# Integrated Monitoring in Bird Conservation Regions (IMBCR): 2011 Annual Report

## April 2012

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# ROCKY MOUNTAIN BIRD OBSERVATORY

***Mission**: To conserve birds and their habitats*

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

***Core Values**:*

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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***Cover Photos:***

Western Tanager by Dave Menke. This photo is a USFWS public domain photo.

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# EXECUTIVE SUMMARY

Rocky Mountain Bird Observatory (RMBO), in conjunction with its partners, conducted landbird monitoring in all or part of Bird Conservation Regions (BCRs) 10 (Northern Rockies), 11 (Prairie Potholes), 16 (Southern Rockies/Colorado Plateau), 17 (Badlands and Prairies), 18 (Shortgrass Prairie), 19 (Central Mixed-grass Prairie) and 34 (Sierra Madre Occidental) ) in 2011. This project used a spatially balanced sampling design and a survey protocol implemented in portions of 12 states as part of a program entitled “Integrated Monitoring in Bird Conservation Regions” (IMBCR). The IMBCR design allows inferences to avian species occurrence and population sizes from local to BCR scales, facilitating conservation at local and national levels.

In 2011, IMBCR partners completed 937 of 956 (98%) planned surveys throughout the study area, with a total of 10,451 point counts conducted. Surveys were conducted between 1 May and 31 July. In total, field technicians observed 284 bird species. RMBO estimated densities and population sizes of 164 species in at least 1 stratum, including 78 priority species. The data yielded robust density estimates (CV < 50%) for 153 species in at least 1 stratum. RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) for 191 species in at least 1 stratum, including 88 priority species. The data yielded robust occupancy estimates (CV < 50%) for 168 species in at least 1 stratum.

This study design allows the calculation of density, population and occupancy estimates for individual strata or biologically meaningful combinations of strata. Please note that not every stratum or conceivable combination of strata are summarized in this report. Density, population and occupancy estimates are also not included in this report. To view interactive maps showing survey and detection locations, species counts, and density, population and occupancy results using the IMBCR study design please visit RMBO’s Avian Data Center at http://rmbo.org/v3/avian/ExploretheData.aspx. Instructions for using the Avian Data Center are included in Appendix B of this report and are available on the Avian Data Center itself.

Data were collectively analyzed across the entire IMBCR sampling frame. Increasing the spatial extent of the analysis enabled us to quantify geographic variation in detection probabilities and increase the precision of occupancy estimates. This approach allowed us to estimate common detection probabilities for species that would have otherwise had an insufficient number of detections at more local scales. Additionally, by utilizing a larger data set we obtained more precise estimates of density, population size and occupancy for regions where sampling intensity was low. Finally, incorporating data collected at small scales to estimate parameters at larger scales allows this design to address the need for large-scale monitoring and research. The region-wide population estimates produced by the IMBCR program can assist managers in identifying large-scale declines of landbird populations.

This spatially-balanced sampling design serves as a model for other long-term monitoring efforts because of its ability to address conservation and management needs of a wide range of stakeholders, landowners and government entities at 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

