Monitoring the Birds of the Badlands and Prairies Bird Conservation Region (BCR 17): 2009 Field Season Report

April 2010

ROCKY MOUNTAIN BIRD OBSERVATORY

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***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:

- ***Monitoring** long-term bird population trends to provide a scientific foundation for conservation action.*
- ***Researching** bird ecology and population response to anthropogenic and natural processes to evaluate and adjust management and conservation strategies using the best available science.*
- ***Educating** people of all ages through active, experiential programs that create an awareness and appreciation for birds.*
- ***Fostering** good stewardship on private and public lands through voluntary, cooperative partnerships that create win-win situations for wildlife and people.*
- ***Partnering** with state and federal natural resource agencies, private citizens, schools, universities, and other non-governmental organizations to build synergy and consensus for bird conservation.*
- ***Sharing** the latest information on bird populations, land management and conservation practices to create informed publics.*
- ***Delivering** bird conservation at biologically relevant scales by working across political and jurisdictional boundaries in western North America.*

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EXECUTIVE SUMMARY

Rocky Mountain Bird Observatory, in conjunction with the USDA Forest Service; USDI Bureau of Land Management; Northern Great Plains Joint Venture; Montana Fish, Wildlife and Parks; South Dakota Game, Fish and Parks; Wyoming Natural Diversity Database; Audubon Wyoming and Wyoming Game and Fish Department conducted its first field season of landbird monitoring throughout the Badlands and Prairies Bird Conservation Region (BCR 17) in 2009. This BCR encompasses large sections of northeastern Wyoming, southeastern Montana, western North Dakota, western South Dakota, and two small discontinuous sections of northern Nebraska. The BCR 17 landbird monitoring program uses a newly-developed, spatially-balanced sampling design using the BCR as the sampling frame and stratifying by land management boundaries and ecoregional attributes. The Integrated Monitoring in Bird Conservation Regions (IMBCR) design allows inferences about avian species distributions and population sizes from small scales to entire BCRs, facilitating conservation from fine scales to national and international levels.

In 2009, Rocky Mountain Bird Observatory and its partners surveyed 226 of 236 (96%) assigned transects throughout BCR 17; 81 in Montana; 28 in North Dakota; 6 in Nebraska; 76 in South Dakota; and 35 in Wyoming. Field technicians conducted 2,675 point counts between 16 May and 15 July 2009 and detected 28,821 birds of 184 species throughout BCR 17.

We estimated BCR-level densities, stratum-level densities and population estimates for 55 landbird species, including 11 priority species. The data yielded robust density estimates (Coefficient of Variation, CV < 50%) for 46 of these species at the BCR scale and for 52 of these species in at least one stratum. Given similar sampling effort and avian population dynamics in future years, we would be able to detect an average annual 3% change in populations of these species within 30 years. We used occupancy modeling to estimate occupancy rates for priority species. This will allow RMBO and its partners to monitor populations of avian species that are rare or difficult to detect and therefore result in detection rates too low for density estimation. We estimated the proportion of transects occupied (Psi) for 11 priority species throughout BCR 17, different from the 11 priority species for which we estimated density. We estimated the proportion of transects occupied (Psi) for 14 priority species in at least one stratum in addition to the priority species for which we estimated density. Altogether, we calculated density or occupancy estimates for 25 priority species.

We generated distribution models using Maximum Entropy for three priority species in BCR 17: Lark Bunting, Grasshopper Sparrow and Chestnut-collared Longspur. The breeding distribution probabilities were based on species occurrence data modeled as a function of ten environmental variables. The model for Lark Bunting showed more suitable habitat in the Montana and South Dakota portion of BCR 17 and less suitable habitat along the westernmost, northeastern and south-central portions of BCR 17. The model for Grasshopper Sparrow showed more suitable habitat in South Dakota, North Dakota and the central-eastern portion of Montana in BCR 17. The model for Chestnut-collared Longspur showed higher habitat suitability restricted to eastern BCR 17.

The spatially-balanced sampling design implemented in BCR 17 serves as a model for other long-term monitoring efforts because of its ability to address the conservation and management needs of a wide range of stakeholders, landowners and government entities at both local and regional scales. The IMBCR design represents one method for achieving effective collaboration in North American bird monitoring and could be applied to other BCRs and regions across the continent.

ACKNOWLEDGEMENTS

Stratification and allocation of survey effort in Bird Conservation Region 17 were determined in collaboration with partner agencies and organizations in 2009: USDA Forest Service, USDI Bureau of Land Management, Montana Fish, Wildlife and Parks, Montana Bird Conservation Partnership, South Dakota Game, Fish and Parks, Audubon Wyoming, and Wyoming Game and Fish Department. Many individuals helped make the 2009 field season a success. We thank Beth Hahn and Robert Skorkowsky of the USDA Forest Service and Catherine Wightman of Montana Fish, Wildlife and Parks. The 2009 Rocky Mountain Bird Observatory (RMBO) field crew faced many challenges locating new survey locations. Field technicians Jennifer Adams, Andy Bankert, Mike Blaalid, Amanda Bowe, Dan Loiz, David Montague, Casey O'Keefe, David Pavlacky, Todd Reeves, Thomas Riecke, Eric Ripma, Katie Stassen, Josh Theurer, and Bri Winter helped make this field season a success. Hannah Griscom from the Wyoming Natural Diversity Database (WYNDD) coordinated surveys in Thunder Basin National Grassland. Two field technicians from WYNDD conducted surveys in Thunder Basin National Grassland (Kerry Cutler and Jennifer Faulkner), which was a substantial contribution to this year's data. Chandman Sambuu managed and updated the RMBO database and produced a new online mapping tool allowing for easier planning and navigation to survey sites. Fort Collins office staff Paul Franco and Sarah Kormos researched and contacted county assessors and private landowners, granting the field crew access and establishing the relationships that enable multi-ownership monitoring to be sustainable. There were too many to list here, but we thank all of the private land owners for allowing access to their land to conduct surveys. Rob Sparks of RMBO produced sample allocation maps for this report. We sincerely appreciate the generosity of Dave Herr for providing the cover photo for this report. We thank Gary White, professor emeritus of Colorado State University, who wrote the initial SAS code for running the multi-scale occupancy models and Paul Lukacs of the Colorado Division of Wildlife who wrote code in program R for generating density estimates from detection probabilities. Finally, this report benefited greatly from review by RMBO staff.

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INTRODUCTION

Birds can be excellent indicators of biological integrity and ecosystem health (Morrison 1986, Hutto 1998, O'Connell et al. 2000, Rich 2002, U.S. EPA 2002, Birdlife International 2003). Birds comprise a diverse group of niche specialists, occupy a broad range of habitats, are relatively easy to monitor and are sensitive to both physical and chemical impacts on the environment. They are useful barometers for environmental change and measuring the sustainability of human activities on ecosystems.

Bird Conservation Regions (BCRs) are "ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues" (http://www.nabci-us.org/bcrs.html). The Badlands and Prairies Bird Conservation Region (BCR 17) supports some of the healthiest populations of high priority grassland birds in North America (http://www.nabci-us.org/bcr17.html). Many breeding birds of this region are currently identified as priorities for conservation in State Wildlife Action Plans (Hagen et al. 2005, WGFD 2005, SDGFP 2008), National Forest Plans (BHNF 2006, USFS 2007, USFS 2008), and the Partners in Flight North American Landbird Conservation Plan (Rich et al. 2004). Given the ongoing decline of many bird species in this region there is a critical need for monitoring programs that identify and track species and the causes for their declines as well as monitoring and maintaining healthy populations. Successful monitoring provides natural resource managers with data to implement conservation efforts, which prevent further losses and, ideally, increase bird populations. BCR 17 offers a unique opportunity for grassland bird conservation as extensive areas of native grassland still endure (Pool and Austin 2006).

Population monitoring forms the backbone of avian conservation; without current monitoring data, conservation efforts may be misguided and inefficient. Population monitoring helps to achieve the intent of legislation such as the Migratory Bird Treaty Act (1918), National Environmental Policy Act (1969), Endangered Species Act (1973), the National Forest Management Act (1976) and various state laws (Manley et al. 1993, Sauer 1993).

The North American Bird Conservation Initiative's "Opportunities for Improving Avian Monitoring" (NABCI 2007) provided goals and recommendations for avian monitoring programs. The goals are:

> Goal 1: Fully integrate monitoring into bird management and conservation practices and ensure that monitoring is aligned with management and conservation priorities.
>
> Goal 2: Coordinate monitoring programs among organizations and integrate them across spatial scales to solve conservation or management problems effectively.
>
> Goal 3: Increase the value of monitoring information by improving statistical design.
>
> Goal 4: Maintain bird population monitoring data in modern data management systems. Recognizing legal, institutional, proprietary, and other constraints provide greater availability of raw data, associated metadata, and summary data for bird monitoring programs.

With the NABCI (2007) guidelines in mind, RMBO, USFS and Colorado Division of Wildlife (CDOW) designed a broad-scale monitoring program for Colorado in 2008 (Blakesley and Hanni

2009). This program was adapted and applied to BCR 17 in 2009. The objectives of this Integrated Monitoring in Bird Conservation Regions (IMBCR) program are to:

1. Provide a design framework to spatially integrate bird monitoring efforts in the region to provide better information on distribution and abundance of breeding birds, especially for high priority species;
2. Provide basic habitat association data for most bird species to address habitat management issues;
3. Provide robust density, population, and occupancy estimates that are comparable at different geographic extents;
4. Provide long-term status and trend data for all regularly occurring breeding species throughout BCR 17, with a target of detecting an average annual rate of population change of ≥3.0% per year within 30 years, with power = 0.8 and alpha = 0.1;
5. Maintain a high-quality database that is accessible to all of our collaborators as well as to the public over the internet, in the form of raw and summarized data and;
6. Generate decision support tools that help guide conservation efforts and provide a better measure of conservation success.

Important properties of the study design are:

- All vegetation types are available for sampling.
- Strata are based on fixed attributes; this will allow RMBO and its partners to relate changes in bird populations to changes on the landscape through time.
- Each state's portion of a BCR can be stratified differently, depending upon local needs and areas to which one wants to make inferences.
- Aggregation of strata-wide estimates to BCR- or state-wide estimates is built into the design.
- Local population trends can be directly compared to regional trends.
- Coordination among partners can reduce the costs of monitoring per partner.

Rocky Mountain Bird Observatory (RMBO), in conjunction with the USDA Forest Service (USFS), USDI Bureau of Land Management (BLM), Northern Great Plains Joint Venture, Montana Fish, Wildlife and Parks (MFWP), Montana Bird Conservation Partnership, South Dakota Game, Fish and Parks, Wyoming Natural Diversity Database, Audubon Wyoming, and Wyoming Game and Fish Department (WGFD), conducted its first season of landbird monitoring throughout BCR 17 in 2009.

METHODS

Unless otherwise specified, all bird species names listed in this report are from the American Ornithologists'' Union (A.O.U.) Check-list of North American Birds, Seventh Edition (2007).

Study Area

The Badlands and Prairies Bird Conservation Region (BCR 17) is characterized by rolling plains and mixed-grass prairie which contains large, continuous tracts of intact, dry grassland managed predominately as ranchland (NABCI 2007), as well as pine and spruce forests at higher elevations. BCR 17 covers portions of five states: Montana, North Dakota, South Dakota, Wyoming and Nebraska (Figure 1).

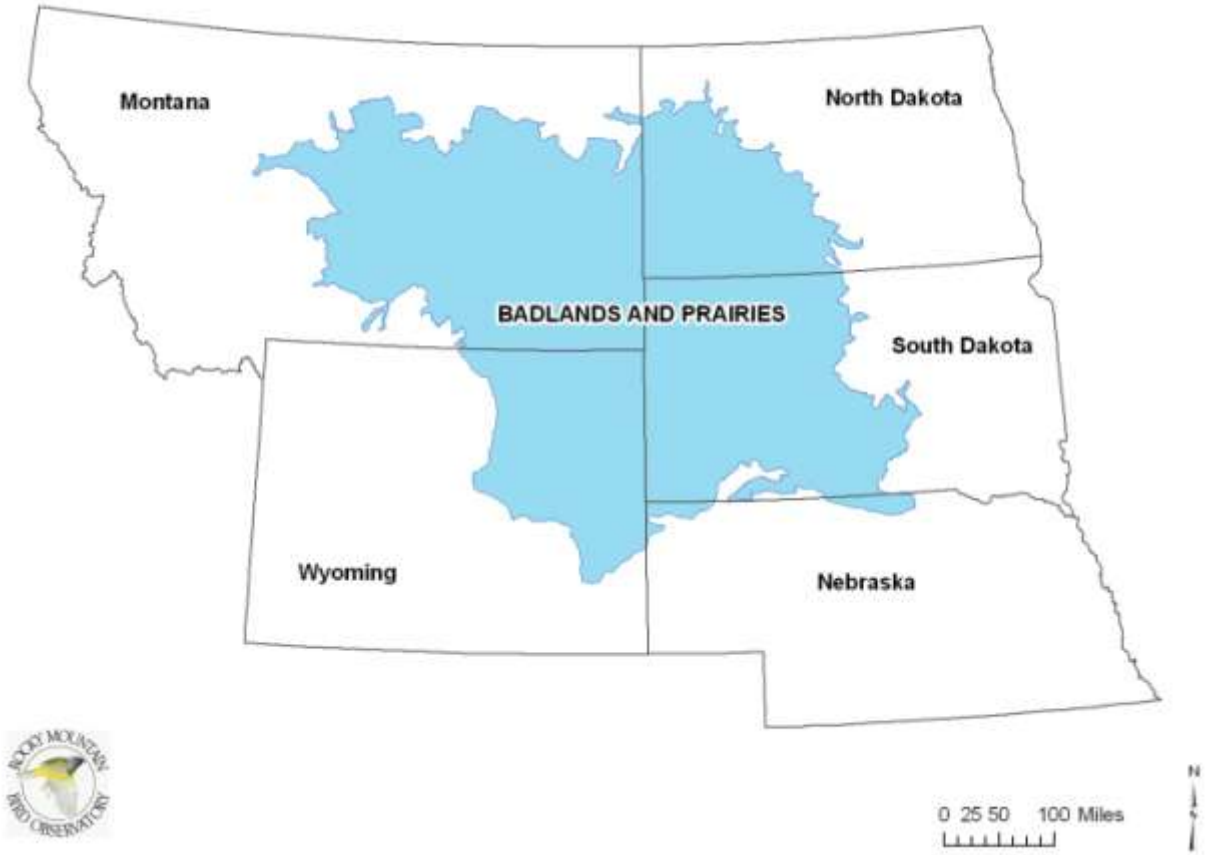

Figure 1. Map of Badlands and Prairies Bird Conservation Region (BCR 17).

Sampling Design

RMBO and its partners defined BCR 17 as the sampling frame; the broad-scale area selected to make inferences about bird populations. All portions of the sampling frame were available for sampling. Within the BCR, RMBO and its partners established strata and substrata based on smaller-scale areas to which we also wanted to make inferences; e.g., states, BLM land, individual National Grasslands (see below). The strata within BCRs are based on fixed attributes, without regard to existing vegetation conditions.

Within each stratum, the IMBCR design uses generalized random-tessellation stratification (GRTS), a spatially balanced sampling algorithm in the SPSURVEY package (Kincaid 2008) in Program R (R Development Core Team 2008) to select sample units. The GRTS design has several appealing properties with respect to long-term monitoring of birds at large spatial scales:

- Spatially-balanced sampling is generally more efficient than simple random sampling of natural resources (Stevens and Olsen 2004). Incorporating information about spatial autocorrelation in the data can increase precision in density estimates;

- Sample units can be weighted according to any factor expected to influence species' distributions, to adjust the probability that sample units will be selected (Stevens and Olsen 2004). The sample weight can be accounted for in data analyses;

- All sample units in the sampling frame are ordered, such that any set of consecutively numbered units is a spatially well-balanced sample (Stevens and Olsen 2004). In the case of fluctuating budgets, RMBO and its partners can adjust the sampling effort among years within each stratum while still preserving a random, spatially-balanced sampling design.

The IMBCR design defines sampling units as 1-km^2 cells that are used to create a uniform grid over the entire BCR, with a random starting point. All spatial data were compiled using ARCGIS 9.2 (ESRI).

Stratification and Sample Allocation

The GRTS design allows great flexibility in stratification, as illustrated by the different approaches to stratification taken throughout BCR 17 (Figure 2). RMBO and its partners created strata and allocated samples among strata in consideration of the partners' management and conservation priorities.

In the Montana portion of BCR 17, the 12 strata were based on Federal land ownership, ecoregions (following "Ecoregions of Montana" Woods et al. 2002), and proximity to major rivers (Yellowstone, Powder, Tongue, Musselshell and Missouri rivers; and associated tributaries with a Strahler stream order of five or greater). There were four strata for BLM lands divided by ecoregion; two strata for each National Forest; one stratum for major rivers; one for tribal lands, one for US Fish and Wildlife Service lands; and three strata divided by ecoregion for "All Other" land ownership; including private and state lands. The ecoregions used were from "Ecoregions of Montana" (Woods et al. 2002).

In the North Dakota portion of BCR 17, the five strata were based on land ownership: one for BLM lands, two for National Grasslands, one for the National Park Service Northern Great Plains Inventory and Monitoring Network, and one for All Other lands.

Two small fingers of BCR 17 extend into Nebraska. The two strata in this state consisted of one for Oglala National Grassland and one for All Other lands.

In the South Dakota portion of, BCR 17 there were eight strata: two for National Forests, three for National Grasslands, one for BLM land, one for the National Park Service Northern Great Plains Inventory and Monitoring Network, and one for All Other lands.

The BCR 17 portion of Wyoming consisted of six strata, one for Black Hills National Forest, three for BLM lands (based on field office), one for Thunder Basin National Grassland, and one for All Other lands.

The hierarchical nature of our data analysis required that a minimum of two transects were sampled within each stratum. The remaining allocation of sampling effort among strata was based on the priorities of our funding partners (Table 1).

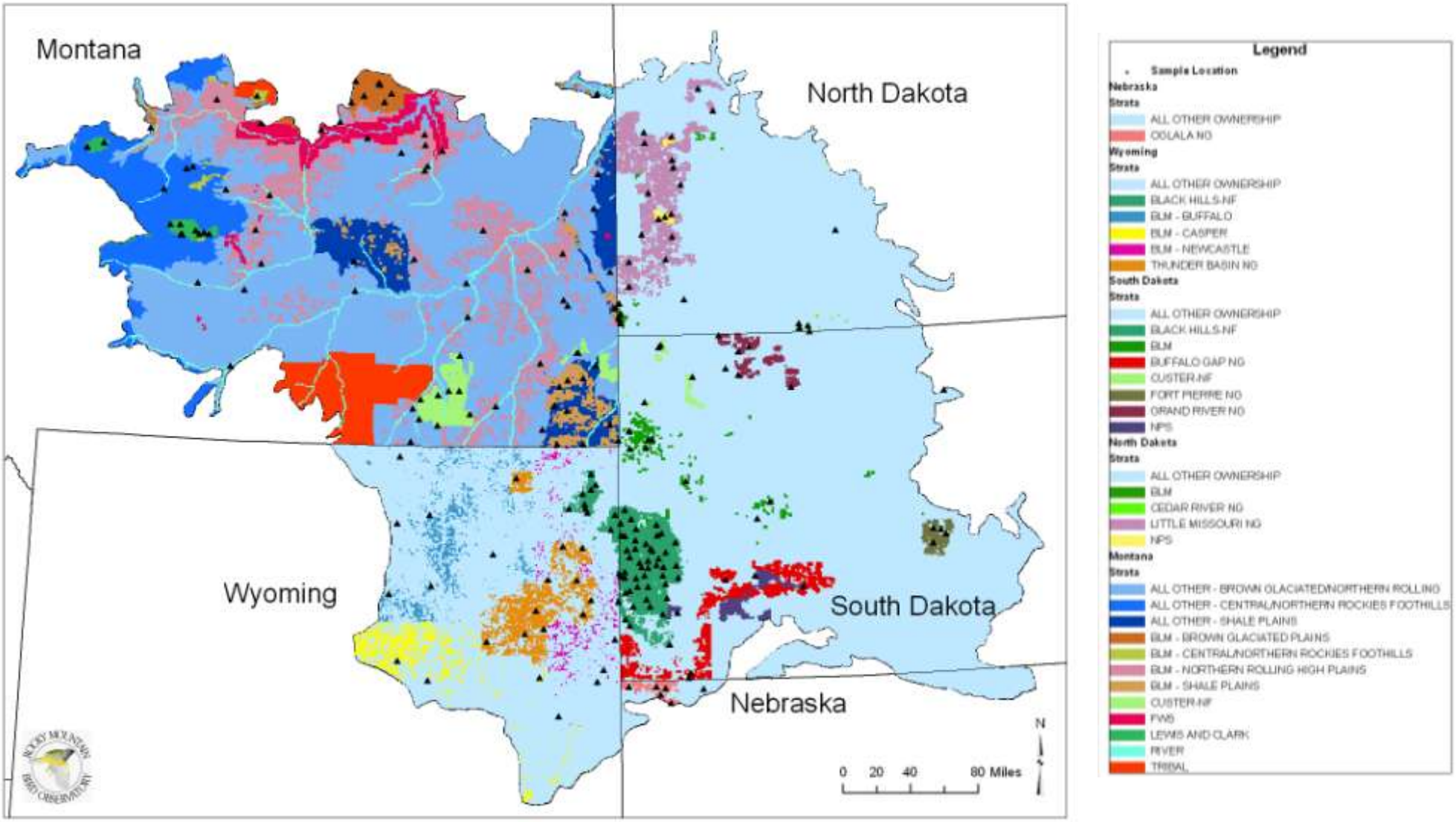

Figure 2. Stratification and sample locations of the Badlands and Prairies Bird Conservation Region (BCR 17), 2009.

Survey Methods

Within each sample cell GIS technicians established 16 points spaced 250 meters apart, in a four by four point grid. Field Technicians surveyed birds from points using methods that allow for estimating detection probability through the principles of Distance sampling. Distance sampling theory was developed to account for the decreasing probability of detecting an object of interest (e.g., a bird) with increasing distance from the observer to the object (Buckland et al. 2001). The detection probability is used to adjust the count of birds to account for birds that were present but undetected. Application of distance theory requires that three critical assumptions be met: 1) all birds at and near the sampling location (distance = 0) are detected; 2) distances of birds are measured accurately; and 3) birds do not move in response to the observer's presence.

Occupancy estimation is most commonly used to quantify the proportion of sample units occupied by an organism (MacKenzie et al. 2002). Occupancy estimation uses a detection probability to adjust the proportion of sites occupied to account for species that were present but undetected (MacKenzie et al. 2002). RMBO used data collected in 2009 to estimate the site occupancy of priority species for which there were too few detections to estimate population density. Occupancy estimation requires multiple surveys to the sample unit in time or space (MacKenzie and Royle 2005). The assumptions of occupancy estimation are 1) the probabilities of detection and occupancy are constant across the sample units; 2) each point is closed to changes in occupancy over the sampling season; 3) the detection of species at each point are independent; and 4) the target species are never falsely identified (MacKenzie et al. 2006).

Field technicians conducted point counts (Buckland et al. 2001) following protocol established by RMBO (Hanni et al. 2009). Technicians conducted surveys in the morning, from ½-hour before sunrise to 11 AM. Technicians conducted up to 16 five-minute point counts within each transect, one at each survey point. At each point, technicians conducted a five-minute survey. For every bird detected during the five minute period, field technicians recorded species, sex, radial distance from the technician, the minute the technician detected each bird, and type of detection (e.g., call, song or visual). Technicians measured distances using laser rangefinders. When it was not possible to measure distance to a bird, technicians estimated distance by measuring to some nearby object. Technicians also recorded birds flying over but not using the immediate surrounding landscape. For distribution mapping purposes, technicians recorded the presence of all low density species heard and seen when traveling the 250 meters between point count locations. Low density species are those rare or difficult to detect species (e.g., woodpeckers, owls, raptors) which field technicians generally record in low numbers.

Field technicians considered all non-independent detections of birds, i.e., flocks or pairs of conspecific birds together in close proximity, as part of a 'cluster' rather than as separate independent observations. Technicians recorded clusters by recording the number of birds detected within the cluster along with a letter code to keep track of each distinct cluster.

At the start and end of each transect, technicians recorded the time, temperature, percent cloud cover, precipitation type, and wind speed using the Beaufort scale. At each point, technicians recorded vegetation data (within a 50 meter radius) and distance from a road (if within 100 meters). For vegetation data, technicians recorded the dominant habitat type and structural stage, and the relative abundance, percent coverage, and mean height of trees and shrubs by species, and percent groundcover. If there was a distinct subcanopy present, technicians

recorded the species of sub-canopy trees. Technicians recorded these data prior to beginning each point count.

For more detailed information about survey methods, refer to RMBO's *Field Protocol for Spatially Balanced Sampling of Landbird Populations* on our Avian Data Center website: http://www.rmbo.org/PUBLIC/MONITORING/protocols/Field_protocol_for_spacially_balanced_sampling_final_2009.pdf.

Data Analysis

Distance Analysis

Analysis of distance data is accomplished by fitting a detection function to the distribution of recorded distances. The distribution of distances can be a function of characteristics of the object (e.g., for birds, its size and color, movement, volume of song or call, and frequency of call), the surrounding environment (e.g., density of vegetation), and observer ability. Because detectability varies among species, we analyzed the data separately for each species.

