37	96	57	160	20	370	24	15	9	2	2	52							422

	Grand River						Little Missouri						Sheyenne						
Common Name	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**Grand Total**
Savannah Sparrow							5	13	4	12	11	45	9	9	13	15	23	69	114
Grasshopper Sparrow	36	85	58	92	60	331	88	192	170	154	106	710	38	98	40	55	28	259	1300
Baird's Sparrow		2				2	12	4	11	29	9	65		1				1	68
Henslow's Sparrow																1		1	1
Le Conte's Sparrow							1					1				28	7	35	36
Song Sparrow											1	1	1	2	5	15	1	24	25
Chestnut-collared Longspur	11	16	9	90	16	142	7		30	2	15	54		1		1		2	198
Rose-breasted Grosbeak													1					1	1
Black-headed Grosbeak				1		1	5	2	1	2	1	11	1					1	13
Lazuli Bunting		5			1	6	3	4	5	19	7	38	1					1	45
Indigo Bunting							1					1							1
Dickcissel				2		2							1		34	7		42	44
Bobolink							3	1	14	20		38	12	42	17	34	20	125	163
Red-winged Blackbird	16	15	10	17	9	67	12	11	20	23	1	67	33	38	93	116	82	362	496
Western Meadowlark	143	133	269	198	157	900	160	352	356	200	206	1274	35	97	82	79	44	337	2511
Yellow-headed Blackbird			2	1		3	4	1	10	3		18			7	7	1	15	36
Brewer's Blackbird					2	2	2	1		8	3	14		10	3	13		26	42
Common Grackle	1		1	16	1	19	4		37		14	55		5	1	59	4	69	143
Brown-headed Cowbird	103	28	171	106	34	442	44	33	111	38	18	244	34	19	54	50	13	170	856
Orchard Oriole				5		5				2		2		2		17		19	26
Bullock's Oriole									2			2	3					3	5
Baltimore Oriole				1		1							2	4			1	7	8
House Finch											1	1							1
Pine Siskin										1	2	3							3

	Grand River						Little Missouri						Sheyenne						
Common Name	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**	**Grand Total**
American Goldfinch	3	1	3	1	2	10	8	11	9	20	14	62		5	12	33		50	122