RMBO used the analysis software Distance 6.0 (Thomas et al. 2010) to estimate detection probabilities using the point count data. We estimated densities of species for which field technicians obtained at least 60 independent detections (n) in BCR 17; each cluster of birds was treated as a single independent detection. We excluded birds flying over but not using the immediate surrounding landscape and birds detected between-point from analyses. We fit the following functions to the distribution of distances for each species: Half normal key function with cosine series expansion, Uniform function with cosine series expansion, Hazard rate key function with cosine series expansion, and Hazard rate key function with simple polynomial series expansion (Buckland et al. 2001). We used Akaike's Information Criterion (AIC) corrected for small sample size (AIC_c) and model selection theory to select the most parsimonious detection function for each species (Burnham and Anderson 2002).

RMBO used the SPSURVEY package (Kincaid 2008) in Program R (R Development Core Team 2008) to estimate density and its variance for each bird species.

Occupancy Analysis

Under the sampling framework, RMBO used a removal model to estimate a detection probability from the sequential 1-2 minute sampling intervals. The 16 grid points served as spatial replicates for estimating the proportion of points occupied within the sampling cells. We used a multi-scale occupancy model (Nichols et al. 2008) to estimate 1) the proportion of 1-km^2 sampling units occupied by a species (Psi); 2) the proportion of points occupied by a species given presence within the1-km^2 sampling units (Theta); and 3) the probability of detecting a species given presence (p). We constrained Theta and p by holding these parameters constant. Our application of the multi-scale model is analogous to a within-season robust design (Pollock 1982) where the points are the primary samples for estimating Theta and the sampling intervals at each point are the secondary samples for estimating p (Nichols et al. 2008). We considered both Theta and p to be nuisance variables that were important for generating unbiased estimates of Psi. Theta can be considered an availability parameter or the probability that a species was present and available for sampling at the points (Nichols et al. 2008). We estimated the detection probabilities (p) using a removal model with 3 intervals. Using the five 1-minute intervals recorded during sampling, we binned minutes 1 and 2, and minutes 3 and 4 to meet the assumption of a monotonic decline in the detection rates. After the target species was detected at a point, we set all subsequent sample intervals at that point to

missing data. We truncated the data, using only detections within 125 m of the sample points; this allows us to use bird detections over a consistent plot size and ensures that the points were independent (points are spread 250 m apart). Truncating allows us to estimate Theta (the proportion of points occupied within each sample unit).

RMBO used program SAS (PROC NLMIXED, SAS Institute 2008) to estimate the model parameters and account for unequal interval length. Gary White from Colorado State University wrote the initial SAS code for running the multi-scale occupancy models. We combined stratum-level estimates of Psi using a weighted mean indexed by stratum area. We estimated the sampling variance and standard error for the weighted mean of Psi using the delta method (Powell 2007) in program SAS (PROC IML, SAS Institute 2008).

Maximum Entropy Distribution Models

RMBO used Maximum Entropy Modeling to model breeding distributions for three priority species (Lark Bunting, Grasshopper Sparrow, and Chestnut-collared Longspur) in BCR 17 using data collected in 2009. We selected these species as sample representatives for BCR 17, because they are stewardship species of management concern in the Partners in Flight North American Landbird Conservation Plan (Rich et al. 2004) within the Prairie Avifaunal Biome. This type of modeling can be useful in predicting species distributions and potentially identifying variables that affect species distributions. We can use distribution models to observe how species are responding to certain variables.

We developed geographic distribution models using Maxent software (Phillips et al. 2004, 2006). The distribution of a species is represented as a probability distribution (π) over a set of sites in the study area. The modeled distribution assigns a non-negative value to every site and the values sum to one. The distribution is subject to a set of constraints derived from the occurrence data as a function of the environmental variables. The mean of each environmental variable approximates the empirical average over the presence sites (Phillips and Dudik 2008). We used ten environmental variables to model species distributions: elevation; landcover (from the USGS national land cover dataset); mean annual temperature; mean diurnal range; isothermality (a measure of the temperature changes throughout a year); temperature seasonality; mean temperature of the warmest quarter; annual precipitation; precipitation seasonality and precipitation of the driest quarter; landcover and elevation data were measured in meters and the climatic variables were measured in Celsius In order to create distribution models using environmental variables, each data set must occur throughout the study area; this limits us in using certain variables. We used landcover and elevation variables because we know these variables play an important role in species distributions. We included climatic variables because we thought that they would be important for predicting species distributions especially for grassland birds, because they are known to be nomadic and thought to dependent on precipitation and other climatic variables more so than birds that inhabit forests.

We incorporated presence and absence data into the model. We used the area under the receiver operating characteristic curve (AUC) to evaluate how well the model predicted species distributions. The AUC is the probability that a randomly chosen presence site will be ranked above a randomly chosen absence site and because the AUC is a portion of the area of the unit square its value will always be between 0 and 1.0. The models were partitioned in 2 sets for Lark Bunting and Grasshopper Sparrow, one for training the model and one for testing the model. A nonparametric bootstrap on the AUC value was carried out on the test model and 95% confidence intervals were obtained from the bootstrap test. Low sample size for Chestnut-collared Longspur restricted us to a training model for this species. We bootstrapped the training model AUC instead of the test model for this species.

RESULTS

BCR 17

Field technicians surveyed 226 of 236 (96%) assigned transects throughout BCR 17 in 2009 (Table 1). We summarized reasons why transects were not surveyed in Table 2. Technicians conducted 2,675 point counts within these 226 transects between 16 May and 15 July 2009. Technicians detected 28,821 birds of 184 species throughout BCR 17 (Appendices B-F).

RMBO estimated BCR-level density and population size for 55 bird species, 14 of which are priority species (Table 3). The data yielded robust density estimates (CV < 50%) for 46 species at the BCR level. At the stratum level, the data yielded robust density estimates (CV < 50%) for 52 of these species in at least one stratum.

Technicians recorded 61 priority species in BCR 17 (Appendix A). We estimated the proportion of transects occupied (Psi) for 11 priority species at the BCR level in addition to the 13 priority species for which we estimated density (Table 5). We estimated the proportion of transects occupied (Psi) for 14 priority species in at least one stratum in addition to the priority species for which we estimated density.

Table 1. Planned and completed surveys within the Badlands and Prairies Bird Conservation Region (BCR 17), by stratum, 2009.

State	Stratum	Abbreviated stratum name[1]	Planned	Completed	% Surveyed
MT	All Other - Brown Glaciated & Northern Rolling Plains	All Other - Plains	10	10	100
MT	All Other - Central Rockies & Northern Rock Foothills	All Other - Rockies	2	2	100
MT	All Other - Shale (Pierre & Soft)	All Other - Shale	2	2	100
MT	BLM - Brown Glaciated Plains	BLM - Glaciated Plains	10	10	100
MT	BLM - Central Rockies & Northern Rock Foothills	BLM - Rockies	2	2	100
MT	BLM - Northern Rolling Plains	BLM - Northern Plains	13	13	100
MT	BLM - Shale (Pierre and Soft)	BLM - Shale	10	10	100
MT	Custer National Forest	Custer NF	10	10	100
MT	Lewis and Clark National Forest	Lewis and Clark NF	10	10	100
MT	Rivers	Rivers	10	10	100
MT	Tribal Lands	Tribal	2	0	0
MT	US Fish and Wildlife Service Lands	USFWS	2	2	100
		Subtotal	**83**	**81**	**98**
ND	All Other Lands	All Other	2	2	100
ND	Bureau of Land Management	BLM	5	5	100
ND	Cedar River National Grassland	Cedar River NG	5	4	80
ND	Little Missouri National Grassland	Little Missouri NG	15	15	100
ND	National Park Service	NPS	2	2	100
		Subtotal	**29**	**28**	**97**
NE	All Other Lands	All Other	2	2	100
NE	Oglala National Grassland	Oglala NG	4	4	100
		Subtotal	**6**	**6**	**100**
SD	All Other Lands	All Other	2	2	100
SD	Black Hills National Forest	Black Hills NF	50	47	94
SD	Buffalo Gap National Grassland	Buffalo Gap NG	4	4	100
SD	Bureau of Land Management	BLM	10	8	80
SD	Custer National Forest	Custer NF	5	4	80
SD	Fort Pierre National Grassland	Fort Pierre NG	4	4	100
SD	Grand River National Grassland	Grand River NG	5	5	100
SD	National Park Service	NPS	2	2	100
		Subtotal	**82**	**76**	**93**
WY	All Other Lands	All Other	10	8	80
WY	Black Hills National Forest	Black Hills NF	10	10	100

State	Stratum	Abbreviated stratum name[1]	Planned	Completed	% Surveyed
WY	BLM - Buffalo	BLM - Buffalo	2	2	100
WY	BLM - Casper	BLM - Casper	2	2	100
WY	BLM - Newcastle	BLM - Newcastle	2	2	100
WY	Thunder Basin National Grassland	Thunder Basin NG	10	11*	110
		Subtotal	**36**	**35**	**97**
		Grand Total	**236**	**226**	**96**

[1] In the remainder of the report, we will refer to strata using the abbreviated stratum names in this column.
*Note – WYNDD completed one extra transect in Thunder Basin NG.

Table 2. Reasons planned surveys were not completed in the Badlands and Prairies Bird Conservation Region (BCR 17), 2009.

Reason transect was not surveyed	MT	ND	NE	SD	WY
Inaccessible due to terrain	--	--	--	2	--
Miscommunication	--	--	--	2	1
Ran out of time	--	1	--	2	--
Unable to contact landowner	2	--	--	--	1

Table 3. Estimated densities per km^2 (D), population sizes (N), lower and upper confidence limits on N (LCL and UCL), percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding bird species in the Badlands and Prairies Bird Conservation Region (BCR 17), 2009. S indicates the number of transects surveyed.

	Bird Conservation Region 17 (S = 226)					
Species	D[1]	N	LCL(N)	UCL(N)	%CV	n[2]
Canada Goose	0.14	51,478	19,475	136,074	65	75
Ring-necked Pheasant	1.27	458,514	256,784	818,724	36	293
Killdeer	2.80	1,009,427	360,089	2,829,694	69	174
Upland Sandpiper[3]	4.43	1,596,451	661,960	3,850,165	58	272
Mourning Dove	4.74	1,710,272	1,147,983	2,547,974	25	918

	Bird Conservation Region 17 (S = 226)					
Species	**D[1]**	**N**	**LCL(N)**	**UCL(N)**	**%CV**	**n[2]**
Red-naped Sapsucker	0.14	50,724	33,415	77,000	26	65
Hairy Woodpecker	0.64	229,182	96,365	545,056	57	68
Northern Flicker	0.90	323,943	169,816	617,957	41	240
Western Wood-Pewee	0.51	182,755	109,664	304,562	32	230
Dusky Flycatcher	1.44	520,561	306,864	883,076	33	174
Western Kingbird	7.84	2,826,162	1,623,647	4,919,290	35	124
Eastern Kingbird	5.17	1,862,160	975,817	3,553,577	41	140
Plumbeous Vireo	0.18	66,596	43,421	102,139	26	90
Warbling Vireo	0.64	230,700	190,808	278,932	12	395
Black-billed Magpie[3]	0.31	113,365	58,408	220,033	42	67
American Crow	0.13	45,900	27,804	75,774	31	164
Horned Lark	27.49	9,911,515	7,156,542	13,727,040	20	1185
Barn Swallow	10.37	3,738,547	1,372,148	10,186,028	67	73
Black-capped Chickadee	1.82	657,553	373,676	1,157,088	35	306
Red-breasted Nuthatch	0.60	216,241	163,464	286,058	17	379
White-breasted Nuthatch	1.03	372,324	142,044	975,932	64	135
Rock Wren	1.64	591,726	343,526	1,019,254	34	195
House Wren	6.78	2,444,128	1,344,463	4,443,233	38	438
Ruby-crowned Kinglet	0.29	104,927	78,822	139,677	18	239
Mountain Bluebird[3]	2.76	993,729	625,641	1,578,376	29	212
Townsend's Solitaire	0.24	84,817	45,055	159,669	40	109
Swainson's Thrush	0.22	78,780	38,359	161,795	46	86
Hermit Thrush	0.12	43,357	16,972	110,759	62	80
American Robin	5.92	2,133,843	1,454,768	3,129,906	24	800
Yellow Warbler[3]	4.54	1,637,741	880,795	3,045,198	39	242
Yellow-rumped Warbler	3.90	1,404,315	802,598	2,457,146	35	652
American Redstart	0.37	133,567	82,421	216,450	30	103
Ovenbird[3]	0.59	211,137	162,635	274,104	16	347
Common Yellowthroat	0.46	165,288	73,976	369,310	52	69
Yellow-breasted Chat	0.33	120,463	67,698	214,355	36	90
Western Tanager	0.60	215,994	136,225	342,474	29	237
Spotted Towhee	3.00	1,082,088	618,952	1,891,770	35	438
Chipping Sparrow	7.87	2,837,272	1,946,142	4,136,447	23	780
Clay-colored Sparrow	1.84	664,978	278,320	1,588,801	57	88

	Bird Conservation Region 17 (S = 226)					
Species	**D[1]**	**N**	**LCL(N)**	**UCL(N)**	**%CV**	**n[2]**
Brewer's Sparrow[3]	8.93	3,221,062	1,939,852	5,348,470	32	440
Field Sparrow	0.98	353,995	206,355	607,265	34	181
Vesper Sparrow[3]	7.17	2,585,006	2,568,802	2,601,313	0	696
Lark Sparrow[3]	13.77	4,965,131	3,601,938	6,844,240	20	487
Lark Bunting[3]	15.80	5,697,194	3,831,598	8,471,144	24	2284
Grasshopper Sparrow[3]	62.49	22,529,388	12,688,671	40,002,086	36	994
Dark-eyed Junco[3]	2.35	846,027	522,200	1,370,665	30	544
Chestnut-collared Longspur[3]	34.00	12,258,387	7,295,944	20,596,108	32	303
Bobolink[3]	2.27	818,368	243,863	2,746,325	85	79
Red-winged Blackbird	9.21	3,318,786	2,594,737	4,244,878	15	487
Western Meadowlark[3]	41.01	14,785,770	13,005,808	16,809,336	8	4550
Brewer's Blackbird	1.52	549,283	333,725	904,072	31	168
Brown-headed Cowbird	47.61	17,165,961	10,264,822	28,706,801	32	1007
Red Crossbill	0.29	104,149	78,567	138,061	17	142
Pine Siskin	0.18	63,594	45,360	89,159	21	82
American Goldfinch	3.25	1,172,540	612,015	2,246,433	41	100

[1] D = (birds/km^2);
[2] n = number of independent detections used to estimate D and N;
[3] Priority species in Bird Conservation Region 17 (see Appendix A).

States

Montana
Field technicians surveyed 81 of 83 (98%) assigned transects throughout the Montana portion of BCR 17 in 2009 (Table 1). Technicians conducted 1,020 point counts within these 81 transects between 18 May and 15 July 2009. Technicians detected 10,902 birds of 158 species (Appendix B). Technicians did not survey two transects in the Tribal Lands stratum, because we did not obtain permission to access these lands.

RMBO estimated density and population sizes of 54 species within Montana-BCR 17, 14 of which are priority species (Table 4). The data yielded robust density estimates (CV < 50%) for 37 of these species. We estimated the proportion of transects occupied (Psi) for 11 priority species in Montana in addition to the 14 for which we estimated density (Table 5).

North Dakota
Field technicians surveyed 28 of 29 (97%) assigned transects throughout the North Dakota portion of BCR 17 in 2009 (Table 1). Technicians conducted 287 point counts within these 28 transects between 24 May and 25 June 2009. Technicians detected 3,530 birds of 84 species (Appendix C). Technicians did not survey one transect in the Cedar River NG stratum this year because we did not obtain permission to access the transect within the optimal survey time.

RMBO estimated density and population sizes of 41 species within North Dakota-BCR 17, 12 of which are priority species (Table 4). The data yielded robust density estimates (CV < 50%) for 17 of these species. We estimated the proportion of transects occupied (Psi) for 5 priority species in North Dakota in addition to the 12 for which we estimated density (Table 5).

Nebraska
Field technicians surveyed 6 of 6 (100%) assigned transects throughout the Nebraska portion of BCR 17 in 2009 (Table 1). Technicians conducted 84 point counts within these 6 transects between 16 May and 20 June 2009. Technicians detected 1,079 birds of 29 species (Appendix D).

RMBO estimated density and population sizes of 15 species within Nebraska-BCR 17, 5 of which are priority species (Table 4). The data yielded robust density estimates (CV < 50%) for three of these species. We estimated the proportion of transects occupied (Psi) for three priority species in Nebraska in addition to the five for which estimated density (Table 5).

South Dakota
Field technicians surveyed 76 of 82 (93%) assigned transects throughout the South Dakota portion of BCR 17 in 2009 (Table 1). Technicians conducted 906 point counts within these 76 transects between 16 May and 14 July 2009. Technicians detected 9,150 birds of 137 species (Appendix E).

Technicians did not survey six transects in this state. Technicians did not survey three transects in the Black Hills NF stratum; two transects were inaccessible and were not replaced before the end of the season, and technicians ran out of time at the end of the season to do the other transect. Technicians did not survey two transects in the BLM stratum, because we accidentally assigned the same two backup transect to two different technicians. Technicians did not complete one transect in Custer NF because they ran out of time at the end of the season.

RMBO estimated density and population sizes of 53 species within South Dakota-BCR 17, 13 of which are priority species (Table 4). The data yielded robust density estimates (CV < 50%) for 32 of these species. We estimated the proportion of transects occupied (Psi) for 3 priority species in South Dakota in addition to the 13 for which we estimated density (Table 5).

Wyoming

Field technicians surveyed 35 of 36 (97%) assigned transects throughout the Wyoming portion of BCR 17 in 2009 (Table 1). Technicians conducted 378 point counts within these 35 transects between 20 May and 9 July 2009. Technicians detected 4,160 birds of 95 species (Appendix F). Technicians did not survey two transects in the All Other Lands stratum in Wyoming. We did not obtain permission to access one of these transect within the optimal survey time. Technicians did not survey the other transect because we accidentally assigned the same backup transect to two different technicians. Technicians surveyed one extra transect in Thunder Basin National Grassland.

RMBO estimated density and population sizes of 47 species within WY-BCR 17, 11 of which are priority species (Table 4). The data yielded robust density estimates (CV < 50%) for 17 of these species. We estimated the proportion of transects occupied (Psi) for 7 priority species in Wyoming in addition to the 11 for which we estimated density (Table 5).

Table 4. Estimated densities per km^2 (D), population sizes (N), percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding bird species in the Badlands and Prairies Bird Conservation Region (BCR 17), by BCR and State, 2009. S indicates the number of transects surveyed.

	BCR 17 (S = 226)				Montana (S = 81)				North Dakota (S = 28)				Nebraska (S = 6)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
Canada Goose	0.14	51,478	33	75	0.10	12,609	43	44	0.00	76	87	6	--	--	--	0
Ring-necked Pheasant	1.27	458,514	18	293	0.70	93,085	27	143	4.37	241,175	55	83	--	--	--	0
Killdeer	2.80	1,009,427	21	174	1.75	232,716	28	79	0.14	7,518	52	19	2.31	11,204	100	5
Upland Sandpiper[3]	4.43	1,596,451	24	272	1.66	220,563	43	92	10.46	577,319	103	39	0.86	4,183	74	10
Mourning Dove	4.74	1,710,272	10	918	5.73	760,188	13	463	5.55	306,367	81	174	4.21	20,376	90	35
Red-naped Sapsucker	0.14	50,724	35	65	--	--	--	0	--	--	--	0	--	--	--	0
Hairy Woodpecker	0.64	229,182	20	68	0.12	16,175	39	8	0.09	4,926	92	1	--	--	--	0
Northern Flicker	0.90	323,943	18	240	0.95	126,596	24	100	0.04	2,222	52	8	--	--	--	0
Western Wood-Pewee	0.51	182,755	18	230	0.91	120,302	47	73	--	--	--	0	--	--	--	0
Dusky Flycatcher	1.44	520,561	19	174	1.17	155,629	57	22	--	--	--	0	--	--	--	0
Western Kingbird	7.84	2,826,162	21	124	1.92	254,251	43	44	5.56	306,823	94	16	1.65	7,973	90	4
Eastern Kingbird	5.17	1,862,160	25	140	6.65	882,659	41	80	11.90	656,429	93	37	1.56	7,555	100	1
Plumbeous Vireo	0.18	66,596	26	90	0.14	18,182	36	14	0.01	803	102	1	--	--	--	0
Warbling Vireo	0.64	230,700	16	395	0.09	11,871	59	12	0.05	2,912	82	5	--	--	--	0
Black-billed Magpie[3]	0.31	113,365	48	67	0.69	91,818	50	45	0.04	1,998	65	9	--	--	--	0
American Crow	0.13	45,900	25	164	0.21	27,745	50	48	0.17	9,540	37	31	--	--	--	0
Horned Lark	27.49	9,911,515	10	1,185	14.06	1,865,865	21	459	18.59	1,025,764	70	218	36.34	175,874	10	78
Barn Swallow	10.37	3,738,547	36	73	0.91	120,325	58	24	45.27	2,498,495	99	27	0.76	3,675	87	3
Black-capped Chickadee	1.82	657,553	12	306	1.55	205,103	34	77	0.09	4,914	82	4	--	--	--	0
Red-breasted Nuthatch	0.60	216,241	10	379	0.42	55,744	40	41	--	--	--	0	--	--	--	0
White-breasted Nuthatch	1.03	372,324	22	135	0.07	8,626	49	8	--	--	--	0	--	--	--	0
Rock Wren	1.64	591,726	35	195	3.65	484,784	41	109	0.28	15,358	83	17	0.95	4,581	86	4
House Wren	6.78	2,444,128	14	438	14.35	1,903,288	46	280	2.08	114,983	38	47	--	--	--	0
Ruby-crowned Kinglet	0.29	104,927	18	239	0.02	3,105	87	8	--	--	--	0	--	--	--	0
Mountain Bluebird[3]	2.76	993,729	19	212	3.19	422,796	48	61	0.96	52,742	45	18	--	--	--	0
Townsend's Solitaire	0.24	84,817	16	109	0.29	38,595	73	19	--	--	--	0	--	--	--	0
Swainson's Thrush	0.22	78,780	25	86	0.01	1,728	69	5	--	--	--	0	--	--	--	0
Hermit Thrush	0.12	43,357	21	80	0.33	43,357	62	80	--	--	--	0	--	--	--	0
American Robin	5.92	2,133,843	10	800	7.05	935,420	41	234	3.59	198,109	84	34	--	--	--	0
Yellow Warbler[3]	4.54	1,637,741	19	242	7.83	1,039,254	54	132	4.07	224,405	32	75	--	--	--	0
Yellow-rumped Warbler	3.90	1,404,315	16	652	2.75	364,491	45	161	--	--	--	0	--	--	--	0

	BCR 17 (S = 226)				Montana (S = 81)				North Dakota (S = 28)				Nebraska (S = 6)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
American Redstart	0.37	133,567	24	103	0.14	19,180	54	18	0.68	37,333	86	10	--	--	--	0
Ovenbird[3]	0.59	211,137	13	347	0.09	12,367	45	31	0.85	47,024	58	24	--	--	--	0
Common Yellowthroat	0.46	165,288	26	69	0.59	78,876	80	33	0.34	18,876	48	20	--	--	--	0
Yellow-breasted Chat	0.33	120,463	37	90	0.40	53,302	45	43	1.21	66,711	54	46	--	--	--	0
Western Tanager	0.60	215,994	14	237	0.45	60,071	62	36	--	--	--	0	--	--	--	0
Spotted Towhee	3.00	1,082,088	12	438	5.63	747,184	48	197	3.37	185,761	23	142	--	--	--	0
Chipping Sparrow	7.87	2,837,272	9	780	9.75	1,293,617	37	207	0.93	51,565	41	24	--	--	--	0
Clay-colored Sparrow	1.84	664,978	39	88	2.52	334,502	73	36	0.87	48,170	34	49	--	--	--	0
Brewer's Sparrow[3]	8.93	3,221,062	23	440	10.27	1,362,224	32	240	0.01	679	66	4	--	--	--	0
Field Sparrow	0.98	353,995	21	181	2.01	266,600	44	77	1.56	85,951	31	97	--	--	--	0
Vesper Sparrow[3]	7.17	2,585,006	2	696	15.93	2,113,317	3	425	0.78	42,835	24	78	--	--	--	0
Lark Sparrow[3]	13.77	4,965,131	9	487	26.27	3,484,724	20	337	0.73	40,192	26	20	0.39	1,909	50	2
Lark Bunting[3]	15.80	5,697,194	13	2,284	19.41	2,574,869	38	791	0.55	30,544	26	235	60.77	294,132	77	164
Grasshopper Sparrow[3]	62.49	22,529,388	12	994	35.75	4,742,183	35	218	97.20	5,363,968	82	141	146.60	709,535	18	152
Dark-eyed Junco[3]	2.35	846,027	10	544	1.46	194,044	25	143	--	--	--	0	--	--	--	0
Chestnut-collared Longspur[3]	34.00	12,258,387	17	303	0.87	114,766	69	10	9.86	543,954	99	42	--	--	--	0
Bobolink[3]	2.27	818,368	35	79	0.75	99,077	76	7	12.72	701,863	98	46	--	--	--	0
Red-winged Blackbird	9.21	3,318,786	12	487	5.95	789,277	40	194	28.17	1,554,483	10	141	1.77	8,581	74	13
Western Meadowlark[3]	41.01	14,785,770	5	4,550	48.53	6,438,748	13	1,955	32.89	1,814,965	7	622	87.49	423,456	9	429
Brewer's Blackbird	1.52	549,283	16	168	2.71	359,503	35	104	0.33	18,316	40	22	0.87	4,210	84	10
Brown-headed Cowbird	47.61	17,165,961	9	1,007	32.80	4,351,972	16	384	34.88	1,924,807	18	181	2.86	13,859	100	4
Red Crossbill	0.29	104,149	19	142	0.25	33,196	44	23	--	--	--	0	--	--	--	0
Pine Siskin	0.18	63,594	22	82	0.12	16,462	30	25	--	--	--	0	--	--	--	0
American Goldfinch	3.25	1,172,540	23	100	5.61	744,713	55	55	0.67	37,243	33	22	--	--	--	0

[1] D = (birds/km^2);
[2] n = number of independent detections used to estimate D and N;
[3] Priority species in Bird Conservation Region 17 (see Appendix A).

Table 4, continued. Estimated densities per km^2 (D), population sizes (N), percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding bird species in the Badlands and Prairies Bird Conservation Region (BCR 17), by BCR and state, 2009. S indicates the number of transects surveyed.

	BCR 17 (S = 226)				South Dakota (S = 76)				Wyoming (S = 35)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
Canada Goose	0.14	51,478	33	75	0.32	32,675	99	20	0.10	6,118	79	5
Ring-necked Pheasant	1.27	458,514	18	293	1.20	124,254	78	67	--	--	--	0
Killdeer	2.80	1,009,427	21	174	7.00	725,753	96	62	0.50	32,236	72	9
Upland Sandpiper[3]	4.43	1,596,451	24	272	7.66	794,386	87	130	--	--	--	1
Mourning Dove	4.74	1,710,272	10	918	4.82	499,687	65	195	1.93	123,655	35	51
Red-naped Sapsucker	0.14	50,724	35	65	0.41	42,072	28	53	0.13	8,652	63	12
Hairy Woodpecker	0.64	229,182	20	68	0.40	41,178	18	47	2.60	166,904	77	12
Northern Flicker	0.90	323,943	18	240	1.40	145,652	85	115	0.77	49,474	69	17
Western Wood-Pewee	0.51	182,755	18	230	0.44	45,674	20	132	0.26	16,778	56	25
Dusky Flycatcher	1.44	520,561	19	174	0.97	100,464	21	129	4.12	264,469	55	23
Western Kingbird	7.84	2,826,162	21	124	18.53	1,921,241	48	30	5.23	335,874	50	30
Eastern Kingbird	5.17	1,862,160	25	140	2.69	278,598	96	15	0.58	36,919	76	7
Plumbeous Vireo	0.18	66,596	26	90	0.39	40,319	39	63	0.11	7,291	52	12
Warbling Vireo	0.64	230,700	16	395	1.58	163,999	13	289	0.81	51,918	26	89
Black-billed Magpie[3]	0.31	113,365	48	67	0.00	507	70	4	0.30	19,042	74	9
American Crow	0.13	45,900	25	164	0.07	7,702	21	73	0.01	914	49	12
Horned Lark	27.49	9,911,515	10	1,185	39.42	4,086,353	28	225	42.98	2,757,659	51	205
Barn Swallow	10.37	3,738,547	36	73	10.62	1,100,742	36	16	0.24	15,309	101	3
Black-capped Chickadee	1.82	657,553	12	306	0.85	88,284	11	187	5.60	359,252	62	38
Red-breasted Nuthatch	0.60	216,241	10	379	0.99	102,894	11	266	0.90	57,602	47	72
White-breasted Nuthatch	1.03	372,324	22	135	0.68	70,462	17	112	4.57	293,236	81	15
Rock Wren	1.64	591,726	35	195	0.21	21,737	72	40	1.02	65,265	48	25
House Wren	6.78	2,444,128	14	438	0.56	58,122	25	89	5.73	367,735	81	22
Ruby-crowned Kinglet	0.29	104,927	18	239	0.91	93,838	19	213	0.12	7,983	33	18
Mountain Bluebird[3]	2.76	993,729	19	212	0.89	91,976	20	103	6.64	426,215	46	30
Townsend's Solitaire	0.24	84,817	16	109	0.22	22,816	20	83	0.36	23,406	77	7
Swainson's Thrush	0.22	78,780	25	86	0.34	35,713	32	71	0.64	41,340	83	10
Hermit Thrush	0.12	43,357	21	80	--	--	--	0	--	--	--	0
American Robin	5.92	2,133,843	10	800	1.59	165,055	14	384	13.02	835,259	33	148
Yellow Warbler[3]	4.54	1,637,741	19	242	2.88	298,809	95	25	1.17	75,273	87	10
Yellow-rumped Warbler	3.90	1,404,315	16	652	2.60	269,138	20	434	12.01	770,686	60	57

	BCR 17 (S = 226)				South Dakota (S = 76)				Wyoming (S = 35)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
American Redstart	0.37	133,567	24	103	0.19	19,690	68	19	0.89	57,364	29	56
Ovenbird[3]	0.59	211,137	13	347	0.72	75,015	18	147	1.20	76,730	17	145
Common Yellowthroat	0.46	165,288	26	69	0.04	3,928	37	11	0.99	63,610	91	5
Yellow-breasted Chat	0.33	120,463	37	90	0.00	450	95	1	--	--	--	0
Western Tanager	0.60	215,994	14	237	0.55	57,020	16	157	1.54	98,902	49	44
Spotted Towhee	3.00	1,082,088	12	438	1.25	130,073	82	71	0.30	19,069	65	28
Chipping Sparrow	7.87	2,837,272	9	780	3.81	394,695	10	425	17.10	1,097,395	41	124
Clay-colored Sparrow	1.84	664,978	39	88	2.72	282,306	102	3	--	--	--	0
Brewer's Sparrow[3]	8.93	3,221,062	23	440	--	--	--	0	28.96	1,858,159	50	196
Field Sparrow	0.98	353,995	21	181	0.01	1,443	88	7	--	--	--	0
Vesper Sparrow[3]	7.17	2,585,006	2	696	0.29	30,383	4	115	6.21	398,471	2	78
Lark Sparrow[3]	13.77	4,965,131	9	487	6.52	676,254	83	101	11.88	762,051	54	27
Lark Bunting[3]	15.80	5,697,194	13	2,284	2.83	293,814	25	254	39.02	2,503,835	39	840
Grasshopper Sparrow[3]	62.49	22,529,388	12	994	110.98	11,504,908	57	446	3.25	208,793	53	37
Dark-eyed Junco[3]	2.35	846,027	10	544	2.11	218,338	10	343	6.76	433,644	57	58
Chestnut-collared Longspur[3]	34.00	12,258,387	17	303	111.89	11,599,667	34	251	--	--	--	0
Bobolink[3]	2.27	818,368	35	79	0.17	17,429	62	26	--	--	--	0
Red-winged Blackbird	9.21	3,318,786	12	487	7.96	825,033	40	125	2.20	141,412	78	14
Western Meadowlark[3]	41.01	14,785,770	5	4,550	38.68	4,010,076	18	834	32.71	2,098,525	19	710
Brewer's Blackbird	1.52	549,283	16	168	0.10	10,747	65	8	2.44	156,507	73	24
Brown-headed Cowbird	47.61	17,165,961	9	1,007	96.79	10,033,758	54	348	13.12	841,564	48	90
Red Crossbill	0.29	104,149	19	142	0.58	59,787	16	100	0.17	11,166	41	19
Pine Siskin	0.18	63,594	22	82	0.36	37,728	29	46	0.15	9,405	58	11
American Goldfinch	3.25	1,172,540	23	100	2.40	248,725	96	18	2.21	141,860	54	5

[1] D = (birds/km^2);

[2] n = number of independent detections used to estimate D and N;

[3] Priority species in Bird Conservation Region 17 (see Appendix A).

Table 5. Estimated site occupancy (Psi; proportion of sample units occupied), percent coefficient of variation of Psi (%CV) and number of transects with detections (n Tran) of priority species in the Badlands and Prairies Bird Conservation Region (BCR 17), by BCR and state, 2009. S indicates the number of transects surveyed.

	BCR 17 (S = 226)			Montana (S = 81)			North Dakota (S = 28)			Nebraska (S = 6)			South Dakota (S = 76)			Wyoming (S = 35)		
Species	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**
Northern Harrier	--	--	9	--	--	2	0.000	--	0	0.070	96	1	0.038	80	5	0.017	105	1
Long-billed Curlew	0.019	57	7	0.021	61	4	0.020	104	1	0.000	--	0	0.028	87	2	0.000	--	0
Marbled Godwit	0.111	63	8	0.037	61	4	0.631	72	2	0.000	--	0	0.004	50	2	0.000	--	0
Red-headed Woodpecker	0.004	35	7	0.007	48	3	0.000	--	0	0.000	--	0	0.005	48	4	0.000	--	0
Black-backed Woodpecker	0.005	46	8	0.003	99	1	0.000	--	0	0.000	--	0	0.012	49	6	0.003	99	1
Loggerhead Shrike	--	--	10	--	--	6	0.000	--	0	0.000	--	0	--	--	1	0.075	62	3
Clark's Nutcracker	0.003	29	9	0.004	32	5	0.000	--	0	0.000	--	0	0.005	48	4	0.000	--	0
Northern Rough-winged Swallow	0.071	50	12	0.168	57	5	0.024	67	2	0.037	87	1	0.005	57	3	0.017	82	1
Brown Creeper	0.073	63	15	0.088	92	4	0.000	--	0	0.000	--	0	0.015	37	8	0.204	93	3
Veery	0.128	70	8	0.001	63	2	0.000	--	0	0.000	--	0	0.443	70	6	0.000	--	0
Sprague's Pipit	0.061	49	7	0.166	49	7	0.000	--	0	0.000	--	0	0.000	--	0	0.000	--	0
Baird's Sparrow	--	--	9	--	--	4	0.002	68	2	0.064	51	2	0.002	94	1	0.000	--	0
Song Sparrow	0.007	55	8	0.004	78	2	0.017	102	1	0.000	--	0	0.008	58	4	0.003	100	1
McCown's Longspur	0.022	88	3	0.003	63	2	0.000	--	0	0.000	--	0	0.000	--	0	0.115	94	1

BLM Lands

Field technicians surveyed 54 of 56 (96%) assigned transects on Bureau of Land Management lands throughout BCR 17 in 2009 (Table 6). Technicians conducted 688 point counts within these 54 transects between 17 May and 6 July 2009. RMBO and its partners detected 7,109 birds of 112 species on BLM lands.

RMBO estimated BLM-wide density and population sizes of 45 species, 13 of which are priority species (Table 7). The data yielded robust density estimates (CV < 50%) for 30 of these species. We estimated the proportion of transects occupied (Psi) for 7 priority species on BLM lands in addition to the 13 priority species for which we estimated density (Table 8).

Table 6. Bureau of Land Management planned and completed surveys within the Badlands and Prairies Bird Conservation Region (BCR 17), by stratum, 2009.

State	Strata	Targeted	Sampled
MT	BLM - Brown Glaciated Plains	10	10
MT	BLM - Central Rockies & Northern Rock Foothills	2	2
MT	BLM - Northern Rolling Plains	13	13
MT	BLM - Shale (Pierre and Soft)	10	10
ND	Bureau of Land Management	5	5
SD	Bureau of Land Management	10	8
WY	BLM - Buffalo	2	2
WY	BLM - Casper	2	2
WY	BLM - Newcastle	2	2

Table 7. Estimated densities per km^2 (D), population sizes (N), percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding bird species in the Badlands and Prairies Bird Conservation Region (BCR 17), by BCR and Bureau of Land Management, 2009. S indicates the number of transects surveyed.

	BCR 17 (S = 226)				Bureau of Land Management (S = 54)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**
Canada Goose	0.14	51,478	65	75	0.11	3,562	64	29
Ring-necked Pheasant	1.27	458,514	36	293	0.11	3,521	52	28
Killdeer	2.80	1,009,427	69	174	3.22	106,525	28	90
Upland Sandpiper[3]	4.43	1,596,451	58	272	1.72	56,852	48	102
Mourning Dove	4.74	1,710,272	25	918	5.16	170,754	21	257
Northern Flicker	0.90	323,943	41	240	0.79	26,204	34	16
Western Wood-Pewee	0.51	182,755	32	230	0.66	21,738	65	7
Dusky Flycatcher	1.44	520,561	33	174	2.96	98,032	81	14
Western Kingbird	7.84	2,826,162	35	124	1.81	59,760	42	21
Eastern Kingbird	5.17	1,862,160	41	140	2.37	78,541	34	34
Black-billed Magpie[3]	0.31	113,365	42	67	0.21	6,970	41	13
American Crow	0.13	45,900	31	164	0.23	7,692	33	32
Horned Lark	27.49	9,911,515	20	1,185	23.56	779,961	19	624
Barn Swallow	10.37	3,738,547	67	73	1.52	50,161	42	23
Black-capped Chickadee	1.82	657,553	35	306	0.79	26,098	61	7
Red-breasted Nuthatch	0.60	216,241	17	379	0.42	13,915	69	5
Rock Wren	1.64	591,726	34	195	1.35	44,656	34	24
House Wren	6.78	2,444,128	38	438	4.84	160,292	43	29
Mountain Bluebird[3]	2.76	993,729	29	212	5.21	172,477	31	35
Townsend's Solitaire	0.24	84,817	40	109	0.01	464	87	1
Hermit Thrush	0.12	43,357	62	80	0.03	1,018	101	2
American Robin	5.92	2,133,843	24	800	1.95	64,436	39	28
Yellow Warbler[3]	4.54	1,637,741	39	242	2.18	71,999	68	12
Yellow-rumped Warbler	3.90	1,404,315	35	652	2.03	67,298	42	11
Common Yellowthroat	0.46	165,288	52	69	0.07	2,248	91	5
Yellow-breasted Chat	0.33	120,463	36	90	0.08	2,591	94	4
Western Tanager	0.60	215,994	29	237	0.18	5,911	63	4
Spotted Towhee	3.00	1,082,088	35	438	1.32	43,630	46	59
Chipping Sparrow	7.87	2,837,272	23	780	16.34	540,822	38	89
Clay-colored Sparrow	1.84	664,978	57	88	0.72	23,938	36	42
Brewer's Sparrow[3]	8.93	3,221,062	32	440	14.38	475,953	27	237

	BCR 17 (S = 226)				Bureau of Land Management (S = 54)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**
Field Sparrow	0.98	353,995	34	181	2.06	68,090	42	50
Vesper Sparrow[3]	7.17	2,585,006	0	696	7.05	233,500	25	222
Lark Sparrow[3]	13.77	4,965,131	20	487	23.62	781,828	15	175
Lark Bunting[3]	15.80	5,697,194	24	2,284	23.90	791,275	16	936
Grasshopper Sparrow[3]	62.49	22,529,388	36	994	14.11	467,009	18	230
Dark-eyed Junco[3]	2.35	846,027	30	544	1.19	39,546	51	7
Chestnut-collared Longspur[3]	34.00	12,258,387	32	303	5.08	168,023	31	115
Bobolink[3]	2.27	818,368	85	79	0.74	24,372	62	22
Red-winged Blackbird	9.21	3,318,786	15	487	2.82	93,282	37	117
Western Meadowlark[3]	41.01	14,785,770	8	4,550	39.87	1,319,632	8	1633
Brewer's Blackbird	1.52	549,283	31	168	5.36	177,583	27	91
Brown-headed Cowbird	47.61	17,165,961	32	1,007	24.05	795,943	16	259
Red Crossbill	0.29	104,149	17	142	0.41	13,417	84	2
American Goldfinch	3.25	1,172,540	41	100	2.03	67,114	46	9

[1] D = (birds/km^2);
[2] n = number of independent detections used to estimate D and N;
[3] Priority species in Bird Conservation Region 17 (see Appendix A).

Table 8. Estimated site occupancy (Psi; proportion of sample units occupied), percent coefficient of variation of Psi (%CV) and number of transects with detections (n Tran) of priority species in the Badlands and Prairies Bird Conservation Region (BCR17), by BCR and Bureau of Land Management, 2009. S indicates the number of transects surveyed.

	BCR 17 (S=226)			BLM (S = 54)		
Species	Psi	%CV	n Tran	Psi	%CV	n Tran
Long-billed Curlew	0.019	57	7	0.035	63	3
Marbled Godwit	0.111	63	8	0.007	95	2
Loggerhead Shrike	--	--	10	0.429	54	5
Northern Rough-winged Swallow	0.071	50	12	0.105	61	4
Sprague's Pipit	0.061	49	7	0.153	49	4
Song Sparrow	0.007	55	8	0.011	100	1
McCown's Longspur	0.022	88	3	0.013	63	2

Lands Administered by the United States Forest Service

Bird Conservation Region 17 contains several National Forest and National Grassland administrative units managed by both the Northern Region (Region 1) as well as the Rocky Mountain Region (Region 2) of the US Forest Service as identified in table 8.

Table 9. Planned and completed surveys on National Forest and National Grassland administrative units within the Badlands and Prairies Bird Conservation Region 17 (BCR17), 2009.

Forest Service Region	Administrative Unit	Strata	Targeted	Sampled
Region 1	Custer National Forest	Custer NF (MT)	10	10
Region 1	Custer National Forest	Custer NF (SD)	5	4
Region 1	Dakota Prairie National Grasslands	Cedar River NG (ND)	5	4
Region 1	Dakota Prairie National Grasslands	Little Missouri NG (ND)	15	15
Region 1	Dakota Prairie National Grasslands	Grand River NG (SD)	5	5
Region 1	Lewis and Clark National Forest	Lewis and Clark NF (MT)	10	10
Region 2	Black Hills National Forest	Black Hills NF (WY)	10	10
Region 2	Black Hills National Forest	Black Hills NF (SD)	50	47
Region 2	Nebraska National Forests & Grasslands	Buffalo Gap NG (SD)	4	4
Region 2	Nebraska National Forests & Grasslands	Fort Pierre NG (SD)	4	4
Region 2	Nebraska National Forests & Grasslands	Oglala NG (NE)	4	4
Region 2	Nebraska National Forests & Grasslands	Neb NF (NE) - BCR 18 portion*	4	4
Region 2	Nebraska National Forests & Grasslands	Oglala NG (NE) - BCR 18 portion*	2	2
Region 2	Thunder Basin National Grassland	Thunder Basin NG (WY)	10	11

*Note: These management units are immediately adjacent to the BCR 17/18 boundary. The Nebraska National Forest stratum is the only National Forest stratum in BCR 18.

Table 10. US Forest Service Rocky Mountain Region (Region 2) priority species detected on US Forest Service lands in the Badlands and Prairies Bird Conservation Region (BCR 17).

Common Name	Status*	Density Estimated	Occupancy Estimated
Ruffed Grouse	MIS		
Greater Prairie-Chicken	S		
Northern Harrier	S		Y
Northern Goshawk	S		
Long-billed Curlew	S		Y
Burrowing Owl	S		
Short-eared Owl	S		
Lewis's Woodpecker	S		
American Three-toed Woodpecker	S		
Black-backed Woodpecker	MIS, S		Y
Loggerhead Shrike	S		Y
Brown Creeper	MIS		Y
Golden-crowned Kinglet	MIS		
Brewer's Sparrow	S		
Grasshopper Sparrow	S	Y	
Song Sparrow	MIS		Y
Chestnut-collared Longspur	S		

*MIS = management indicator species; S = sensitive species.

Table 11. US Forest Service Northern Region (Region 1) priority species detected on US Forest Service lands in the Badlands and Prairies Bird Conservation Region (BCR 17).

Common Name	Status*	Density Estimated	Occupancy Estimated
Sharp-tailed Grouse	MIS		
Golden Eagle	MIS		
Long-billed Curlew	S		Y
Black-backed Woodpecker	S		Y
Loggerhead Shrike	S		Y
Yellow Warbler	MIS	Y	
Ovenbird	MIS	Y	
Brewer's Sparrow	MIS	Y	
Lark Sparrow	MIS	Y	
Baird's Sparrow	S		Y

*MIS = management indicator species; S = sensitive species.

United States Forest Service: National Forests

Field technicians surveyed 81 of 85 (95%) assigned transects on National Forests throughout BCR 17 in 2009 (Table 9). Technicians conducted 950 point counts within these 81 transects between 23 May and 15 July 2009. Technicians detected 8,855 birds of 128 species on National Forests.

RMBO estimated National Forest-wide density and population sizes of 53 species; 5 of these are USFS priority species classified as either sensitive species or management indicator species (MIS) in US Forest Service Regions 1 or 2 (Tables 12,14, and 16). The data yielded robust density estimates (CV < 50%) for 40 of these species. We also estimated species densities and population sizes for each individual National Forest within BCR 17 (Black Hills, Custer, and Lewis and Clark). RMBO estimated the proportion of transects occupied (Psi) by seven priority species National Forest-wide; three of these are either sensitive species or MIS (Tables 13, 15, and 17).

Black Hills National Forest

Within this sampling design the Black Hills National Forest is split into two strata because the National Forest occurs in both the states of South Dakota and Wyoming. However this state level stratification distinction is made for the benefit of the state partners to allow for the summation of the data for individual states. In this section of this report these two strata are combined to the administrative area of the Black Hills National Forest lands within BCR 17.

Field technicians surveyed 57 of 60 (95%) assigned transects in Black Hills National Forest in 2009 (figure 3). Technicians conducted 670 point counts within these 57 transects between 23 May and 14 July 2009. Technicians detected 6,171 birds of 96 species in Black Hills National Forest.

RMBO estimated density and population sizes in Black Hills National Forest for 44 species; 1 of these is a sensitive species and MIS in US Forest Service Region 2 (Table 12). The data yielded robust density estimates (CV < 50%) for 36 species. RMBO estimated the proportion of transects occupied (Psi) by seven priority species in Black Hills National Forest; three of these are either sensitive species or MIS in Region 2 (Table 13).

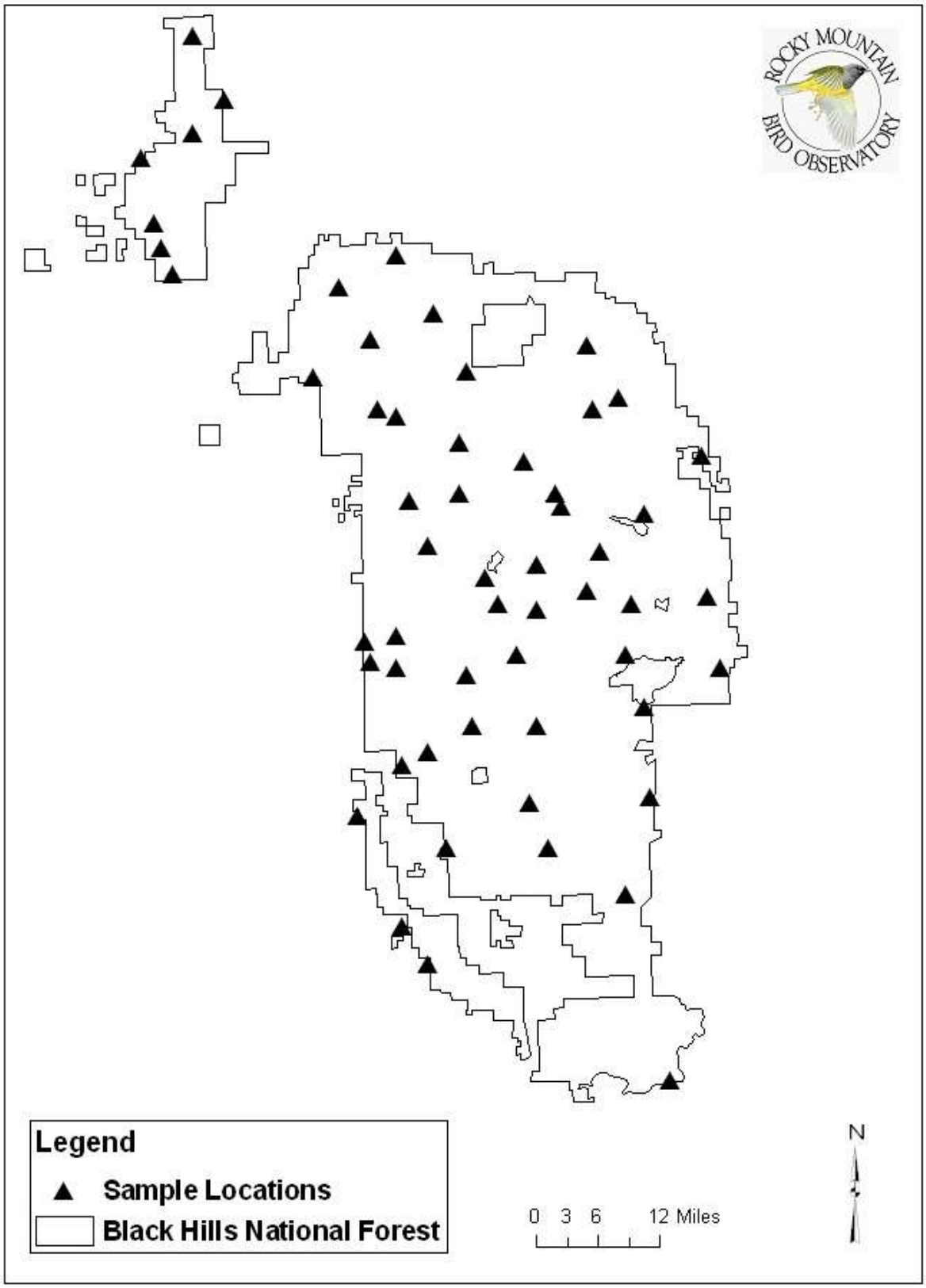

Figure 3. Sample locations in Black Hills National Forest within the Badlands and Prairies Bird Conservation Region (BCR 17), 2009.

Table 12. Estimated densities (D), population sizes (N), percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding bird species in Black Hills National Forest within the Badlands and Prairies Bird Conservation Region (BCR 17), 2009. S indicates the number of transects surveyed.

	BCR 17 (S = 226)				National Forests (S = 81)				Black Hills NF (S = 57)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
Canada Goose	0.14	51,478	65	75	0.01	56	88	2	0.01	56	88	2
Ring-necked Pheasant	1.27	458,514	36	293	0.07	775	58	10	--	--	--	0
Killdeer	2.80	1,009,427	69	174	0.03	349	87	1	0.05	349	87	1
Upland Sandpiper	4.43	1,596,451	58	272	0.07	711	92	3	--	--	--	1
Mourning Dove	4.74	1,710,272	25	918	2.86	30,149	13	163	0.98	6,445	24	51
Red-naped Sapsucker	0.14	50,724	26	65	4.82	50,724	26	65	7.72	50,724	26	65
Hairy Woodpecker	0.64	229,182	57	68	6.02	63,403	16	64	7.84	51,510	17	57
Northern Flicker	0.90	323,943	41	240	3.77	39,684	17	174	3.48	22,863	23	120
Western Wood-Pewee	0.51	182,755	32	230	7.81	82,259	16	208	7.90	51,853	18	149
Dusky Flycatcher	1.44	520,561	33	174	12.02	126,523	18	155	16.99	111,581	19	144
Western Kingbird	7.84	2,826,162	35	124	1.11	11,693	46	15	0.07	443	88	1
Eastern Kingbird	5.17	1,862,160	41	140	0.54	5,689	37	11	0.28	1,816	54	4
Plumbeous Vireo	0.18	66,596	26	90	5.73	60,299	29	87	7.25	47,610	34	75
Warbling Vireo	0.64	230,700	12	395	20.91	220,194	12	386	32.88	215,917	12	378
Black-billed Magpie	0.31	113,365	42	67	0.03	305	56	4	0.03	182	70	3
American Crow	0.13	45,900	31	164	0.67	7,082	21	85	0.78	5,148	26	67
Horned Lark	27.49	9,911,515	20	1,185	0.28	2,965	65	4	--	--	--	0
Barn Swallow	10.37	3,738,547	67	73	0.12	1,256	85	2	0.19	1,256	85	2
Black-capped Chickadee	1.82	657,553	35	306	13.40	141,099	10	271	14.87	97,684	11	209
Red-breasted Nuthatch	0.60	216,241	17	379	14.12	148,670	9	371	19.61	128,796	10	332
White-breasted Nuthatch	1.03	372,324	64	135	8.05	84,780	15	129	11.27	74,019	16	118
Rock Wren	1.64	591,726	34	195	2.01	21,207	23	81	0.80	5,231	38	24
House Wren	6.78	2,444,128	38	438	22.44	236,286	21	244	6.67	43,804	31	73
Ruby-crowned Kinglet	0.29	104,927	18	239	9.89	104,122	18	238	15.38	101,017	18	230
Mountain Bluebird	2.76	993,729	29	212	15.38	161,938	16	149	13.96	91,706	20	108
Townsend's Solitaire	0.24	84,817	40	109	2.89	30,441	16	105	3.74	24,533	19	89
Swainson's Thrush	0.22	78,780	46	86	3.93	41,388	28	85	6.04	39,661	29	80
Hermit Thrush	0.12	43,357	62	80	1.06	11,203	19	75	--	--	--	0
American Robin	5.92	2,133,843	24	800	27.98	294,575	10	639	32.44	213,030	12	489
Yellow Warbler	4.54	1,637,741	39	242	6.85	72,101	26	66	2.05	13,457	32	14
Yellow-rumped Warbler	3.90	1,404,315	35	652	36.08	379,838	15	610	43.22	283,830	19	455

	BCR 17 (S = 226)				National Forests (S = 81)				Black Hills NF (S = 57)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
American Redstart	0.37	133,567	30	103	9.14	96,234	25	93	11.73	77,054	28	75
Ovenbird	0.59	211,137	16	347	15.59	164,113	12	322	22.64	148,705	13	287
Common Yellowthroat	0.46	165,288	52	69	0.57	5,999	35	21	0.31	2,009	40	7
Yellow-breasted Chat	0.33	120,463	36	90	0.77	8,100	72	11	--	--	--	0
Western Tanager	0.60	215,994	29	237	7.73	81,349	13	225	10.53	69,181	14	193
Spotted Towhee	3.00	1,082,088	35	438	8.71	91,707	20	172	2.91	19,089	26	54
Chipping Sparrow	7.87	2,837,272	23	780	59.08	622,104	11	617	65.13	427,733	10	477
Clay-colored Sparrow	1.84	664,978	57	88	0.15	1,538	67	2	--	--	--	0
Brewer's Sparrow	8.93	3,221,062	32	440	0.70	7,348	77	9	--	--	--	0
Field Sparrow	0.98	353,995	34	181	0.16	1,668	77	8	--	--	--	0
Vesper Sparrow	7.17	2,585,006	0	696	3.52	37,066	27	131	4.45	29,201	34	112
Lark Sparrow	13.77	4,965,131	20	487	16.30	171,664	15	137	6.23	40,886	28	46
Lark Bunting	15.80	5,697,194	24	2,284	0.85	8,969	74	24	--	--	--	0
Grasshopper Sparrow[3]	62.49	22,529,388	36	994	1.92	20,178	37	24	0.36	2,393	59	5
Dark-eyed Junco	2.35	846,027	30	544	31.22	328,740	8	526	38.28	251,382	9	393
Red-winged Blackbird	9.21	3,318,786	15	487	0.40	4,245	37	15	0.52	3,428	41	12
Western Meadowlark	41.01	14,785,770	8	4,550	4.96	52,258	31	197	0.66	4,365	39	42
Brewer's Blackbird	1.52	549,283	31	168	0.46	4,798	52	7	0.20	1,295	88	3
Brown-headed Cowbird	47.61	17,165,961	32	1,007	28.00	294,794	12	283	19.54	128,318	13	160
Red Crossbill	0.29	104,149	17	142	8.62	90,732	15	140	10.80	70,953	15	119
Pine Siskin	0.18	63,594	21	82	6.04	63,594	21	80	7.03	46,170	26	56
American Goldfinch	3.25	1,172,540	41	100	5.18	54,570	35	44	1.65	10,821	40	17

[1] D = (birds/km2);
[2] n = number of independent detections used to estimate D and N;
[3] USFS priority species (sensitive species or management indicator species) in the Rocky Mountain Region (Region 2).

Table 13. Estimated site occupancy (Psi; proportion of sample units occupied), percent coefficient of variation of Psi (%CV) and number of transects with detections (n Tran) of priority species in Black Hills National Forest within the Badlands and Prairies Bird Conservation Region (BCR 17), 2009. S indicates the number of transects surveyed.

	BCR 17 (S = 226)			National Forests (S = 81)			Black Hills NF (S = 57)		
Species*	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**
Long-billed Curlew	0.019	57	7	0.000	--	0	0.000	--	0
Marbled Godwit	0.111	63	8	0.000	--	0	0.000	--	0
Red-headed Woodpecker	0.004	35	7	0.132	35	7	0.079	48	4
Black-backed Woodpecker	0.005	46	8	0.173	46	8	0.211	46	7
Clark's Nutcracker	0.003	29	9	0.095	29	9	0.079	48	4
Northern Rough-winged Swallow	0.071	50	12	0.030	67	2	0.025	100	1
Brown Creeper	0.073	63	15	0.222	31	13	0.287	34	10
Veery	0.128	70	8	0.052	43	5	0.056	56	3
Sprague's Pipit	0.061	49	7	0.000	--	0	0.000	--	0
Song Sparrow	0.007	55	8	0.118	52	6	0.163	54	5
McCown's Longspur	0.022	88	3	0.000	--	0	0.000	--	0

*Bolded species are USFS priority species (sensitive species or management indicator species) in the US Forest Service Rocky Mountain Region (Region 2).

Custer National Forest

Within this sampling design the Custer National Forest is split into two strata because the National Forest occurs in both the states of Montana and South Dakota. However this state level stratification distinction is made for the benefit of the state partners to allow for the summation of the data for individual states. In this section of this report these two strata are combined to the administrative area of the Custer National Forest lands within BCR 17. Note that a portion of Custer National Forest falls outside of the BCR 17 boundary; we did not collect data from that portion in 2009.

Field technicians surveyed 14 of 15 (93%) assigned transects in Custer National Forest in 2009 (figure 4). Technicians conducted 174 point counts within these 14 transects between 25 May and 7 July 2009. Technicians detected 1,893 birds of 83 species in Custer National Forest.

RMBO estimated density and population sizes in Custer National Forest for 46 species; 3 of these are sensitive species or MIS in US Forest Service Region 1 (Table 14). The data yielded robust density estimates (CV < 50%) for 30 species. RMBO estimated the proportion of transects occupied (Psi) by three priority species in Custer National Forest, one of these is a sensitive species in Region 1 (Table 15).

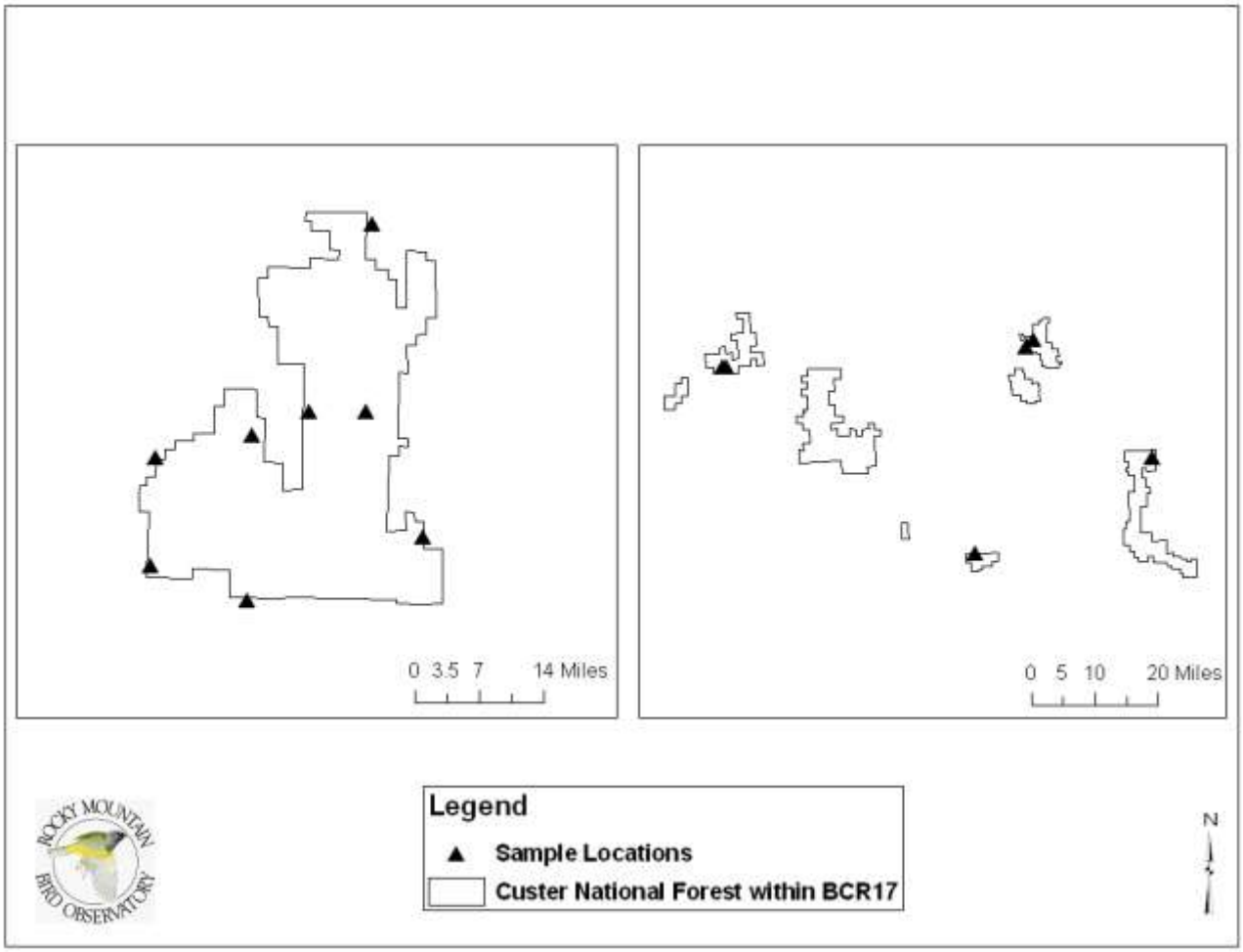

Figure 4. Sample locations in Custer National Forest within the Badlands and Prairies Bird Conservation Region (BCR 17), 2009.

Table 14. Estimated densities per km^2 (D), population sizes (N), percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding bird species in Custer National Forest within the Badlands and Prairies Bird Conservation Region (BCR 17), 2009. S indicates the number of transects surveyed.

	BCR 17 (S = 226)				National Forests (S = 81)				Custer NF (S = 14)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
Canada Goose	0.14	51,478	65	75	0.01	56	88	2	--	--	--	0
Ring-necked Pheasant	1.27	458,514	36	293	0.07	775	58	10	0.25	775	58	10
Killdeer	2.80	1,009,427	69	174	0.03	349	87	1	--	--	--	0
Upland Sandpiper	4.43	1,596,451	58	272	0.07	711	92	3	0.23	711	92	2
Mourning Dove	4.74	1,710,272	25	918	2.86	30,149	13	163	7.49	23,176	16	107
Red-naped Sapsucker	0.14	50,724	26	65	4.82	50,724	26	65	--	--	--	0
Hairy Woodpecker	0.64	229,182	57	68	6.02	63,403	16	64	3.55	10,988	47	5
Northern Flicker	0.90	323,943	41	240	3.77	39,684	17	174	4.56	14,107	27	39
Western Wood-Pewee	0.51	182,755	32	230	7.81	82,259	16	208	9.29	28,768	33	46
Dusky Flycatcher	1.44	520,561	33	174	12.02	126,523	18	155	4.59	14,220	43	10
Western Kingbird	7.84	2,826,162	35	124	1.11	11,693	46	15	3.63	11,250	48	14
Eastern Kingbird	5.17	1,862,160	41	140	0.54	5,689	37	11	1.25	3,873	48	7
Plumbeous Vireo	0.18	66,596	26	90	5.73	60,299	29	87	4.10	12,688	44	12
Warbling Vireo	0.64	230,700	12	395	20.91	220,194	12	386	--	--	--	0
Black-billed Magpie	0.31	113,365	42	67	0.03	305	56	4	0.04	123	93	1
American Crow	0.13	45,900	31	164	0.67	7,082	21	85	0.58	1,801	39	16
Horned Lark	27.49	9,911,515	20	1,185	0.28	2,965	65	4	0.96	2,965	65	4
Barn Swallow	10.37	3,738,547	67	73	0.12	1,256	85	2	--	--	--	0
Black-capped Chickadee	1.82	657,553	35	306	13.40	141,099	10	271	11.83	36,613	24	44
Red-breasted Nuthatch	0.60	216,241	17	379	14.12	148,670	9	371	5.04	15,607	26	23
White-breasted Nuthatch	1.03	372,324	64	135	8.05	84,780	15	129	3.30	10,208	45	10
Rock Wren	1.64	591,726	34	195	2.01	21,207	23	81	4.32	13,358	33	40
House Wren	6.78	2,444,128	38	438	22.44	236,286	21	244	61.04	188,915	25	164
Ruby-crowned Kinglet	0.29	104,927	18	239	9.89	104,122	18	238	--	--	--	0
Mountain Bluebird	2.76	993,729	29	212	15.38	161,938	16	149	21.56	66,716	28	36
Townsend's Solitaire	0.24	84,817	40	109	2.89	30,441	16	105	1.18	3,653	41	6
Swainson's Thrush	0.22	78,780	46	86	3.93	41,388	28	85	--	--	--	0
Hermit Thrush	0.12	43,357	62	80	1.06	11,203	19	75	0.13	392	92	3
American Robin	5.92	2,133,843	24	800	27.98	294,575	10	639	18.35	56,794	22	80
Yellow Warbler[3]	4.54	1,637,741	39	242	6.85	72,101	26	66	17.10	52,935	33	44
Yellow-rumped Warbler	3.90	1,404,315	35	652	36.08	379,838	15	610	13.24	40,974	32	44

	BCR 17 (S = 226)				National Forests (S = 81)				Custer NF (S = 14)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
American Redstart	0.37	133,567	30	103	9.14	96,234	25	93	5.02	15,529	65	13
Ovenbird[3]	0.59	211,137	16	347	15.59	164,113	12	322	2.84	8,788	58	15
Common Yellowthroat	0.46	165,288	52	69	0.57	5,999	35	21	0.58	1,804	63	4
Yellow-breasted Chat	0.33	120,463	36	90	0.77	8,100	72	11	2.62	8,100	72	11
Western Tanager	0.60	215,994	29	237	7.73	81,349	13	225	2.34	7,256	31	16
Spotted Towhee	3.00	1,082,088	35	438	8.71	91,707	20	172	23.46	72,618	24	118
Chipping Sparrow	7.87	2,837,272	23	780	59.08	622,104	11	617	58.10	179,823	27	120
Clay-colored Sparrow	1.84	664,978	57	88	0.15	1,538	67	2	0.50	1,538	67	2
Brewer's Sparrow[3]	8.93	3,221,062	32	440	0.70	7,348	77	9	2.37	7,348	77	9
Field Sparrow	0.98	353,995	34	181	0.16	1,668	77	8	0.47	1,443	88	7
Vesper Sparrow	7.17	2,585,006	0	696	3.52	37,066	27	131	2.54	7,865	32	19
Lark Sparrow[3]	13.77	4,965,131	20	487	16.30	171,664	15	137	41.99	129,960	18	90
Lark Bunting	15.80	5,697,194	24	2,284	0.85	8,969	74	24	2.90	8,969	74	24
Grasshopper Sparrow	62.49	22,529,388	36	994	1.92	20,178	37	24	5.75	17,785	41	19
Dark-eyed Junco	2.35	846,027	30	544	31.22	328,740	8	526	8.18	25,303	19	23
Red-winged Blackbird	9.21	3,318,786	15	487	0.40	4,245	37	15	0.26	817	86	3
Western Meadowlark	41.01	14,785,770	8	4,550	4.96	52,258	31	197	15.47	47,893	33	155
Brewer's Blackbird	1.52	549,283	31	168	0.46	4,798	52	7	1.13	3,503	64	4
Brown-headed Cowbird	47.61	17,165,961	32	1,007	28.00	294,794	12	283	52.86	163,595	19	119
Red Crossbill	0.29	104,149	17	142	8.62	90,732	15	140	6.06	18,750	48	19
Pine Siskin	0.18	63,594	21	82	6.04	63,594	21	80	0.31	962	85	1
American Goldfinch	3.25	1,172,540	41	100	5.18	54,570	35	44	13.68	42,355	44	25

[1] D = (birds/km2);
[2] n = number of independent detections used to estimate D and N;
[3] USFS priority species (sensitive species or management indicator species) in the Northern Region (Region 1) (see Appendix A).

Table 15. Estimated site occupancy (Psi; proportion of sample units occupied), percent coefficient of variation of Psi (%CV) and number of transects with detections (n Tran) of priority species in Custer National Forest, 2009. S indicates the number of transects surveyed.

	BCR 17 (S = 226)			National Forests (S = 81)			Custer NF (S = 14)		
Species*	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**
Long-billed Curlew	0.019	57	7	0.000	--	0	0.000	--	0
Marbled Godwit	0.111	63	8	0.000	--	0	0.000	--	0
Red-headed Woodpecker	0.004	35	7	0.132	35	7	0.283	48	3
Black-backed Woodpecker	0.005	46	8	0.173	46	8	0.141	99	1
Clark's Nutcracker	0.003	29	9	0.095	29	9	0.000	--	0
Northern Rough-winged Swallow	0.071	50	12	0.030	67	2	0.051	87	1
Brown Creeper	0.073	63	15	0.222	31	13	0.000	--	0
Veery	0.128	70	8	0.052	43	5	0.000	--	0
Sprague's Pipit	0.061	49	7	0.000	--	0	0.000	--	0
Song Sparrow	0.007	55	8	0.118	52	6	0.000	--	0
McCown's Longspur	0.022	88	3	0.000	--	0	0.000	--	0

*Bolded species are USFS priority species (sensitive species or management indicator species) in the Northern Region (Region 1).

Lewis and Clark National Forest

Field technicians surveyed 10 of 10 (100%) assigned transects in Lewis and Clark National Forest in 2009 (figure 5). Technicians conducted 105 point counts within these 10 transects between 1 July and 15 July 2009. Technicians detected 790 birds of 53 species in Lewis and Clark National Forest. Note that a portion of Lewis and Clark National Forest falls outside of the BCR 17 boundary; we did not collect data from that portion in 2009.

RMBO estimated density and population sizes in Lewis and Clark National Forest for 32 species; 4 of these are sensitive species or MIS in US Forest Service Region 1 (Table 16). The data yielded robust density estimates (CV < 50%) for 16 species. RMBO estimated the proportion of transects occupied (Psi) by four priority species in Lewis and Clark National Forest (Table 17).

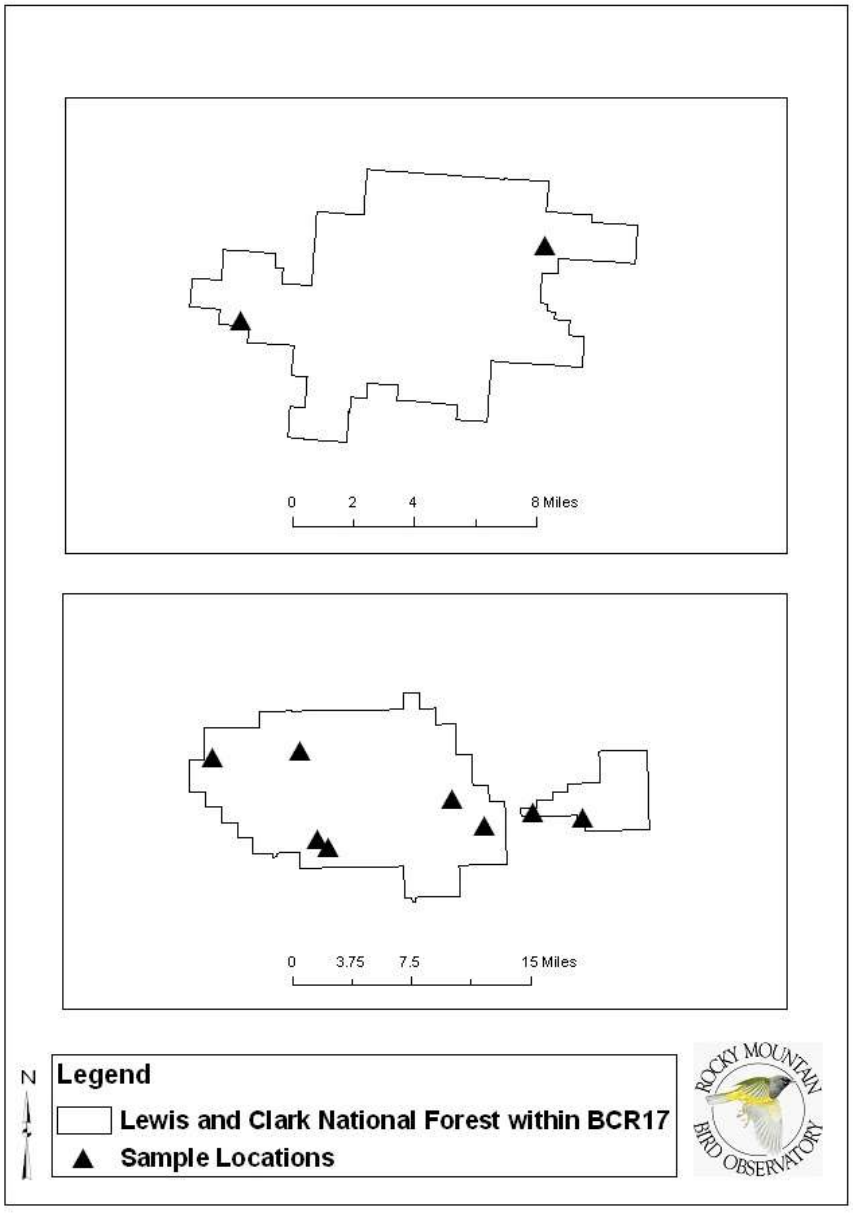

Figure 5. Sample locations in Lewis and Clark National Forest within the Badlands and Prairies Bird Conservation Region (BCR 17), 2009.

Table 16. Estimated densities per km^2 (D), population sizes (N), percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding bird species in Lewis and Clark National Forest within the Badlands and Prairies Bird Conservation Region (BCR 17), 2009. S indicates the number of transects surveyed.

	BCR 17 (S = 226)				National Forests (S = 81)				Lewis and Clark NF (S = 10)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
Canada Goose	0.14	51,478	65	75	0.01	56	88	2	--	--	--	0
Ring-necked Pheasant	1.27	458,514	36	293	0.07	775	58	10	--	--	--	0
Killdeer	2.80	1,009,427	69	174	0.03	349	87	1	--	--	--	0
Upland Sandpiper	4.43	1,596,451	58	272	0.07	711	92	3	--	--	--	0
Mourning Dove	4.74	1,710,272	25	918	2.86	30,149	13	163	0.61	528	43	5
Red-naped Sapsucker	0.14	50,724	26	65	4.82	50,724	26	65	--	--	--	0
Hairy Woodpecker	0.64	229,182	57	68	6.02	63,403	16	64	1.04	904	83	2
Northern Flicker	0.90	323,943	41	240	3.77	39,684	17	174	3.13	2,714	41	15
Western Wood-Pewee	0.51	182,755	32	230	7.81	82,259	16	208	1.89	1,639	82	13
Dusky Flycatcher	1.44	520,561	33	174	12.02	126,523	18	155	0.83	721	91	1
Western Kingbird	7.84	2,826,162	35	124	1.11	11,693	46	15	--	--	--	0
Eastern Kingbird	5.17	1,862,160	41	140	0.54	5,689	37	11	--	--	--	0
Plumbeous Vireo	0.18	66,596	26	90	5.73	60,299	29	87	--	--	--	0
Warbling Vireo	0.64	230,700	12	395	20.91	220,194	12	386	4.93	4,277	50	8
Black-billed Magpie	0.31	113,365	42	67	0.03	305	56	4	--	--	--	0
American Crow	0.13	45,900	31	164	0.67	7,082	21	85	0.15	133	63	2
Horned Lark	27.49	9,911,515	20	1,185	0.28	2,965	65	4	--	--	--	0
Barn Swallow	10.37	3,738,547	67	73	0.12	1,256	85	2	--	--	--	0
Black-capped Chickadee	1.82	657,553	35	306	13.40	141,099	10	271	7.85	6,803	44	18
Red-breasted Nuthatch	0.60	216,241	17	379	14.12	148,670	9	371	4.92	4,267	45	16
White-breasted Nuthatch	1.03	372,324	64	135	8.05	84,780	15	129	0.64	554	86	1
Rock Wren	1.64	591,726	34	195	2.01	21,207	23	81	3.02	2,618	47	17
House Wren	6.78	2,444,128	38	438	22.44	236,286	21	244	4.11	3,567	42	7
Ruby-crowned Kinglet	0.29	104,927	18	239	9.89	104,122	18	238	3.58	3,105	87	8
Mountain Bluebird	2.76	993,729	29	212	15.38	161,938	16	149	4.05	3,516	37	5
Townsend's Solitaire	0.24	84,817	40	109	2.89	30,441	16	105	2.60	2,255	46	10
Swainson's Thrush	0.22	78,780	46	86	3.93	41,388	28	85	1.99	1,728	69	5
Hermit Thrush	0.12	43,357	62	80	1.06	11,203	19	75	12.47	10,811	19	72
American Robin	5.92	2,133,843	24	800	27.98	294,575	10	639	28.55	24,751	16	70
Yellow Warbler[3]	4.54	1,637,741	39	242	6.85	72,101	26	66	6.59	5,709	84	8
Yellow-rumped Warbler	3.90	1,404,315	35	652	36.08	379,838	15	610	63.48	55,034	27	111

	BCR 17 (S = 226)				National Forests (S = 81)				Lewis and Clark NF (S = 10)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
American Redstart	0.37	133,567	30	103	9.14	96,234	25	93	4.21	3,651	66	5
Ovenbird[3]	0.59	211,137	16	347	15.59	164,113	12	322	7.64	6,621	44	20
Common Yellowthroat	0.46	165,288	52	69	0.57	5,999	35	21	2.52	2,185	73	10
Yellow-breasted Chat	0.33	120,463	36	90	0.77	8,100	72	11	--	--	--	0
Western Tanager	0.60	215,994	29	237	7.73	81,349	13	225	5.67	4,912	46	16
Spotted Towhee	3.00	1,082,088	35	438	8.71	91,707	20	172	--	--	--	0
Chipping Sparrow	7.87	2,837,272	23	780	59.08	622,104	11	617	16.78	14,548	39	20
Clay-colored Sparrow	1.84	664,978	57	88	0.15	1,538	67	2	--	--	--	0
Brewer's Sparrow[3]	8.93	3,221,062	32	440	0.70	7,348	77	9	--	--	--	0
Field Sparrow	0.98	353,995	34	181	0.16	1,668	77	8	0.26	224	86	1
Vesper Sparrow	7.17	2,585,006	0	696	3.52	37,066	27	131	--	--	--	0
Lark Sparrow[3]	13.77	4,965,131	20	487	16.30	171,664	15	137	0.94	817	82	1
Lark Bunting	15.80	5,697,194	24	2,284	0.85	8,969	74	24	--	--	--	0
Grasshopper Sparrow	62.49	22,529,388	36	994	1.92	20,178	37	24	--	--	--	0
Dark-eyed Junco	2.35	846,027	30	544	31.22	328,740	8	526	60.04	52,055	17	110
Red-winged Blackbird	9.21	3,318,786	15	487	0.40	4,245	37	15	--	--	--	0
Western Meadowlark	41.01	14,785,770	8	4,550	4.96	52,258	31	197	--	--	--	0
Brewer's Blackbird	1.52	549,283	31	168	0.46	4,798	52	7	--	--	--	0
Brown-headed Cowbird	47.61	17,165,961	32	1,007	28.00	294,794	12	283	3.32	2,881	66	4
Red Crossbill	0.29	104,149	17	142	8.62	90,732	15	140	1.19	1,029	63	2
Pine Siskin	0.18	63,594	21	82	6.04	63,594	21	80	18.99	16,462	30	23
American Goldfinch	3.25	1,172,540	41	100	5.18	54,570	35	44	1.61	1,394	61	2

[1] D = (birds/km2);
[2] n = number of independent detections used to estimate D and N.
[3] USFS priority species (sensitive species or management indicator species) in the Northern Region (Region 1) (see Appendix A).

Table 17. Estimated site occupancy (Psi; proportion of sample units occupied), percent coefficient of variation of Psi (%CV) and number of transects with detections (n Tran) of priority species in Lewis and Clark National Forest within the Badlands and Prairies Bird Conservation Region (BCR 17), 2009. S indicates the number of transects surveyed.

	BCR 17 (S = 226)			National Forests (S = 81)			Lewis and Clark NF (S = 10)		
Species*	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**
Long-billed Curlew	0.019	57	7	0.000	--	0	0.000	--	0
Marbled Godwit	0.111	63	8	0.000	--	0	0.000	--	0
Red-headed Woodpecker	0.004	35	7	0.132	35	7	0.000	--	0
Black-backed Woodpecker	0.005	46	8	0.173	46	8	0.000	--	0
Clark's Nutcracker	0.003	29	9	0.095	29	9	0.558	32	5
Northern Rough-winged Swallow	0.071	50	12	0.030	67	2	0.000	--	0
Brown Creeper	0.073	63	15	0.222	31	13	0.530	52	3
Veery	0.128	70	8	0.052	43	5	0.210	63	2
Sprague's Pipit	0.061	49	7	0.000	--	0	0.000	--	0
Song Sparrow	0.007	55	8	0.118	52	6	0.203	101	1
McCown's Longspur	0.022	88	3	0.000	--	0	0.000	--	0

*Bolded species are USFS priority species (sensitive species or management indicator species) in the Northern Region (Region 1).

United States Forest Service: National Grasslands

Field technicians surveyed 47 of 47 (100%) assigned transects on National Grasslands throughout BCR 17 in 2009 (Table 9). Technicians conducted 528 point counts within these 47 transects between 16 May and 25 June 2009. Technicians detected 6,579 birds of 101 species on National Grasslands.

RMBO estimated National Grassland-wide density and population sizes of 42 species; 5 of these are sensitive species or MIS in US Forest Service Regions 1 or 2 (Tables 18, 20, 22). The data yielded robust density estimates (CV < 50%) for 32 of these species. We also estimated species densities and population sizes for each individual National Grassland within BCR 17 (Buffalo Gap, Cedar River, Fort Pierre, Grand River, Little Missouri, Oglala, and Thunder Basin).

RMBO estimated the proportion of transects occupied (Psi) by eight priority species National Grassland-wide; three of these are sensitive species or MIS (Tables 19, 21, 23). We only estimated occupancy rates for two of the seven individual National Grasslands (Little Missouri and Thunder Basin). We could not estimate occupancy rates for the other National Grasslands because the number of transects surveyed was too small.

Dakota Prairie National Grasslands

Field technicians surveyed 24 of 25 (96%) assigned transects on Dakota Prairie National Grasslands (DPNG) (Cedar River, Grand River, and Little Missouri), throughout BCR 17 in 2009 (figure 6). Technicians conducted 248 point counts within these 24 transects between 17 May and 25 June 2009. Technicians detected 2,947 birds of 87 species on DPNG. Note that one National Grasslands within this management unit falls outside of the BCR 17 boundary; we did not collect data from that National Grassland in 2009 using this study design. We did, however, collect data from this grassland using a different study design. For more information on this, refer to the "Monitoring of Grassland Birds on Little Missouri, Sheyenne and Grand River National Grasslands" report (Sparks and Hanni 2009).

RMBO estimated DPNG-wide density and population sizes of 41 species; 3 of these are sensitive species or MIS in US Forest Service Region 1 (Table 18). The data yielded robust density estimates (CV < 50%) for 26 of these species. We also estimated species densities and population sizes for each individual National Grassland

RMBO estimated the proportion of transects occupied (Psi) by seven priority species on the DPNG; two of these are sensitive species or MIS in Region 1 (Table 19). We only calculated occupancy rates for one of the three individual DPNG (Little Missouri). We could not calculate occupancy for the other Grasslands, because number of transects surveyed was too small. We estimated site occupancy (Psi) for three priority species in Little Missouri NG; one of these is a sensitive species in Region 1.

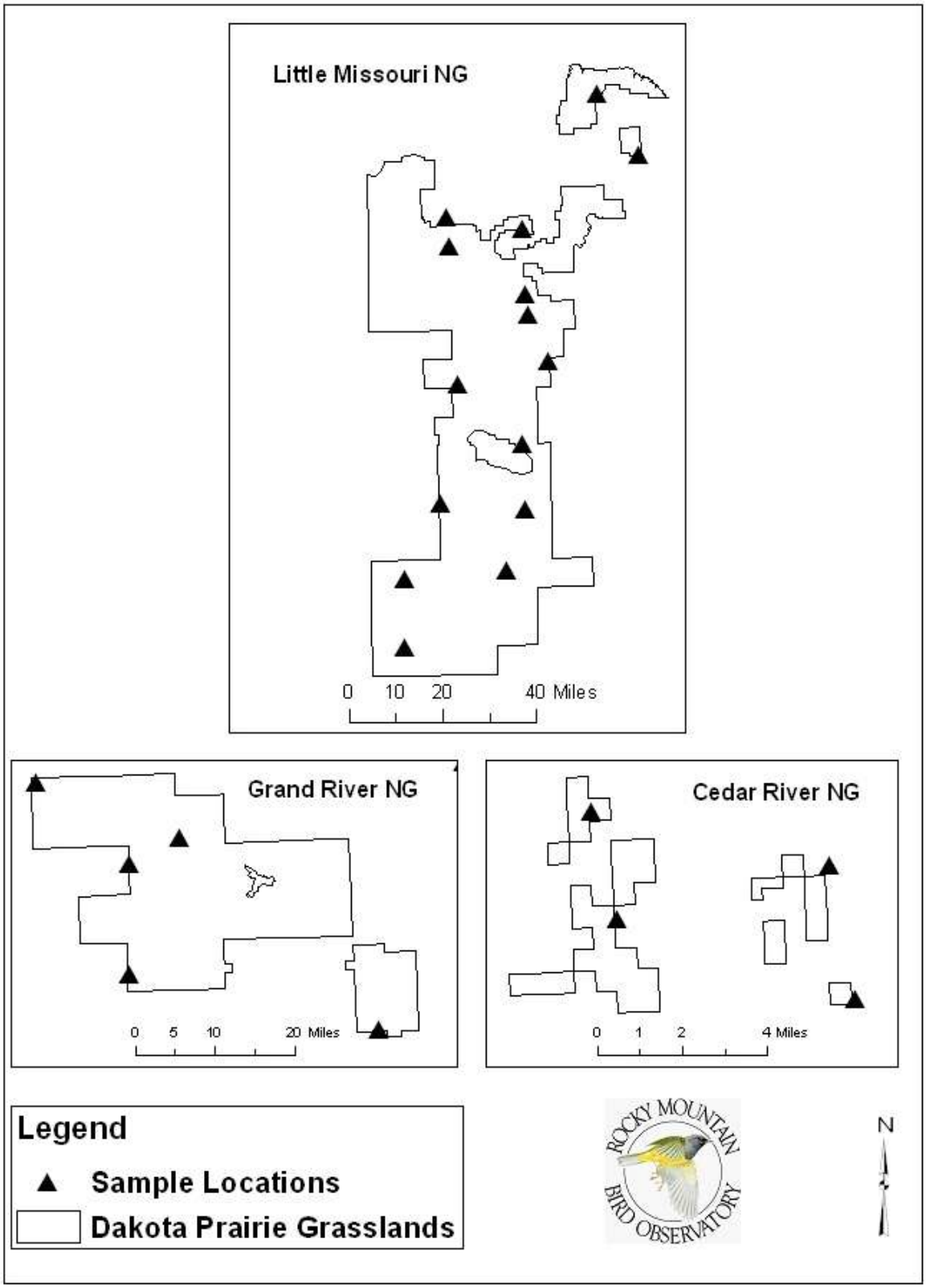

Figure 6. Sample locations in Dakota Prairie National Grasslands within the Badlands and Prairies Bird Conservation Region (BCR 17), 2009.

Table 18. Estimated densities per km^2 (D), population sizes (N), percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding bird species on Dakota Prairie National Grasslands within the Badlands and Prairies Bird Conservation Region (BCR 17), 2009. S indicates the number of transects surveyed.

	National Grasslands (S = 47)				Dakota Prairie NG (S = 24)				Cedar River NG (S = 4)				Grand River NG (S = 5)				Little Missouri NG (S = 15)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
Canada Goose	0.01	247	41	10	0.02	124	63	7	0.90	76	88	6	0.05	49	84	1	--	--	--	0
Ring-necked Pheasant	0.66	11,218	22	118	1.29	9,928	24	94	2.41	202	42	23	2.14	2,202	57	30	1.15	7,524	27	41
Killdeer	1.86	31,735	27	42	1.32	10,109	41	18	1.72	144	83	2	3.53	3,621	38	10	0.97	6,344	61	6
Upland Sandpiper	2.74	46,702	28	103	2.61	20,058	33	52	0.86	73	89	2	10.93	11,220	45	38	1.33	8,766	50	12
Mourning Dove	5.80	98,987	16	239	8.36	64,155	15	161	3.74	314	28	13	6.18	6,345	41	29	8.76	57,496	16	119
Hairy Woodpecker	0.29	4,926	92	1	0.64	4,926	92	1	--	--	--	0	--	--	--	0	0.75	4,926	92	1
Northern Flicker	0.23	3,847	40	10	0.50	3,847	40	9	--	--	--	0	1.83	1,875	56	5	0.30	1,971	57	4
Western Kingbird	3.47	59,224	45	34	3.14	24,138	37	19	2.18	183	48	2	3.73	3,829	89	5	3.06	20,125	41	12
Eastern Kingbird	3.26	55,718	38	40	6.29	48,257	44	33	4.64	390	61	5	0.79	814	82	1	7.17	47,053	45	27
Warbling Vireo	0.17	2,912	82	5	0.38	2,912	82	5	--	--	--	0	--	--	--	0	0.44	2,912	82	5
Black-billed Magpie	0.11	1,928	67	8	0.25	1,928	67	8	--	--	--	0	--	--	--	0	0.29	1,928	67	8
American Crow	0.58	9,845	36	27	1.18	9,078	39	26	--	--	--	0	--	--	--	0	1.38	9,078	39	26
Horned Lark	24.36	416,004	20	294	13.18	101,162	39	114	42.41	3,563	24	38	28.98	29,765	25	39	10.33	67,834	57	37
Barn Swallow	5.27	89,914	30	24	8.00	61,449	39	12	--	--	--	0	4.23	4,346	89	2	8.70	57,103	41	10
Black-capped Chickadee	0.30	5,189	78	4	0.68	5,189	78	4	--	--	--	0	0.81	830	88	1	0.66	4,360	92	3
Rock Wren	1.61	27,413	49	35	2.00	15,358	83	17	--	--	--	0	--	--	--	0	2.34	15,358	83	17
House Wren	6.64	113,337	39	42	14.76	113,337	39	42	--	--	--	0	--	--	--	0	17.26	113,337	39	42
Ruby-crowned Kinglet	0.05	805	88	1	0.10	805	88	1	--	--	--	0	0.78	805	88	1	--	--	--	0
Mountain Bluebird	2.80	47,876	49	14	6.24	47,876	49	14	--	--	--	0	--	--	--	0	7.29	47,876	49	14
American Robin	2.11	36,017	65	36	4.69	36,017	65	34	--	--	--	1	1.69	1,739	56	3	5.22	34,278	68	30
Yellow Warbler[3]	13.31	227,219	31	74	29.59	227,219	31	74	--	--	--	0	4.94	5,072	65	5	33.83	222,147	32	69
Yellow-rumped Warbler	0.07	1,188	90	1	0.15	1,188	90	1	--	--	--	0	1.16	1,188	90	1	--	--	--	0
American Redstart	2.04	34,806	92	8	4.53	34,806	92	8	--	--	--	0	--	--	--	0	5.30	34,806	92	8
Ovenbird[3]	2.72	46,370	59	23	6.04	46,370	59	23	--	--	--	0	--	--	--	0	7.06	46,370	59	23
Common Yellowthroat	1.21	20,724	44	24	2.59	19,882	46	22	4.30	361	39	6	0.98	1,007	90	2	2.82	18,514	49	14
Yellow-breasted Chat	3.79	64,775	56	39	8.44	64,775	56	39	--	--	--	0	--	--	--	0	9.86	64,775	56	39
Spotted Towhee	11.24	191,987	23	135	23.21	178,240	24	122	--	--	--	0	0.63	644	88	1	27.04	177,596	24	121
Chipping Sparrow	4.26	72,712	41	32	6.33	48,601	42	21	2.53	212	85	1	1.73	1,774	82	1	7.10	46,615	44	19
Clay-colored Sparrow	2.53	43,151	37	24	5.62	43,151	37	24	3.67	308	58	3	--	--	--	0	6.52	42,843	37	21
Field Sparrow	4.80	81,913	32	80	10.67	81,913	32	80	--	--	--		--	--	--	0	12.47	81,913	32	80

	National Grasslands (S = 47)				Dakota Prairie NG (S = 24)				Cedar River NG (S = 4)				Grand River NG (S = 5)				Little Missouri NG (S = 15)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
Vesper Sparrow	3.39	57,836	21	93	5.36	41,156	25	62	0.46	39	83	1	0.95	975	88	3	6.11	40,142	25	58
Lark Sparrow[3]	4.44	75,827	35	20	4.06	31,148	32	9	--	--	--	0	--	--	--	0	4.74	31,148	32	9
Lark Bunting	44.19	754,623	14	870	1.32	10,161	74	15	0.60	50	85	2	1.23	1,263	51	3	1.35	8,848	85	10
Grasshopper Sparrow	55.26	943,526	16	423	33.82	259,691	20	159	58.98	4,954	19	43	64.48	66,221	22	57	28.71	188,517	27	59
Chestnut-collared Longspur	9.29	158,569	34	134	14.68	112,746	38	123	61.33	5,151	31	32	104.77	107,595	40	91	--	--	--	0
Bobolink	1.16	19,742	41	47	1.97	15,135	52	40	36.62	3,076	51	34	--	--	--	0	1.84	12,059	63	6
Red-winged Blackbird	7.01	119,774	22	194	11.39	87,417	29	137	30.98	2,602	11	45	13.47	13,835	44	29	10.81	70,980	35	63
Western Meadowlark	50.41	860,784	7	1,512	36.29	278,656	13	522	40.66	3,415	5	87	32.35	33,227	21	98	36.85	242,014	15	337
Brewer's Blackbird	2.48	42,282	30	34	1.80	13,828	54	9	1.06	89	85	1	--	--	--	0	2.09	13,738	54	8
Brown-headed Cowbird	29.05	496,009	13	281	37.39	287,050	17	161	55.31	4,646	18	36	61.06	62,704	31	46	33.46	219,700	21	79
American Goldfinch	2.10	35,793	33	17	4.66	35,793	33	17	2.06	173	83	1	1.41	1,445	83	1	5.20	34,175	35	15

[1] D = (birds/km^2);

[2] n = number of independent detections used to estimate D and N;

[3] USFS priority species (sensitive species or management indicator species) in the Northern Region (Region 1) (see Appendix A).

Table 19. Estimated site occupancy (Psi; proportion of sample units occupied), percent coefficient of variation of Psi (%CV) and number of transects with detections (n Tran) of priority species in Dakota Prairie National Grasslands, 2009. S indicates the number of transects surveyed.

	BCR 17 (S = 226)			All NG combined (S = 47)			Dakota NG (S = 24)			Little Missouri NG (S = 15)		
Species	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**
Northern Harrier	--	--	--	0.314	69	7	0.071	99	2	0.000	--	0
Long-billed Curlew	0.019	57	7	0.212	79	2	0.143	104	1	0.167	104	1
Marbled Godwit	0.111	63	8	0.024	47	3	0.003	87	1	0.000	--	0
Red-headed Woodpecker	0.004	35	7	--	--	--	--	--	--	0.000	--	0
Black-backed Woodpecker	0.005	46	8	--	--	--	--	--	--	0.000	--	0
Loggerhead Shrike	--	--	--	0.127	74	2	--	--	--	0.000	--	0
Clark's Nutcracker	0.003	29	9	--	--	--	--	--	--	0.000	--	0
Northern Rough-winged Swallow	0.071	50	12	0.088	61	3	0.172	67	2	0.202	67	2
Brown Creeper	0.073	63	15	--	--	--	--	--	--	0.000	--	0
Veery	0.128	70	8	0.024	55	2	0.054	55	2	0.000	--	0
Sprague's Pipit	0.061	49	7	--	--	--	--	--	--	0.000	--	0
Baird's Sparrow	--	--	--	0.020	47	3	0.004	88	1	0.000	--	0
Song Sparrow	0.007	55	8	0.053	102	1	0.119	102	1	0.139	102	1
McCown's Longspur	0.022	88	3	--	--	--	--	--	--	0.000	--	0

*Bolded species are USFS priority species (sensitive species or management indicator species) in the Northern Region (Region 1).

Nebraska National Forests and Grasslands

Field technicians surveyed 12 of 12 (100%) assigned transects on Nebraska National Forests and Grasslands (NNFG) (Buffalo Gap, Fort Pierre, and Oglala National Grasslands) in 2009 (figure 7). Technicians conducted 144 point counts within these 12 transects between 16 May and 20 June 2009. Technicians detected 1,989 birds of 56 species. Note that a portion of Oglala NG and all of the Nebraska National Forest falls outside of BCR 17. We collected data from both of these sections using the same study design in the Shortgrass Prairie Bird Conservation Region (BCR18). For more information on this, refer to the "Monitoring BCR 18 Grassland Birds: 2009 Field Season Report" (Rehm-Lorber et. al. 2009).

RMBO estimated NNFG-wide density and population sizes of 22 species; 3 of these are sensitive species or MIS in US Forest Service Region 2 (Table 20). The data yielded robust density estimates (CV < 50%) for 12 of these species. We also estimated density and population sizes for each individual NNFG.

RMBO estimated the proportion of transects occupied (Psi) by five priority species within the NNFG; three of these are sensitive species or MIS in Region 2 (Table 21). We did not calculate occupancy for any of the individual grasslands, because the number of transects surveyed was too small.

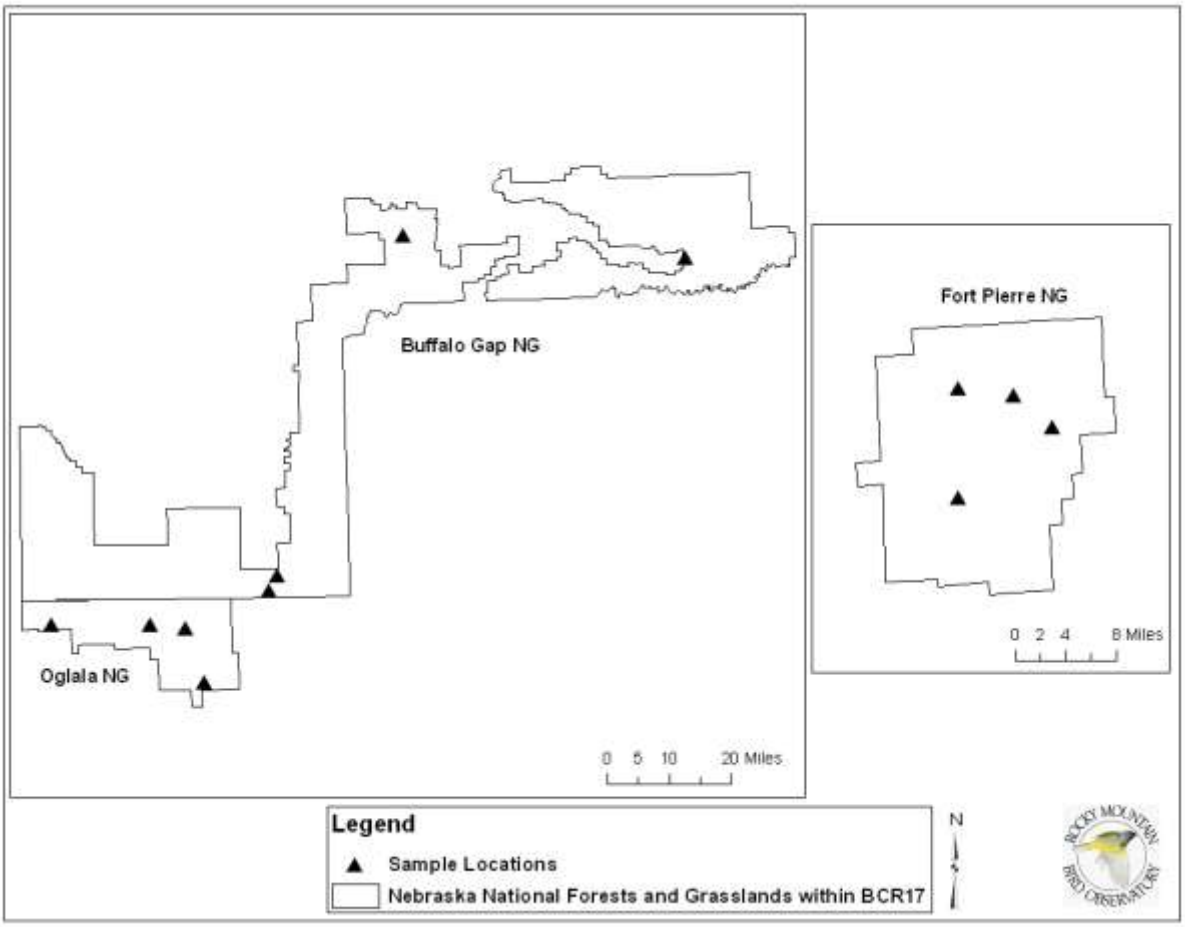

Figure 7. Sample locations in Nebraska National Forests and Grasslands within the Badlands and Prairies Bird Conservation Region (BCR 17), 2009.

Table 20. Estimated densities per km^2 (D), population sizes (N), percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding bird species on Nebraska National Forests and Grasslands within the Badlands and Prairies Bird Conservation Region (BCR 17), 2009. S indicates the number of transects surveyed.

	National Grasslands (S = 47)				Nebraska NF and NG (S = 12)				Buffalo Gap NG (S = 4)				Fort Pierre NG (S = 4)				Oglala NG (S = 4)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
Canada Goose	0.14	51,478	65	75	0.03	123	0.52	3	--	--	--	0	0.17	123	52	3	--	--	--	0
Ring-necked Pheasant	1.27	458,514	36	293	0.26	1,290	0.33	24	--	--	--	0	1.80	1,290	33	24	--	--	--	0
Killdeer	2.80	1,009,427	69	174	2.99	14,595	0.46	12	2.78	10,051	63	5	6.35	4,544	47	12	--	--	--	0
Upland Sandpiper	4.43	1,596,451	58	272	5.46	26,644	0.42	38	5.59	20,202	54	13	7.09	5,074	43	29	2.49	1,368	62	9
Mourning Dove	4.74	1,710,272	25	918	4.96	24,211	0.49	30	5.72	20,650	57	18	2.05	1,464	42	8	3.81	2,097	36	22
Red-naped Sapsucker	0.14	50,724	26	65	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Hairy Woodpecker	0.64	229,182	57	68	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Northern Flicker	0.90	323,943	41	240	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Western Wood-Pewee	0.51	182,755	32	230	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Dusky Flycatcher	1.44	520,561	33	174	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Western Kingbird	7.84	2,826,162	35	124	6.28	30,626	0.81	2	8.24	29,762	84	7	--	--	--	0	1.57	863	86	2
Eastern Kingbird	5.17	1,862,160	41	140	1.21	5,880	0.67	2	1.25	4,519	85	2	1.90	1,362	57	2	--	--	--	0
Plumbeous Vireo	0.18	66,596	26	90	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Warbling Vireo	0.64	230,700	12	395	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Black-billed Magpie	0.31	113,365	42	67	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
American Crow	0.13	45,900	31	164	0.16	767	0.85	0	0.21	767	84	1	--	--	--	0	--	--	--	0
Horned Lark	27.49	9,911,515	20	1185	40.20	196,042	0.34	60	47.71	172,286	38	40	1.93	1,383	56	4	40.68	22,373	36	56
Barn Swallow	10.37	3,738,547	67	73	5.84	28,465	0.43	11	3.34	12,064	87	1	17.77	12,726	43	8	6.68	3,675	87	3
Black-capped Chickadee	1.82	657,553	35	306	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Red-breasted Nuthatch	0.60	216,241	17	379	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
White-breasted Nuthatch	1.03	372,324	64	135	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Rock Wren	1.64	591,726	34	195	0.14	706	0.84	3	--	--	--	0	--	--	--	0	1.28	706	84	3
House Wren	6.78	2,444,128	38	438	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Ruby-crowned Kinglet	0.29	104,927	18	239	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Mountain Bluebird	2.76	993,729	29	212	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Townsend's Solitaire	0.24	84,817	40	109	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0

	National Grasslands (S = 47)				Nebraska NF and NG (S = 12)				Buffalo Gap NG (S = 4)				Fort Pierre NG (S = 4)				Oglala NG (S = 4)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
Swainson's Thrush	0.22	78,780	46	86	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Hermit Thrush	0.12	43,357	62	80	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
American Robin	5.92	2,133,843	24	800	--	--	--	0	--	--	--	1	--	--	--	0	--	--	--	0
Yellow Warbler	4.54	1,637,741	39	242	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Yellow-rumped Warbler	3.90	1,404,315	35	652	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
American Redstart	0.37	133,567	30	103	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Ovenbird	0.59	211,137	16	347	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Common Yellowthroat	0.46	165,288	52	69	0.17	842	0.86	2	--	--	--	0	1.18	842	86	2	--	--	--	0
Yellow-breasted Chat	0.33	120,463	36	90	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Western Tanager	0.60	215,994	29	237	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Spotted Towhee	3.00	1,082,088	35	438	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Chipping Sparrow	7.87	2,837,272	23	780	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Clay-colored Sparrow	1.84	664,978	57	88	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Brewer's Sparrow[3]	8.93	3,221,062	32	440	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Field Sparrow	0.98	353,995	34	181	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Vesper Sparrow	7.17	2,585,006	0	696	0.06	272	0.86	1	--	--	--	0	0.38	272	83	1	--	--	--	0
Lark Sparrow	13.77	4,965,131	20	487	6.46	31,528	0.75	3	7.81	28,202	83	3	1.98	1,417	83	1	3.47	1,909	50	2
Lark Bunting	15.80	5,697,194	24	2284	57.13	278,635	0.26	109	69.89	252,358	28	120	7.87	5,634	45	18	37.53	20,642	50	91
Grasshopper Sparrow[3]	62.49	22,529,388	36	994	131.98	643,653	0.22	180	135.75	490,181	29	66	117.68	84,256	15	78	125.85	69,217	12	102
Dark-eyed Junco	2.35	846,027	30	544	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Chestnut-collared Longspur[3]	34.00	12,258,387	32	303	9.40	45,823	0.73	6	11.03	39,822	83	5	8.38	6,001	84	6	--	--	--	0
Bobolink	2.27	818,368	85	79	0.94	4,607	0.39	7	--	--	--	0	6.43	4,607	39	7	--	--	--	0
Red-winged Blackbird	9.21	3,318,786	15	487	5.85	28,520	0.30	50	2.03	7,315	86	2	26.17	18,740	31	39	4.48	2,465	61	11
Western Meadowlark	41.01	14,785,770	8	4550	65.73	320,554	0.11	442	62.75	226,573	16	129	50.22	35,956	10	137	105.50	58,025	5	305
Brewer's Blackbird	1.52	549,283	31	168	2.56	12,503	0.62	10	2.30	8,293	83	2	--	--	--	0	7.65	4,210	84	10
Brown-headed Cowbird	47.61	17,165,961	32	1007	32.15	156,780	0.18	86	16.07	58,019	42	10	137.93	98,761	15	85	--	--	--	1
Red Crossbill	0.29	104,149	17	142	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
Pine Siskin	0.18	63,594	21	82	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0
American Goldfinch	3.25	1,172,540	41	100	--	--	--	0	--	--	--	0	--	--	--	0	--	--	--	0

[1] D = (birds/km^2);
[2] n = number of independent detections used to estimate D and N;
[3] USFS priority species (sensitive species or management indicator species) in the Rocky Mountain Region (Region 2) (see Appendix A).

Table 21. Estimated site occupancy (Psi; proportion of sample units occupied), percent coefficient of variation of Psi (%CV) and number of transects with detections (n Tran) of priority species on Nebraska National Forests and Grasslands, 2009. S indicates the number of transects surveyed.

	BCR 17 (S = 226)			National Grasslands (S = 47)			Nebraska NF and NG (S = 12)		
Species	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**
Northern Harrier	--	--	9	0.314	69	7	0.760	82	4
Long-billed Curlew	0.019	57	7	0.212	79	2	0.516	96	1
Marbled Godwit	0.111	63	8	0.024	47	3	0.077	50	2
Red-headed Woodpecker	0.004	35	7	0.000	--	0	0.000	--	0
Black-backed Woodpecker	0.005	46	8	0.000	--	0	0.000	--	0
Loggerhead Shrike	--	--	10	0.127	74	2	0.000	--	0
Clark's Nutcracker	0.003	29	9	0.000	--	0	0.000	--	0
Northern Rough-winged Swallow	0.071	50	12	0.088	61	3	0.036	87	1
Brown Creeper	0.073	63	15	0.000	--	0	0.000	--	0
Veery	0.128	70	8	0.024	55	2	0.000	--	0
Sprague's Pipit	0.061	49	7	0.000	--	0	0.000	--	0
Baird's Sparrow	--	--	9	0.020	47	3	0.064	51	2
Song Sparrow	0.007	55	8	0.053	102	1	0.000	--	0
McCown's Longspur	0.022	88	3	0.000	--	0	0.000	--	0

*Bolded species are USFS priority species (sensitive species or management indicator species) in the Rocky Mountain Region (Region 2).

Thunder Basin National Grasslands

Field technicians surveyed 11 of 10 (110%) assigned transects in Thunder Basin National Grassland in 2009 (figure 8). Technicians conducted 136 point counts within these 11 transects between 21 May and 29 May 2009. Technicians detected 1,643 birds of 29 species in Thunder Basin National Grassland.

RMBO estimated density and population sizes in Thunder Basin National Grassland for 17 species; 3 of these are sensitive species or MIS in US Forest Service Region 2 (Table 22). The data yielded robust density estimates (CV < 50%) for 9 species. RMBO estimated the proportion of transects occupied (Psi) by two priority species in Thunder Basin National Grassland (Table 23); these two are sensitive species in Region 2.

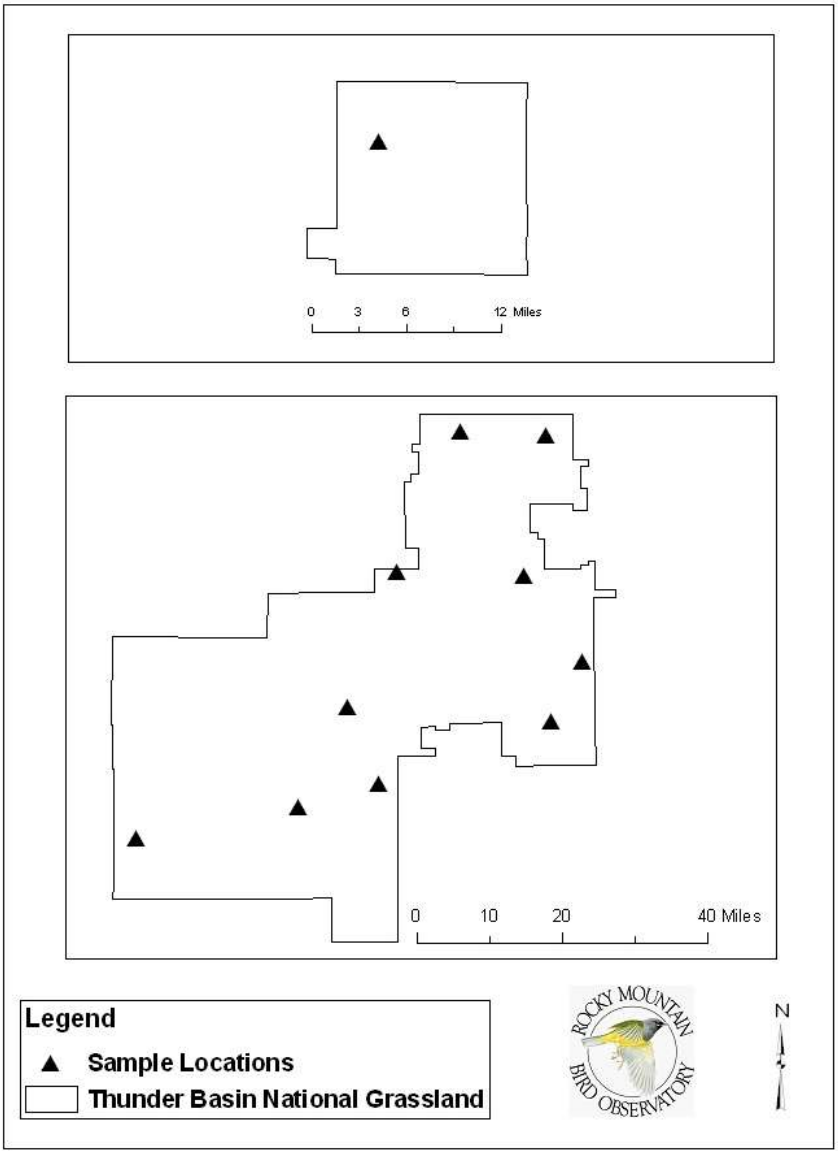

Figure 8. Sample locations in Thunder Basin National Grassland within the Badlands and Prairies Bird Conservation Region (BCR 17), 2009.

Table 22. Estimated densities per km^2 (D), population sizes (N), percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding bird species in Thunder Basin National Grassland, 2009. S indicates the number of transects surveyed.

	BCR 17 (S = 226)				National Grasslands (S = 47)				Thunder Basin NG (S = 11)			
Species	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
Canada Goose	0.14	51,478	65	75	0.01	247	41	10	--	--	--	0
Ring-necked Pheasant	1.27	458,514	36	293	0.66	11,218	22	118	--	--	--	0
Killdeer	2.80	1,009,427	69	174	1.86	31,735	27	42	1.56	7,031	44	7
Upland Sandpiper	4.43	1,596,451	58	272	2.74	46,702	28	103	--	--	--	0
Mourning Dove	4.74	1,710,272	25	918	5.80	98,987	16	239	2.35	10,621	29	30
Hairy Woodpecker	0.64	229,182	57	68	0.29	4,926	92	1	--	--	--	0
Northern Flicker	0.90	323,943	41	240	0.23	3,847	40	10	--	--	--	1
Western Kingbird	7.84	2,826,162	35	124	3.47	59,224	45	34	0.99	4,461	89	6
Eastern Kingbird	5.17	1,862,160	41	140	3.26	55,718	38	40	0.35	1,580	88	3
Warbling Vireo	0.64	230,700	12	395	0.17	2,912	82	5	--	--	--	0
Black-billed Magpie	0.31	113,365	42	67	0.11	1,928	67	8	--	--	--	0
American Crow	0.13	45,900	31	164	0.58	9,845	36	27	--	--	--	0
Horned Lark	27.49	9,911,515	20	1185	24.36	416,004	20	294	26.28	118,801	30	80
Barn Swallow	10.37	3,738,547	67	73	5.27	89,914	30	24	--	--	--	0
Black-capped Chickadee	1.82	657,553	35	306	0.30	5,189	78	4	--	--	--	0
Rock Wren	1.64	591,726	34	195	1.61	27,413	49	35	2.51	11,348	36	15
House Wren	6.78	2,444,128	38	438	6.64	113,337	39	42	--	--	--	0
Ruby-crowned Kinglet	0.29	104,927	18	239	0.05	805	88	1	--	--	--	0
Mountain Bluebird	2.76	993,729	29	212	2.80	47,876	49	14	--	--	--	0
American Robin	5.92	2,133,843	24	800	2.11	36,017	65	36	--	--	--	1
Yellow Warbler	4.54	1,637,741	39	242	13.31	227,219	31	74	--	--	--	0
Yellow-rumped Warbler	3.90	1,404,315	35	652	0.07	1,188	90	1	--	--	--	0
American Redstart	0.37	133,567	30	103	2.04	34,806	92	8	--	--	--	0
Ovenbird	0.59	211,137	16	347	2.72	46,370	59	23	--	--	--	0
Common Yellowthroat	0.46	165,288	52	69	1.21	20,724	44	24	--	--	--	0
Yellow-breasted Chat	0.33	120,463	36	90	3.79	64,775	56	39	--	--	--	0
Spotted Towhee	3.00	1,082,088	35	438	11.24	191,987	23	135	3.04	13,747	88	13
Chipping Sparrow	7.87	2,837,272	23	780	4.26	72,712	41	32	5.33	24,111	88	11
Clay-colored Sparrow	1.84	664,978	57	88	2.53	43,151	37	24	--	--	--	0
Brewer's Sparrow[3]	8.93	3,221,062	32	440	4.20	71,663	44	64	15.85	71,663	44	64
Field Sparrow	0.98	353,995	34	181	4.80	81,913	32	80	--	--	--	0
Vesper Sparrow	7.17	2,585,006	0	696	3.39	57,836	21	93	3.63	16,408	42	30

	BCR 17 (S = 226)				National Grasslands (S = 47)				Thunder Basin NG (S = 11)			
Species	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**	**D**	**N**	**%CV**	**n**
Lark Sparrow	13.77	4,965,131	20	487	4.44	75,827	35	20	2.91	13,151	52	5
Lark Bunting	15.80	5,697,194	24	2284	44.19	754,623	14	870	103.06	465,827	17	626
Grasshopper Sparrow[3]	62.49	22,529,388	36	994	55.26	943,526	16	423	8.89	40,181	59	18
Chestnut-collared Longspur[3]	34.00	12,258,387	32	303	9.29	158,569	34	134	--	--	--	0
Bobolink	2.27	818,368	85	79	1.16	19,742	41	47	--	--	--	0
Red-winged Blackbird	9.21	3,318,786	15	487	7.01	119,774	22	194	0.85	3,838	62	5
Western Meadowlark	41.01	14,785,770	8	4550	50.41	860,784	7	1,512	57.87	261,573	10	419
Brewer's Blackbird	1.52	549,283	31	168	2.48	42,282	30	34	3.53	15,952	40	13
Brown-headed Cowbird	47.61	17,165,961	32	1007	29.05	496,009	13	281	11.54	52,179	54	24
American Goldfinch	3.25	1,172,540	41	100	2.10	35,793	33	17	--	--	--	0

[1] D = (birds/km2);
[2] n = number of independent detections used to estimate D and N;
[3] USFS priority species (sensitive species or management indicator species) in the Rocky Mountain Region (Region 2) (see Appendix A).

Table 23. Estimated site occupancy (Psi; proportion of sample units occupied), percent coefficient of variation of Psi (%CV) and number of transects with detections (n Tran) of priority species in Thunder Basin National Grassland, 2009. S indicates the number of transects surveyed.

	BCR 17 (S = 226)			National Grasslands (S = 47)			Thunder Basin NG (S = 11)		
Species	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**	**Psi**	**%CV**	**n Tran**
Northern Harrier	--	--	9	0.314	69	7	0.246	105	1
Long-billed Curlew	0.019	57	7	0.212	79	2	0.000	--	0
Marbled Godwit	0.111	63	8	0.024	47	3	0.000	--	0
Red-headed Woodpecker	0.004	35	7	0.000	--	0	0.000	--	0
Black-backed Woodpecker	0.005	46	8	0.000	--	0	0.000	--	0
Loggerhead Shrike	--	--	10	0.127	74	2	0.480	74	2
Clark's Nutcracker	0.003	29	9	0.000	--	0	0.000	--	0
Northern Rough-winged Swallow	0.071	50	12	0.088	61	3	0.000	--	0
Brown Creeper	0.073	63	15	0.000	--	0	0.000	--	0
Veery	0.128	70	8	0.024	55	2	0.000	--	0
Sprague's Pipit	0.061	49	7	0.000	--	0	0.000	--	0
Baird's Sparrow	--	--	9	0.020	47	3	0.000	--	0
Song Sparrow	0.007	55	8	0.053	102	1	0.000	--	0
McCown's Longspur	0.022	88	3	0.000	--	0	0.000	--	0

*Bolded species are USFS priority species (sensitive species or management indicator species) in the Rocky Mountain Region (Region 2).

National Park Service

Field technicians surveyed 4 of 4 (100%) assigned transects on National Park Service lands within the Northern Great Plains Inventory and Monitoring Network (one in Badlands National Park, one in Wind Cave National Park, and two in Theodore Roosevelt National Park in 2009 (Table 1). Technicians conducted 40 point counts within these 4 transects between 16 May and 9 July 2009. Technicians detected 369 birds of 43 species on National Park Service lands.

RMBO estimated National Park Service-wide density and population sizes of 30 species, 6 of which are priority species (Table 25). The data yielded robust density estimates (CV < 50%) for seven of these species. Note that many of the %CVs for these estimates are large due to the small number of transects surveyed. We could not estimate occupancy rates of priority species for National Park Service lands due to the small number of transects surveyed.

Table 24. National Park Service strata and sample allocation within the Badlands and Prairies Bird Conservation Region 17 (BCR17).

State	Strata	Targeted	Sampled
ND	National Park Service	2	2
SD	National Park Service	2	2

Table 25. Estimated densities per km^2 (D), population sizes (N), percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding bird species in the Badlands and Prairies Bird Conservation Region (17), by BCR and National Park Service, 2009. S indicates the number of transects surveyed.

	BCR 17 (S = 226)				All National Parks (S = 4)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**
Ring-necked Pheasant	1.27	458,514	36	293	0.18	228	100	1
Killdeer	2.80	1,009,427	69	174	1.50	1,871	100	1
Upland Sandpiper[3]	4.43	1,596,451	58	272	4.68	5,842	102	7
Mourning Dove	4.74	1,710,272	25	918	7.73	9,651	17	32
Northern Flicker	0.90	323,943	41	240	0.20	250	101	3
Plumbeous Vireo	0.18	66,596	26	90	0.64	803	102	1
Black-billed Magpie[3]	0.31	113,365	42	67	0.32	395	86	2
American Crow	0.13	45,900	31	164	1.40	1,746	45	8
Horned Lark	27.49	9,911,515	20	1185	12.32	15,376	100	6
Barn Swallow	10.37	3,738,547	67	73	1.16	1,451	101	5
Black-capped Chickadee	1.82	657,553	35	306	0.44	554	100	1
Rock Wren	1.64	591,726	34	195	12.44	15,527	100	12
House Wren	6.78	2,444,128	38	438	1.32	1,646	100	5
Mountain Bluebird[3]	2.76	993,729	29	212	3.90	4,866	100	4
American Robin	5.92	2,133,843	24	800	0.93	1,161	101	2
Yellow Warbler[3]	4.54	1,637,741	39	242	1.81	2,258	102	6
American Redstart	0.37	133,567	30	103	2.02	2,527	101	2
Ovenbird	0.59	211,137	16	347	0.52	655	100	1
Yellow-breasted Chat	0.33	120,463	36	90	1.55	1,936	110	7
Spotted Towhee	3.00	1,082,088	35	438	6.54	8,165	21	21
Chipping Sparrow	7.87	2,837,272	23	780	8.20	10,236	66	5
Field Sparrow	0.98	353,995	34	181	3.24	4,038	40	17
Vesper Sparrow[3]	7.17	2,585,006	0	696	1.09	1,362	86	6
Lark Sparrow[3]	13.77	4,965,131	20	487	7.25	9,045	33	11
Grasshopper Sparrow[3]	62.49	22,529,388	36	994	38.69	48,287	45	19
Red-winged Blackbird	9.21	3,318,786	15	487	4.91	6,126	100	5

	BCR 17 (S = 226)				All National Parks (S = 4)			
Species	**D[1]**	**N**	**%CV**	**n[2]**	**D**	**N**	**%CV**	**n**
Western Meadowlark[3]	41.01	14,785,770	8	4550	62.55	78,067	53	100
Brewer's Blackbird	1.52	549,283	31	168	3.60	4,488	8	13
Brown-headed Cowbird	47.61	17,165,961	32	1007	3.19	3,987	100	4
American Goldfinch	3.25	1,172,540	41	100	2.32	2,894	73	6

[1] D = (birds/km^2);
[2] n = number of independent detections used to estimate D and N.
[3] Priority species in Bird Conservation Region 17 (see Appendix A).

Maximum Entropy Modeling

RMBO created distribution models for three priority species in BCR 17: Lark Bunting, Grasshopper Sparrow and Chestnut-collared Longspur (Figures 9 - 11). The AUC values for all three species indicate that the predictive performance of these distribution models is high (Table 24). The distribution model for Lark Bunting showed more suitable habitat in the Montana and South Dakota portion of BCR 17 and less suitable habitat along the western boundary, northeastern and south-central portions (Black Hills National Forest) of BCR 17 (Fig. 9). The distribution model for Grasshopper Sparrow showed higher habitat suitability in South Dakota, North Dakota and the central-eastern portion of Montana of BCR 17 (Fig. 10). The model for Chestnut-collared Longspur showed a well defined area of higher habitat suitability restricted to the eastern part of BCR 17 (Fig. 11).

Table 26. AUC values for the training model (AUC TrM), test model (AUC TeM) and 95% nonparametric bootstrap confidence intervals for the AUC values.

Species	AUC TrM	AUC TeM	LCL	UCL
Lark Bunting	0.95	0.93	0.90	0.96
Grasshopper Sparrow	0.93	0.93	0.89	0.99
Chestnut-collared Longspur	0.98	--	0.96	0.99

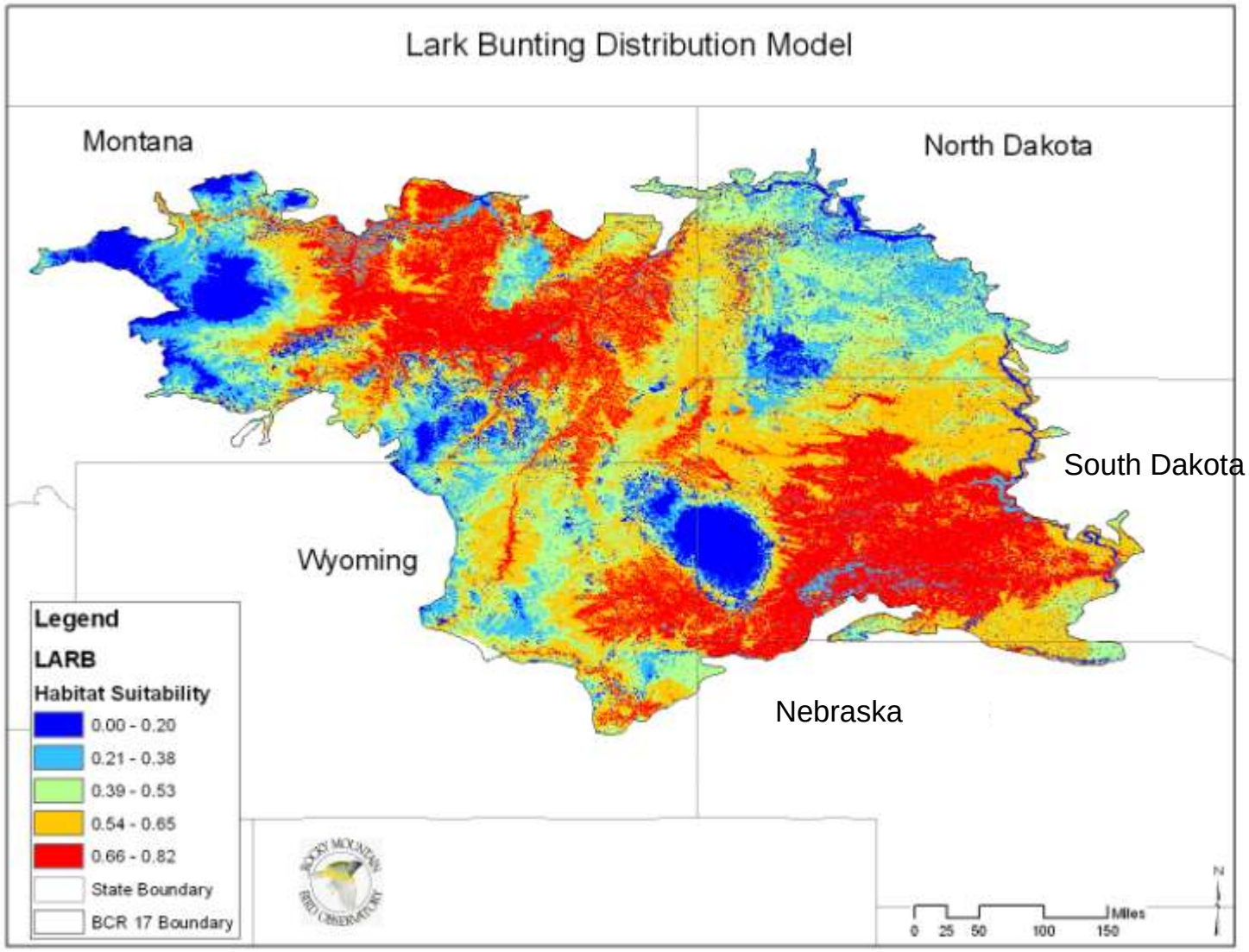

Figure 9. Maximum Entropy Distribution model for Lark Bunting in the Badlands and Prairies Bird Conservation Region (BCR 17), 2009.

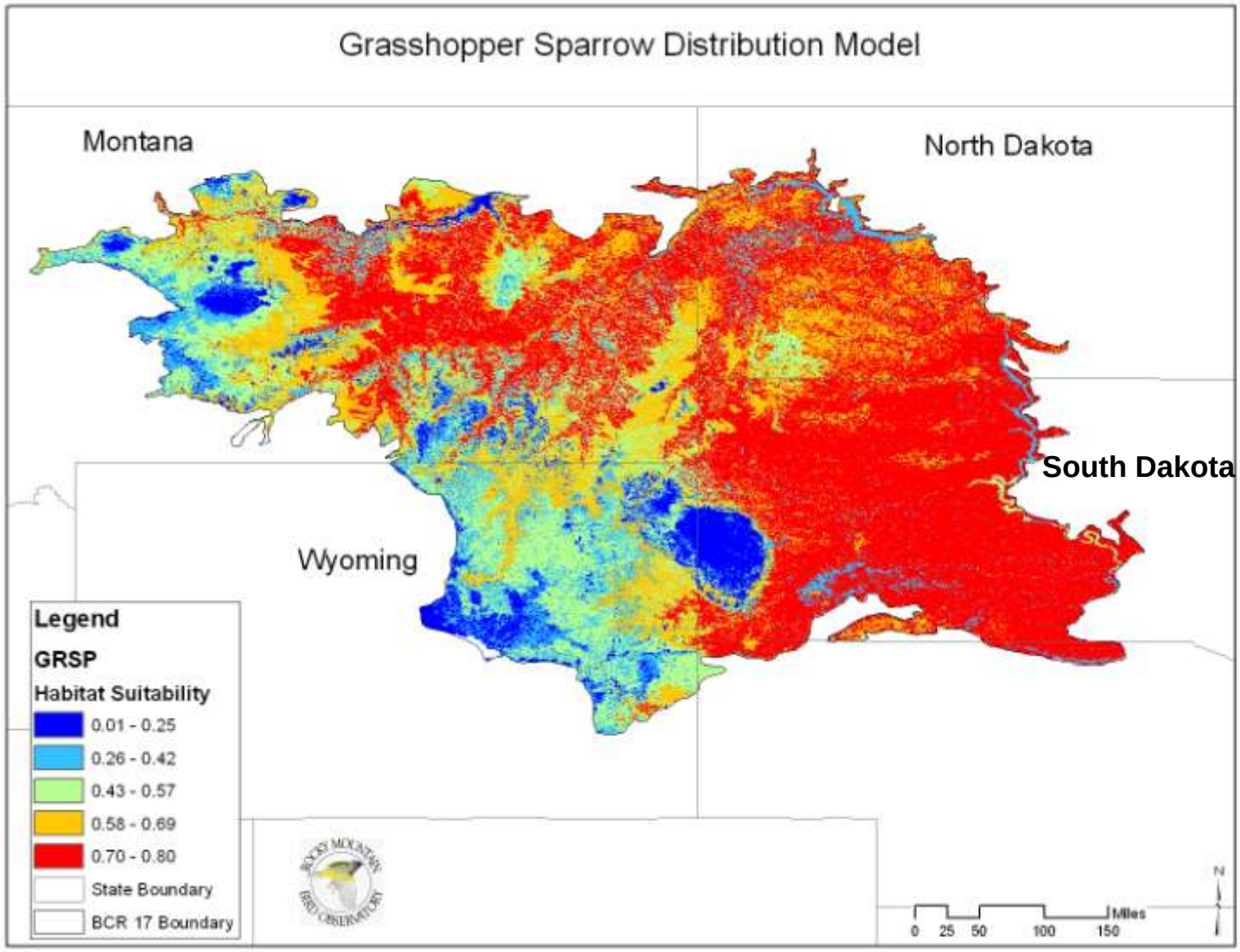

Figure 10. Maximum Entropy Distribution model for Grasshopper Sparrow in the Badlands and Prairies Bird Conservation Region (BCR 17), 2009.

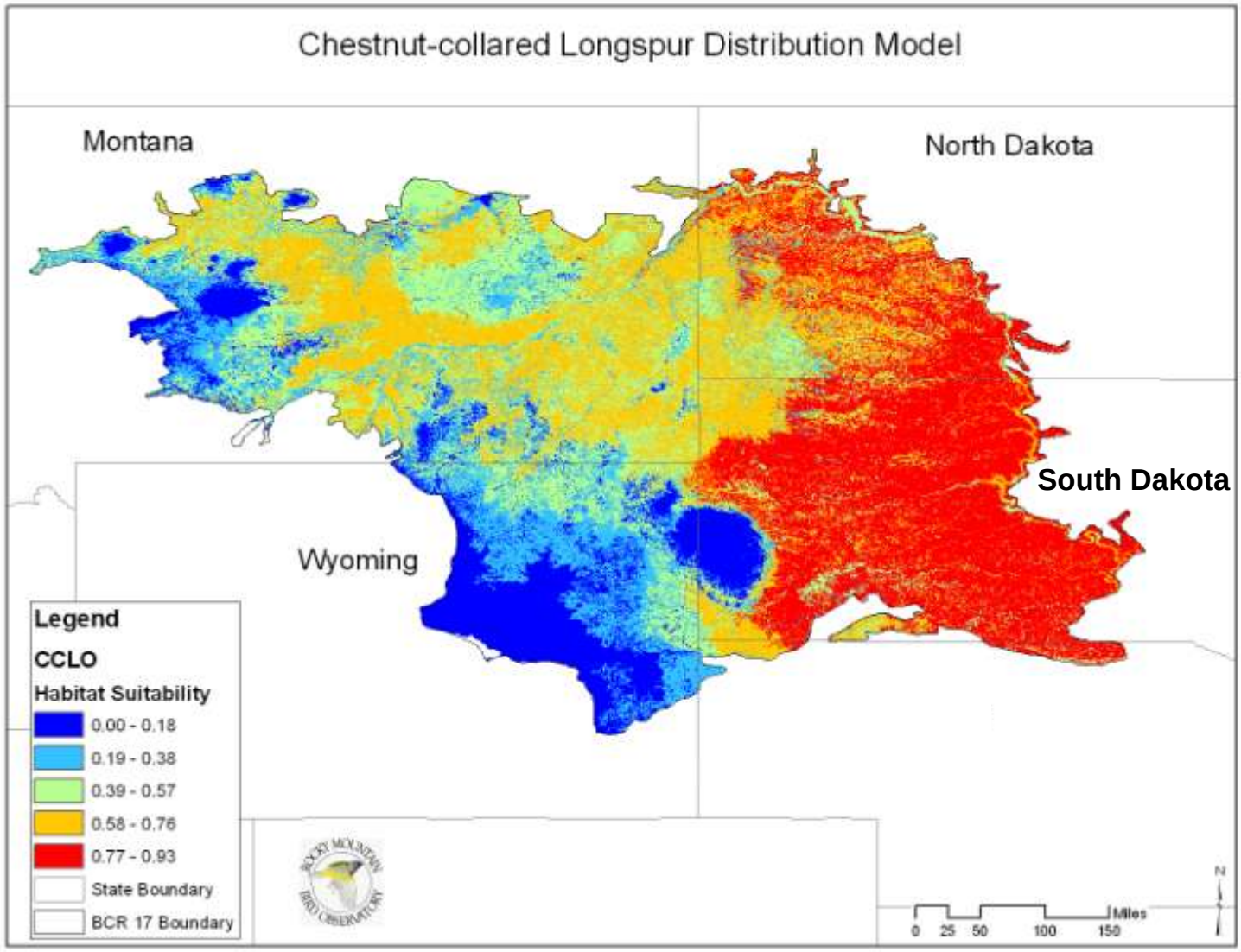

Figure 11. Maximum Entropy Distribution model for Chestnut-collared Longspur in the Badlands and Prairies Bird Conservation Region (BCR 17), 2009.

DISCUSSION AND RECOMMENDATIONS

2009 was the first year the IMBCR design was implemented in BCR 17. Because parameter estimates at small scales are integrated into estimates at larger scales, we obtained precise large-scale estimates of density and population sizes even when some strata contained very few samples. If RMBO and its partners increase the number of samples surveyed in each stratum in future years, we will be able to estimate density and population for more species in individual strata under the current IMBCR sampling design.

This report provides precise (CV < 50%) strata-wide and BCR-wide density and population estimates for 55 species in BCR 17 using Distance sampling theory. Simulations using 10 years of data from a similar avian monitoring program (J. Blakesley, unpublished) indicated that it would be possible to detect an average annual 3% decline in the population of a species within 25 years with 80% power and CV ≤ 40%. A similar trend could be detected within 30 years with CV ≤ 50%. It is important to note that the ability to detect population trends for any species is a function of not only the sampling effort but also the abundance and annual variation in abundance of that particular species. Some grassland bird species shift their breeding ranges from year to year based on environmental conditions. These species may require more precise density estimates to monitor population trends within 25-30 years.

For the first time, we used occupancy modeling to estimate the proportion of sites occupied for 14 priority species, for which there were insufficient data to estimate density. This new method for monitoring uncommon species required substantial time for data preparation and analysis. In addition to distance sampling, using analytical methods such as occupancy modeling can increase the number of bird species that we are able to effectively monitor, thus providing a clearer picture of the health of bird populations throughout BCR 17. As suggested by MacKenzie et al. (2005), we improved inferences about populations of rare species by estimating site occupancy instead of abundance, and borrowing information about detectability from other places or times. By estimating a common detection parameter over the entire BCR 17, we were able to estimate site occupancy for strata and regions that would otherwise have insufficient numbers of samples and detections (MacKenzie et al. 2005).

We identified three limitations of occupancy estimation as applied to the current sample design. First, the occupancy model occasionally failed to converge when strata contained only two sample units. This limitation prevented us from estimating site occupancy for some regions. Second, small sample sizes in strata comprised of large geographic areas may have produced biased estimates of site occupancy. Because we estimated regional site occupancy using a weighted mean indexed by stratum area, small-sample estimates from large strata often received more weight than large-sample estimates from small strata. For example, the relatively large BCR 17-wide estimates of occupancy for the Marbled Godwit (*Limosa fedoa*) and Veery (*Catharus fuscescens*) were strongly influenced by small-sample (n = 2) estimates from North Dakota All Other Lands (48,027 km^2) and South Dakota All Other Lands (89,931 km^2), respectively. We recommend avoiding the allocation of only two sample units per stratum in the future. Strata with fewer than approximately 10 samples are not expected to produce robust estimates of occupancy. Finally, several occupancy estimates exhibited low precision with Coefficients of Variation exceeding 50%. We anticipate that increasing the number of sample units in each stratum will improve the precision of the occupancy estimates.

The multi-scale occupancy model can easily be extended to investigate habitat relationships for priority species. The probability of occupancy for the 1 km^2 sample units can be modeled as a function of habitat covariates such as vegetation cover and land use. The habitat relationships can be used to identify habitats that support populations of priority species and these habitats can then be prioritized for protection by management. Habitat models may reveal spatial trends in occupancy related to habitat loss or land use that are symptomatic of population declines, and suggest land management strategies for species recovery.

In the past, many bird monitoring programs generally avoided surveying on private lands, limiting inferences about bird populations to public lands. The successful survey effort on private lands in 2009 demonstrated that accessing private lands is possible and can be accomplished efficiently. Figure 2 illustrates that private lands make up a substantial portion of the study area. Surveying on these lands allows inferences to be made about bird populations throughout BCR 17. We are actively improving our ability to contact landowners in a timely manner by hiring a landowner liaison and effectively managing a landowner database.

This sampling design did not use habitat type as a basis for stratification. However, because field technicians collect vegetation data in the field at each survey point, we can post-stratify the data by vegetation cover type and habitat, and estimate avian densities by habitat (for habitats with large enough sample size). Alternatively, we can use remotely-sensed data such as the Gap Analysis data layers to post-stratify the data by vegetation and habitat type. Analyses of avian-habitat relationships using these data will help guide future conservation and management, especially for priority species.

Knowing where suitable habitat occurs for a given species is critical for conservation. Geographic distribution models highlight areas of suitable habitat for individual species and groups of species which will assist land managers in management and conservation planning. Maxent distribution models had high predictive performance for the 3 priority species modeled: Lark Bunting, Grasshopper Sparrow and Chestnut-collared Longspur. All 3 models showed a pattern of high habitat suitability in the eastern portion of BCR 17 and the north rolling high plains of Montana showed high habitat suitability for the Lark Bunting and Grasshopper Sparrow models. Model selection has not been fully developed for Maxent models; however the jackknife procedure has been used to address model selection in maximum entropy models (Yost et al. 2008). In the future we plan to identify which variables in the model have the most influence on species distributions.

Population estimates are becoming an important conservation tool for the Joint Ventures and the developing Landscape Conservation Cooperatives that are being established by the USFWS to evaluate success. Population estimates are currently provided by Partners in Flight at a variety of scales varying from the BCR, state and BCR/state boundaries. These estimates, found in the PIF Population Estimates Database (http://rmbo.org/pif_db/laped/), are the first population estimates provided for landbirds. This first effort to calculate population estimates used BBS data and several correction factors to try to compensate for detectability (Blancher et.al. 2007). This document identified some next steps that need to be addressed.

The IMBCR design has taken steps to improve upon the estimates within the PIF population estimates Database. For the first time, RMBO has generated population estimates for BCR 17 and BCR 17/state boundaries. We have also calculated population estimates for smaller land areas such as Forest Service lands. The population estimates can be directly compared to evaluate bird populations at a variety of scales. In BCR 17 we have also calculated species-specific detection distances that can be used to update the PIF Landbird Population Estimate

Database. This new design can work with the database to refine the population estimates and reflect a more precise estimate that will improve abilities to more successfully evaluate management actions.

The spatially-balanced sampling design in BCR 17 serves as a model for other long-term monitoring efforts because of its ability to address the conservation and management needs of a wide range of stakeholders, landowners and governmental entities at both local and regional scales. Our monitoring design represents one method for achieving effective collaboration and coordinated bird monitoring in North America (NABCI 2007) and could be applied to other BCRs and regions across the continent.

Our sampling design is not limited to estimating population density and occupancy rates of birds. This design could be used to estimate nesting success or other demographic parameters. Furthermore, this sampling design could be used to monitor the distribution and population dynamics of additional taxa, including reptiles, small mammals and plants. A spatially balanced design using similar stratification and cell weighting for ponds and wetlands could be used to monitor shorebirds and amphibians, whereas a design with larger sample cells would be appropriate for monitoring large mammals. Identifying and monitoring the distributions of plants and animals at multiple spatial scales over time will help scientists and land managers face challenges associated with climate change and other natural and anthropogenic changes to the environment.

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APPENDIX A

Priority species recorded in the Badlands and Prairies Bird Conservation Region (BCR 17) by management designation, 2009.

	BLM[1]	PIF[2]	State Wildlife Agencies[3]				USFS[4]		USFWS[5]	Density	Occupancy
Species	BCR 17	BCR 17	MTFWP	NDGFD	SDGFP	WGFD	Region 1	Region 2	BCR 17	Estimated	Estimated
Northern Pintail				SoCP LII		SGCN					
Canvasback				SoCP LII		SGCN					
Ruffed Grouse							MIS	MIS			
Greater Sage-Grouse	MT,ND,SD,WY	CC,RC,CS,RS	S2	SoCP LII	SGCN	SGCN	MIS, S	S			
Sharp-tailed Grouse		CS,RS		SoCP LII			MIS				
Greater Prairie-Chicken		CC,RC		SoCP LII	SGCN		MIS, S	S			
American White Pelican			S3B	SoCP LI	SGCN	SGCN					
American Bittern			S3B	SoCP LI		SGCN		S	BCC		
Great Blue Heron			S3			SGCN					
Osprey					SGCN, ST						
Northern Harrier		RC		SoCP LII				S			Y
Northern Goshawk	MT,ND,SD,WY	RC	S3		SGCN	SGCN	MIS	S			
Swainson's Hawk	MT,ND,SD	CC		SoCP LI		SGCN					
Ferruginous Hawk	MT,ND,SD,WY	RC,RS	S3B	SoCP LI	SGCN	SGCN		S	BCC		
Golden Eagle	MT,ND,SD	RC	S3	SoCP LII			MIS		BCC		
Prairie Falcon				SoCP LII			MIS		BCC		
Mountain Plover	MT,ND,SD		S2B			SGCN		S	BCC		
Upland Sandpiper				SoCP LI		SGCN			BCC	Y	
Long-billed Curlew	MT,ND,SD,WY		S3B	SoCP LI	SGCN	SGCN	S	S	BCC		Y
Marbled Godwit	MT,ND,SD			SoCP LI	SGCN				BCC		Y
Wilson's Phalarope				SoCP LI	SGCN						
Black-billed Cuckoo		RC	S3B	SoCP LI					BCC		
Burrowing Owl	MT,ND,SD	RC	S3B	SoCP LII	SGCN	SGCN	S	S	BCC		
Short-eared Owl		CC,RC		SoCP LII		SGCN		S	BCC		
White-throated Swift		CC									
Lewis's Woodpecker		CC,RC	S2B		SGCN	SGCN		S	BCC		
Red-headed Woodpecker	MT,ND,SD	CC,RC	S3B	SoCP LII					BCC		Y
American Three-toed Woodpecker	MT,ND,SD				SGCN	SGCN	MIS	S			
Black-backed Woodpecker	MT,ND,SD	RC	S3		SGCN	SGCN	S	MIS, S			Y
Willow Flycatcher		CC				SGCN		E			

	BLM[1]	PIF[2]	State Wildlife Agencies[3]				USFS[4]		USFWS[5]	Density	Occupancy
Species	BCR 17	BCR 17	MTFWP	NDGFD	SDGFP	WGFD	Region 1	Region 2	BCR 17	Estimated	Estimated
Say's Phoebe		RS									
Loggerhead Shrike	MT,ND,SD,WY	RC	S3B	SoCP LII			S	S	BCC		Y
Pinyon Jay		CC,RC	S3						BCC		
Clark's Nutcracker			S3								Y
Black-billed Magpie		RC								Y	
Northern Rough-winged Swallow		RC									Y
Brown Creeper			S3					MIS			Y
Sedge Wren	MT,ND,SD		S3B	SoCP LII							
American Dipper					SGCN, ST						
Golden-crowned Kinglet								MIS			
Blue-gray Gnatcatcher	MT,ND,SD		MT				S				
Mountain Bluebird		RC								Y	
Veery			S3B								Y
Sage Thrasher	MT,ND,SD,WY	RC	S3B			SGCN			BCC		
Sprague's Pipit	MT,ND,SD	CC,RC	S3B	SoCP LI	SGCN		S		BCC		Y
Yellow Warbler							MIS			Y	
Ovenbird							MIS			Y	
Brewer's Sparrow	MT,ND,SD,WY	CC,RC	S3B			SGCN	MIS	S	BCC	Y	
Vesper Sparrow		RC,RS								Y	
Lark Sparrow							MIS			Y	
Sage Sparrow	MT,ND,SD,WY		S3B			SGCN		S	BCC		
Lark Bunting		RC,CS,RS		SoCP LI	SGCN	SGCN				Y	
Grasshopper Sparrow		RC,CS,RS	S3B	SoCP LI		SGCN		S	BCC	Y	
Baird's Sparrow	MT,ND,SD,WY	CC,RC	S3B	SoCP LI	SGCN		S		BCC		Y
Song Sparrow								MIS			Y
Dark-eyed Junco (White-winged)					SGCN					Y	
McCown's Longspur	MT,ND,SD	CC,RC,CS,RS	S3B			SGCN		S	BCC		Y
Chestnut-collared Longspur	MT,ND,SD	RC,CS,RS	S2B	SoCP LI	SGCN	SGCN		S	BCC	Y	
Dickcissel	MT,ND,SD	CC,RC		SoCP LII		SGCN			BCC		
Bobolink	MT,ND,SD		S3B	SoCP LII		SGCN				Y	
Western Meadowlark		RS								Y	

[1] BLM = Bureau of Land Management; BCR 17 = Bird Conservation Region 17 (Badlands and Prairies); MT = Sensitive Species in Montana; ND = Sensitive Species in North Dakota; SD = Sensitive Species in South Dakota (BLM 2009); WY = Sensitive Species in Wyoming (BLM 2002).

[2] PIF = Partners In Flight; BCR 17 = Bird Conservation Region 17 (Badlands and Prairies); CC = Continental Concern Species; RC = Regional Concern Species; CS = Continental Stewardship Species; RS = Regional Stewardship Species (PIF 2005).

[3] State; MT = Montana; S1 = Species at high risk because of extremely limited and/or rapidly declining numbers, range, and/or habitat; S2 = Species at risk because of very limited and/or declining numbers, range, and/or habitat; S3 = Species potentially at risk because of limited and/or declining numbers, range, and/or habitat, even though it may be abundant in some areas (MTNHP and MFWP 2009); ND = North Dakota; SoCP = Species of Conservation Priority; L1 = Level 1: Species in greatest need of conservation; L2 = Level 2: Species in need of conservation; but that have had support from other wildlife programs (Hagen et al. 2005); SD = South Dakota; SGCN = Species of Greatest Conservation Need; ST = State Threatened Species (SDGFP 2006, SDGFP 2008); WY = Wyoming; SGCN = Species of Greatest Conservation Need (WGFD 2005).

[4] USFS = United States Forest Service; Region 1 = USFS Northern Region (Region 1); Region 2 = USFS Rocky Mountain Region (Region 2); MIS = management indicator species; S = sensitive species; Climate = species of interest relative to climate change.

[5] USFWS = United States Fish and Wildlife Service; BCC = Bird of Conservation Concern for Badlands and Prairies Bird Conservation Region (17) (USFWS 2008).

APPENDIX B

Number of birds detected in the Montana portion of the Badlands and Prairies Bird Conservation Region (BCR 17) by stratum, 2009[1].

Species	All Other - Plains	All Other - Rockies	All Other - Shale	USFWS	Rivers
Canada Goose	1	20	12		52
Gadwall	1		166		4
American Wigeon		10			5
Mallard					7
Blue-winged Teal					4
Northern Shoveler					1
Northern Pintail	2		7		
Common Merganser					1
Ruddy Duck		2			
Gray Partridge					6
Ring-necked Pheasant	27	9			71
Sharp-tailed Grouse[2]	22	1			1
Wild Turkey					3
Eared Grebe			9		
Western Grebe		3			
American White Pelican[2]		3			4
Double-crested Cormorant					2
Great Blue Heron[2]		1			5
Turkey Vulture					5
Osprey					3
Northern Harrier[2]			1		
Cooper's Hawk	1				
Swainson's Hawk[2]		1			1
Red-tailed Hawk	2				9
American Kestrel	8				2
Merlin	1				

Species	All Other - Plains	All Other - Rockies	All Other - Shale	USFWS	Rivers
Prairie Falcon[2]	1				
Virginia Rail	1				1
Sora	2				2
American Coot		3			
Sandhill Crane	4	6			15
Killdeer	6	2	1		18
Spotted Sandpiper					1
Willet			2		
Upland Sandpiper[2]	26	2	4		1
Long-billed Curlew[2]					2
Marbled Godwit[2]		1	3		1
Wilson's Snipe		1			1
Wilson's Phalarope	4		1		
Ring-billed Gull					12
Rock Pigeon					2
Mourning Dove	90	5	1	3	95
Great Horned Owl	1				1
Common Nighthawk	9				1
Belted Kingfisher					2
Hairy Woodpecker					2
Northern Flicker	10			1	21
Olive-sided Flycatcher					1
Western Wood-Pewee	3				13
Willow Flycatcher[2]	1				1
Least Flycatcher	3				5
Dusky Flycatcher	1				
Say's Phoebe[2]	2		1		4
Western Kingbird	26				10
Eastern Kingbird	32	5			14
Loggerhead Shrike[2]	3			1	

Species	All Other - Plains	All Other - Rockies	All Other - Shale	USFWS	Rivers
Plumbeous Vireo					2
Warbling Vireo					4
Black-billed Magpie[2]	28	18			13
American Crow	1	4			11
Common Raven	2				1
Horned Lark	30	10	56	1	48
Tree Swallow					31
Violet-green Swallow					6
Northern Rough-winged Swallow[2]	14				19
Bank Swallow					2
Cliff Swallow					12
Barn Swallow		1			9
Black-capped Chickadee	6				7
Red-breasted Nuthatch	1				
Brown Creeper[2]	1				
Rock Wren	33			4	2
House Wren	46				64
Sedge Wren[2]	2				
Mountain Bluebird[2]	16				
Townsend's Solitaire	2				
Hermit Thrush	3				
American Robin	44	1			24
Gray Catbird	1				7
Northern Mockingbird	1				
Brown Thrasher					2
European Starling					5
Sprague's Pipit[2]	17	1			1
Yellow Warbler	20	1			59
Yellow-rumped Warbler	5				10
Ovenbird		1			

Species	All Other - Plains	All Other - Rockies	All Other - Shale	USFWS	Rivers
Common Yellowthroat		5			12
Yellow-breasted Chat					29
Western Tanager	2				2
Green-tailed Towhee	2				1
Spotted Towhee	34	1			18
Chipping Sparrow	15			2	8
Clay-colored Sparrow	2	9	1		6
Brewer's Sparrow[2]	59	1	16		1
Field Sparrow	16				10
Vesper Sparrow[2]	143	26	16	4	36
Lark Sparrow	54	13	2		78
Lark Bunting[2]	124		135		57
Savannah Sparrow	3				10
Grasshopper Sparrow[2]	123	10	28	2	13
Baird's Sparrow[2]					1
Dark-eyed Junco	2				3
Chestnut-collared Longspur[2]	2				
Black-headed Grosbeak	3				
Bobolink[2]	3				2
Red-winged Blackbird	42	14			115
Western Meadowlark[2]	424	51	105	17	209
Yellow-headed Blackbird	1	8			2
Brewer's Blackbird	14	2			9
Common Grackle	1				15
Brown-headed Cowbird	93	18	13	3	45
Bullock's Oriole	12				13
American Goldfinch	16	2			12

[1] Survey effort varied across strata (see Table 1).
[2] Priority species in Montana (see Appendix A).

Number of birds detected in the Montana portion of the Badlands and Prairies Bird Conservation Region (BCR 17) by stratum, 2009[1], continued.

Species	BLM - Glaciated Plains	BLM - Rockies	BLM - Northern Plains	BLM - Shale	Custer NF	Lewis and Clark NF
Canada Goose	22		80	17		
Gadwall	6					
American Wigeon	2		27	11		
Mallard	5	2	7	7		
Blue-winged Teal			9	1		
Northern Pintail	2					
Canvasback			1			
Ruddy Duck	2					
Ring-necked Pheasant	19	5	6		10	
Greater Sage-Grouse[2]				4		
Sharp-tailed Grouse[2]			1	1		
Wild Turkey	3		2		6	
American White Pelican[2]	2				27	
Double-crested Cormorant		1				
American Bittern[2]				3		
Great Blue Heron[2]				1		
Turkey Vulture	3		5	1	1	
Osprey	1					
Northern Harrier[2]	4	3			1	
Sharp-shinned Hawk			1			
Cooper's Hawk					2	2
Swainson's Hawk[2]		1		4		
Red-tailed Hawk	1		5	2	7	1
Ferruginous Hawk[2]			1	3		
Golden Eagle[2]						1
American Kestrel			5		2	
Merlin			2		2	
Sandhill Crane					1	

Species	BLM - Glaciated Plains	BLM - Rockies	BLM - Northern Plains	BLM - Shale	Custer NF	Lewis and Clark NF
Killdeer	5	6	25	21		
Mountain Plover[2]	4					
Spotted Sandpiper			1			
Willet	3			8		
Upland Sandpiper[2]	9		21	43	2	
Long-billed Curlew[2]	9			2		
Marbled Godwit[2]	2		2			
Wilson's Phalarope	4			1		
California Gull		6				
Rock Pigeon		1				
Mourning Dove	45		118	58	84	5
Black-billed Cuckoo[2]					4	
Burrowing Owl	4					
Common Nighthawk	2	1	4	1	15	
Common Poorwill					1	
Broad-tailed Hummingbird					1	
Red-headed Woodpecker[2]					19	
Williamson's Sapsucker						2
Downy Woodpecker					1	
Hairy Woodpecker					5	3
Black-backed Woodpecker[2]					1	
Northern Flicker	1	3	11	1	41	16
Western Wood-Pewee			3		42	13
Least Flycatcher					3	
Hammond's Flycatcher						11
Dusky Flycatcher	4		10		6	1
Cordilleran Flycatcher						5
Say's Phoebe[2]			10		9	
Western Kingbird		1	4		13	
Eastern Kingbird	11	4	19		6	

Species	BLM - Glaciated Plains	BLM - Rockies	BLM - Northern Plains	BLM - Shale	Custer NF	Lewis and Clark NF
Loggerhead Shrike[2]			5	3	1	
Plumbeous Vireo					12	
Warbling Vireo						8
Gray Jay						1
Blue Jay						1
Pinyon Jay[2]	1				10	
Clark's Nutcracker[2]						51
Black-billed Magpie[2]	1	1	10		1	
American Crow	2	6	4	11	12	2
Common Raven	5		6			21
Horned Lark	175	13	57	129	2	
Tree Swallow	1				2	
Violet-green Swallow			4			2
Northern Rough-winged Swallow[2]	3		2			
Cliff Swallow			22		3	
Barn Swallow	20	2				
Black-capped Chickadee			7		39	18
Mountain Chickadee						26
Red-breasted Nuthatch			5		19	16
White-breasted Nuthatch					7	1
Brown Creeper[2]					1	10
Rock Wren			24		29	17
Canyon Wren			1			2
House Wren	3		24		138	7
Golden-crowned Kinglet						3
Ruby-crowned Kinglet						9
Eastern Bluebird					1	
Mountain Bluebird[2]	10	1	15		29	5
Townsend's Solitaire	1				6	10
Veery[2]						9

Species	BLM - Glaciated Plains	BLM - Rockies	BLM - Northern Plains	BLM - Shale	Custer NF	Lewis and Clark NF
Swainson's Thrush						5
Hermit Thrush		2			3	72
American Robin	6	7	12		74	73
Sage Thrasher[2]	2				2	
Brown Thrasher		1	9			
European Starling	1					
Sprague's Pipit[2]	1		11			
Cedar Waxwing					1	
Yellow Warbler	2	2	7		37	8
Yellow-rumped Warbler		1	10		24	114
Black-and-white Warbler	10					
American Redstart					13	5
Ovenbird					10	20
MacGillivray's Warbler		5				2
Common Yellowthroat	5				2	10
Wilson's Warbler						4
Yellow-breasted Chat	4				10	
Western Tanager	1	1	2		12	16
Green-tailed Towhee	4	7	6		2	
Spotted Towhee	53	1	5		89	
Chipping Sparrow	21		56	6	88	20
Clay-colored Sparrow	12		1	4	1	
Brewer's Sparrow[2]	116	1	29	19	10	
Field Sparrow	30		20			2
Vesper Sparrow[2]	63	12	63	60	11	
Lark Sparrow	28	2	59	82	61	1
Lark Bunting[2]	180		204	262	20	
Savannah Sparrow	1					
Grasshopper Sparrow[2]	3		30	12	2	
Baird's Sparrow[2]	3	1				

Species	BLM - Glaciated Plains	BLM - Rockies	BLM - Northern Plains	BLM - Shale	Custer NF	Lewis and Clark NF
Song Sparrow	1					4
White-crowned Sparrow						1
Dark-eyed Junco		1	6		24	112
McCown's Longspur[2]	27					
Chestnut-collared Longspur[2]	7		2			
Black-headed Grosbeak					3	1
Lazuli Bunting			1			
Dickcissel[2]					1	
Bobolink[2]			2			
Red-winged Blackbird	49	4	15	17		
Western Meadowlark[2]	340	37	429	319	98	
Yellow-headed Blackbird	1					
Brewer's Blackbird	76	11	39	20	9	
Common Grackle	2		1			
Brown-headed Cowbird	66	1	86	102	103	4
Bullock's Oriole			2		19	
Red Crossbill			2		21	6
Pine Siskin	1	1				29
American Goldfinch	3		5		31	2
Evening Grosbeak			3			
House Sparrow		16				

[1] Survey effort varied across strata (see Table 1).
[2] Priority species in Montana (see Appendix A).

APPENDIX C

Number of birds detected in the North Dakota portion of the Badlands and Prairies Bird Conservation Region (BCR 17) by stratum, 2009[1].

Species	All Other	BLM	Cedar River NG	Little Missouri NG	NPS
Canada Goose			18		
Gadwall		18	3	5	
Mallard	10	4	11	17	
Blue-winged Teal		1	5		
Northern Shoveler			2		
Northern Pintail[2]	3		1		
Canvasback				2	
Gray Partridge				2	
Ring-necked Pheasant	19		25	41	
Sharp-tailed Grouse[2]				2	3
Wild Turkey				3	2
Double-crested Cormorant				5	
Great Blue Heron				1	
Turkey Vulture			1	1	1
Northern Harrier[2]	1		3		1
Cooper's Hawk				2	
Red-tailed Hawk	2			4	
Golden Eagle[2]		2			
American Kestrel		1		5	
American Coot				1	
Killdeer	1	11	2	6	
Upland Sandpiper[2]	10	15	3	12	1
Long-billed Curlew[2]				1	
Marbled Godwit[2]	5		2		
Wilson's Snipe	7			1	
Wilson's Phalarope[2]		9	5		
Mourning Dove	6	17	16	127	21
Common Nighthawk		7		3	
Downy Woodpecker				1	
Hairy Woodpecker				1	

Species	All Other	BLM	Cedar River NG	Little Missouri NG	NPS
Northern Flicker	1			4	3
Least Flycatcher				22	
Say's Phoebe[2]		2		15	
Western Kingbird	2		3	20	
Eastern Kingbird	8		6	29	
Plumbeous Vireo					1
Warbling Vireo				5	
Red-eyed Vireo				13	2
Black-billed Magpie[2]				9	1
American Crow				32	5
Horned Lark	8	161	44	38	
Tree Swallow	1			4	
Northern Rough-winged Swallow[2]				2	
Cliff Swallow			1		
Barn Swallow	17	4		14	6
Black-capped Chickadee				3	1
Rock Wren				17	
House Wren				42	5
Mountain Bluebird[2]				17	5
American Robin	1		1	30	2
Gray Catbird				15	
Brown Thrasher				10	
European Starling				1	
Cedar Waxwing				4	9
Yellow Warbler				69	6
Black-and-white Warbler				12	
American Redstart				11	2
Ovenbird				23	1
Common Yellowthroat			6	14	
Yellow-breasted Chat				39	7
Spotted Towhee				123	22
Chipping Sparrow			4	23	4
Clay-colored Sparrow		26	3	21	
Brewer's Sparrow[2]		4			
Field Sparrow				81	17

Species	All Other	BLM	Cedar River NG	Little Missouri NG	NPS
Vesper Sparrow[2]		13	1	58	6
Lark Sparrow				10	13
Lark Bunting[2]		260	2	12	
Savannah Sparrow	21	1	9		
Grasshopper Sparrow[2]	20	13	43	59	6
Baird's Sparrow[2]		2	2		
Song Sparrow				1	
Chestnut-collared Longspur[2]	3	10	39		
Black-headed Grosbeak				6	
Lazuli Bunting				1	1
Bobolink[2]	5	1	38	6	
Red-winged Blackbird	13	22	57	123	
Western Meadowlark[2]	25	141	88	345	32
Yellow-headed Blackbird		2		1	
Brewer's Blackbird			1	13	15
Common Grackle	9		5	1	1
Brown-headed Cowbird	6	87	54	113	6
Orchard Oriole	1			1	
American Goldfinch			1	17	6

[1] Survey effort varied across strata (see Table 1).
[2] Priority species in North Dakota (see Appendix A).

APPENDIX D

Number of birds detected in the Nebraska portion of the Badlands and Prairies Bird Conservation Region (BCR 17) by stratum, 2009[1].

Species	All Other	Oglala NG
Mallard		4
Northern Shoveler		2
Sharp-tailed Grouse[2]		1
Great Blue Heron		1
Northern Harrier[2]		1
Red-tailed Hawk		1
American Kestrel	1	
Prairie Falcon[2]		1
Killdeer	5	
Upland Sandpiper[2]	1	9
Long-billed Curlew[2]	2	
Mourning Dove	15	27
Common Nighthawk	7	2
Western Kingbird	2	2
Eastern Kingbird	1	
Horned Lark	25	62
Northern Rough-winged Swallow[2]		1
Cliff Swallow	7	
Barn Swallow		5
Rock Wren	1	3
European Starling		4
Lark Sparrow		2
Lark Bunting[2]	82	137
Grasshopper Sparrow[2]	50	102
Baird's Sparrow[2]		13

Species	All Other	Oglala NG
Red-winged Blackbird	2	21
Western Meadowlark[2]	127	330
Brewer's Blackbird		15
Brown-headed Cowbird	3	2

[1] Survey effort varied across strata (see Table 1).
[2] Priority species in Nebraska (see Appendix A).

APPENDIX E

Number of birds detected in the South Dakota portion of the Badlands and Prairies Bird Conservation Region (BCR 17) by stratum, 2009[1].

Species	All Other	Buffalo Gap NG	Fort Pierre NG	Grand River NG
Canada Goose	7		3	3
Gadwall	1			7
American Wigeon				2
Mallard	5	5	2	
Blue-winged Teal	3		10	1
Northern Shoveler			1	5
Northern Pintail	10		2	1
Green-winged Teal	1		1	
Ring-necked Duck				2
Ruddy Duck			3	
Ring-necked Pheasant	12		24	31
Greater Prairie-Chicken[2]			10	
Wild Turkey	9			10
Pied-billed Grebe			2	
Eared Grebe			1	
Double-crested Cormorant			1	
Turkey Vulture		2		
Northern Harrier[2]		2	3	7
Swainson's Hawk[2]	1		1	
Red-tailed Hawk	3	1		
American Coot			1	1
Killdeer	7	5	14	10
Upland Sandpiper[2]	20	13	35	41
Long-billed Curlew[2]		11		
Marbled Godwit[2]			18	

Species	All Other	Buffalo Gap NG	Fort Pierre NG	Grand River NG
Wilson's Snipe	4			1
Wilson's Phalarope	2		3	16
Mourning Dove	19	20	11	32
Burrowing Owl[2]		1		
Short-eared Owl[2]		2		
Common Nighthawk		1		
Belted Kingfisher				1
Downy Woodpecker				1
Northern Flicker	2			5
Least Flycatcher		1		
Say's Phoebe[2]	1	2		
Western Kingbird	20	8		6
Eastern Kingbird	3	3	2	1
Loggerhead Shrike[2]	3			
American Crow		2		
Horned Lark	32	41	4	41
Tree Swallow			1	
Barn Swallow	4	1	13	2
Black-capped Chickadee				1
Ruby-crowned Kinglet				1
Veery	18			9
American Robin	1	1		3
Brown Thrasher	1	2		6
Yellow Warbler	1			5
Yellow-rumped Warbler				1
Common Yellowthroat			2	2
Spotted Towhee	1			1
Chipping Sparrow				1
Clay-colored Sparrow	2			
Vesper Sparrow[2]			1	3

Species	All Other	Buffalo Gap NG	Fort Pierre NG	Grand River NG
Lark Sparrow	2	5	1	
Lark Bunting[2]		242	25	3
Savannah Sparrow	4			
Grasshopper Sparrow[2]	49	66	78	57
Song Sparrow[2]				1
Chestnut-collared Longspur[2]	61	6	6	117
Black-headed Grosbeak				3
Bobolink			11	
Red-winged Blackbird	7	2	49	38
Western Meadowlark[2]	62	137	146	103
Yellow-headed Blackbird			29	
Brewer's Blackbird		4		
Common Grackle	1		7	
Brown-headed Cowbird	60	14	120	87
American Goldfinch	2			1

[1] Survey effort varied across strata (see Table 1).
[2] Priority species in South Dakota (see Appendix A).

Number of birds detected in the South Dakota portion of the Badlands and Prairies Bird Conservation Region (BCR 17) by stratum, 2009[1], continued.

Species	Black Hills NF	BLM	Custer NF	NPS
Canada Goose	16	23		
Gadwall		4		
Mallard	2	1		
Northern Shoveler		8		
Hooded Merganser		4		
Ring-necked Pheasant				1
Sharp-tailed Grouse[2]	1			
Wild Turkey	28		1	1
Western Grebe	1			
Great Blue Heron	3			
Turkey Vulture	19	8	11	
Osprey[2]	1			
Northern Harrier[2]		1	1	
Northern Goshawk[2]	6			
Broad-winged Hawk[2]	1			
Red-tailed Hawk	9	3	4	1
Golden Eagle[2]				1
American Kestrel	8	1		1
Killdeer	1	26		1
Upland Sandpiper[2]	1	27		12
Long-billed Curlew[2]		2		
Wilson's Phalarope[2]		4		
Mourning Dove	53	32	30	12
Great Horned Owl	2		1	
Common Nighthawk	6	5		
White-throated Swift[2]	4			
Lewis's Woodpecker[2]	10			
Red-headed Woodpecker[2]	28			

Species	Black Hills NF	BLM	Custer NF	NPS
Red-naped Sapsucker	58		1	
Downy Woodpecker	12			
Hairy Woodpecker	59			
American Three-toed Woodpecker[2]	2			
Black-backed Woodpecker[2]	13			
Northern Flicker	107		1	
Western Wood-Pewee	128		4	
Alder Flycatcher	1			
Dusky Flycatcher	125		4	
Cordilleran Flycatcher	3			
Eastern Phoebe	3			
Say's Phoebe[2]			1	
Western Kingbird	1	1	1	
Eastern Kingbird	1	5	2	
Plumbeous Vireo	63			
Warbling Vireo	291			
Red-eyed Vireo	3			
Gray Jay	51			
Blue Jay	4			
Pinyon Jay[2]	7			
Clark's Nutcracker	7			
Black-billed Magpie[2]	5		1	1
American Crow	60	10	4	4
Horned Lark		115	3	6
Tree Swallow	1			
Violet-green Swallow	23		6	
Northern Rough-winged Swallow[2]	1	7	1	
Cliff Swallow				11
Barn Swallow	1	3		
Black-capped Chickadee	204		5	

Species	Black Hills NF	BLM	Custer NF	NPS
Red-breasted Nuthatch	264		4	
White-breasted Nuthatch	111		3	
Brown Creeper[2]	18			
Rock Wren	17		11	13
Canyon Wren	1			
House Wren	61	2	28	
American Dipper[2]	1			
Golden-crowned Kinglet[2]	8			
Ruby-crowned Kinglet	212			
Blue-gray Gnatcatcher	2			
Eastern Bluebird	3			
Mountain Bluebird[2]	96	10	11	
Townsend's Solitaire	88			
Veery	5			
Swainson's Thrush	80			
American Robin	380	1	9	
Gray Catbird	1		5	
Brown Thrasher	1			
European Starling				3
Cedar Waxwing	1			
Orange-crowned Warbler			1	
Virginia's Warbler	4			
Yellow Warbler	9		10	
Yellow-rumped Warbler	418		23	
American Redstart	29			
Ovenbird	142		5	
MacGillivray's Warbler	4			
Common Yellowthroat	6		2	
Yellow-breasted Chat			1	
Western Tanager	155		5	

Species	Black Hills NF	BLM	Custer NF	NPS
Spotted Towhee	40		34	
Chipping Sparrow	408	4	41	1
Clay-colored Sparrow			1	
Field Sparrow			7	
Vesper Sparrow[2]	95	8	8	
Lark Sparrow	41	16	43	
Lark Bunting[2]		158	19	
Savannah Sparrow		4		
Grasshopper Sparrow[2]	5	162	17	13
Baird's Sparrow[2]		6		
Song Sparrow[2]	5			
Lincoln's Sparrow	1	6		
Dark-eyed Junco[2]	356			
Chestnut-collared Longspur[2]		144		
Black-headed Grosbeak	19		2	
Lazuli Bunting	1			
Dickcissel[2]		33		
Bobolink		26		
Red-winged Blackbird	12	39	3	5
Western Meadowlark[2]	39	254	59	68
Brewer's Blackbird	13	4		
Common Grackle			1	
Brown-headed Cowbird	121	33	52	
Bullock's Oriole	1			
Cassin's Finch	1			
Red Crossbill	166			
White-winged Crossbill	4			
Pine Siskin	48		1	
American Goldfinch	28			

[1] Survey effort varied across strata (see Table 1).

[2] Priority species in South Dakota (see Appendix A).

APPENDIX F

Number of birds detected in the Wyoming portion of the Badlands and Prairies Bird Conservation Region (BCR 17) by stratum, 2009[1].

Common Name	All Other	Black Hills NF	BLM - Buffalo	BLM - Casper	BLM - Newcastle	Thunder Basin NG
Canada Goose	34					
Mallard	3		2			1
Ruffed Grouse		1				
Wild Turkey		5				
American White Pelican[2]						1
Turkey Vulture	2	1	1	1		1
Northern Harrier[2]	1					4
Northern Goshawk[2]		2				
Swainson's Hawk[2]	1		1			
Red-tailed Hawk	3	8			1	5
Ferruginous Hawk[2]	3			2		
Golden Eagle[2]	2			2		
American Kestrel	2	3	1	4	1	1
Prairie Falcon[2]				1		
Killdeer	2		1			7
Upland Sandpiper[2]			1		1	
Mourning Dove	22	1	4	9	4	48
Great Horned Owl	2					
Common Nighthawk		2	3			
White-throated Swift[2]		2				
Lewis's Woodpecker[2]		2				
Red-headed Woodpecker[2]		2				
Red-naped Sapsucker		16				
Downy Woodpecker		4				
Hairy Woodpecker	2	10				
Black-backed Woodpecker[2]		1				
Northern Flicker	3	13				1
Western Wood-Pewee		21		5		
Dusky Flycatcher	4	19				
Cordilleran Flycatcher		9				

Common Name	All Other	Black Hills NF	BLM - Buffalo	BLM - Casper	BLM - Newcastle	Thunder Basin NG
Say's Phoebe[2]						5
Western Kingbird	9			6	2	7
Eastern Kingbird	1	3				4
Loggerhead Shrike[2]	1			1	1	3
Plumbeous Vireo		12				
Warbling Vireo		90				
Red-eyed Vireo		7				
Gray Jay		4				
Blue Jay		5				
Pinyon Jay[2]	1					
Black-billed Magpie[2]	6			2		
American Crow	2	13				
Common Raven	7		6	2		
Horned Lark	81		29	24	1	89
Tree Swallow	1					
Violet-green Swallow		3	2			
Northern Rough-winged Swallow[2]				2		
Cliff Swallow	5					
Barn Swallow	1	1	1			
Black-capped Chickadee	12	30				
Mountain Chickadee						5
Red-breasted Nuthatch	2	71				
White-breasted Nuthatch	6	10				
Brown Creeper	1	7				
Rock Wren	3	7				16
House Wren	9	13				
Ruby-crowned Kinglet		18				
Blue-gray Gnatcatcher	2					
Eastern Bluebird		1				
Mountain Bluebird[2]	6	23	2	1		
Townsend's Solitaire	1	7				
Swainson's Thrush	1	9				
American Robin	26	128	3			1
Gray Catbird	1					
Sage Thrasher[2]			7			

Common Name	All Other	Black Hills NF	BLM - Buffalo	BLM - Casper	BLM - Newcastle	Thunder Basin NG
European Starling	7					
Cedar Waxwing	37	4				
Yellow Warbler	4	5				
Chestnut-sided Warbler		1				
Yellow-rumped Warbler	16	42				
American Redstart		57				
Ovenbird		145				
MacGillivray's Warbler		9				
Common Yellowthroat	3	2				
Western Tanager	3	41				1
Green-tailed Towhee	4		6			
Spotted Towhee		15				13
Chipping Sparrow	18	95	2	3		13
Brewer's Sparrow[2]	58		39	3		67
Vesper Sparrow[2]	24	17	7			30
Lark Sparrow	16	5		7		6
Sage Sparrow[2]	1		4			
Lark Bunting[2]	159		38	1	86	791
Grasshopper Sparrow	6			7	6	27
Song Sparrow		1				
Dark-eyed Junco	11	57				
McCown's Longspur[2]	1					
Black-headed Grosbeak		14				
Red-winged Blackbird	11					8
Western Meadowlark[2]	134	3	32	56	23	430
Brewer's Blackbird	14		8			31
Brown-headed Cowbird	31	60				27
Red Crossbill		39				
Pine Siskin		19				
American Goldfinch	2	2	2		2	

[1] Survey effort varied across strata (see Table 1).
[2] Priority species in Wyoming (see Appendix A).