Many individuals helped make the 2011 field season a success. Stratification and allocation of survey efforts were determined in collaboration with partner agencies and organizations, each of which provided funding or in-kind assistance in 2011: US Forest Service; US Bureau of Land Management; Northern Great Plains Joint Venture; Wyoming Game and Fish Department; Montana Fish, Wildlife and Parks; Colorado Division of Parks and Wildlife; and US Fish and Wildlife Service Great Northern Landscape Conservation Cooperative. We thank the Avian Science Center, Idaho Bird Observatory, Montana Natural Heritage Program and Wyoming Natural Diversity Database for planning and implementing field work in their study areas. We thank the members of the Integrated Monitoring in Bird Conservation Regions (IMBCR) coordination committee including Andrea Orabona and Susan Patla of the Wyoming Game and Fish Department, Robert Skorkowsky of US Forest Service Region 2 office, Beth Hann of US Forest Service Region 1 office, Clint McCarthy of US Forest Service Region 4 office, Dennis Saville of the Bureau of Land Management Wyoming, Wes Anderson of the Bureau of Land Management Colorado, John Carlson of the Bureau of Land Management Montana, David Klute of the Colorado Division of Parks and Wildlife, Catherine Wightman of the Montana Fish, Wildlife and Parks, Valerie Stein Foster and Chirre Keckler from Kaibab National Forest for their help throughout the study. Rocky Mountain Bird Observatory's landowner liaison, Jenny Berven, contacted county assessors to determine land ownership of survey locations. We thank Gary White, professor emeritus of Colorado State University, who wrote the initial SAS code and implemented the multi-scale occupancy model in program MARK and Paul Lukacs of the University of Montana who wrote code in program R for generating density estimates from detection probabilities. We thank Jeff Laake for implementing the multi-scale occupancy model in the RMark package which aided in the automation of the analyses. Lance Catron and Craig Pugsley of Custer State Park and the staff at the Creekside Lodge provided excellent training facilities for the northern monitoring effort. We also thank the field technicians who collected avian and vegetation point count data and contacted private landowners to obtain access to survey locations and establish working relationships for the future. Without the efforts of these technicians and the cooperation of numerous private landowners IMBCR partners would have been unable to conduct avian monitoring on private lands. Finally, this report benefited greatly from review by IMBCR partners.

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# ACRONYMS

| | |
|---|---|
| AIC | Akaike's Information Criterion |
| AICc | Akaike's Information Criterion corrected for small sample size |
| ASC | Avian Science Center |
| BBS | Breeding Bird Survey |
| BCR | Bird Conservation Region |
| BLM | Bureau of Land Management |
| CDOW | Colorado Division of Wildlife |
| CPW | Colorado Division of Parks and Wildlife |
| DOD | Department of Defense |
| GPS | Global Positioning System |
| GRTS | Generalized Random-Tessellation Stratification |
| GRYN | Greater Yellowstone Network |
| IBO | Idaho Bird Observatory |
| IMBCR | Integrated Monitoring in Bird Conservation Regions |
| MTFWP | Montana Fish, Wildlife and Parks |
| MTNHP | Montana Natural Heritage Program |
| NABCI | North American Bird Conservation Initiative |
| NCPN | Northern Colorado Plateau Network |
| NDGFD | North Dakota Game and Fish Department |
| NF | National Forest |
| NG | National Grassland |
| NGPC | Nebraska Game and Parks Commission |
| NPS | National Park Service |
| PIF | Partners In Flight |
| RMBO | Rocky Mountain Bird Observatory |
| RMNW | Rocky Mountain Network |
| SCPN | Southern Colorado Plateau Network |
| SDGFP | South Dakota Game, Fish and Parks |
| USFS | US Forest Service |
| USFWS | US Fish and Wildlife Service |
| WGFD | Wyoming Game and Fish Department |
| WYNDD | Wyoming Natural Diversity Database |

# INTRODUCTION

Monitoring is an essential component of wildlife management and conservation science (Witmer 2005, Marsh and Trenham 2008). Common goals of population monitoring are to estimate the population status of target species and to detect changes in populations over time (Thompson et al. 1998, Sauer and Knutson 2008). Effective monitoring programs can identify species that are at-risk due to small or declining populations (Dreitz et al. 2006); provide an understanding of how management actions affect populations (Alexander et al. 2008, Lyons et al. 2008); evaluate population responses to landscape alteration and climate change (Baron et al. 2008, Lindenmayer and Likens 2009); as well as provide basic information on species distributions.

While monitoring at local scales remains critical, there is an increasing need to monitor the consequences of environmental change over large spatial and temporal scales and address questions much larger than those that can be answered within individual management units, such as a National Forest (Lindenmayer and Likens 2009). Reconciling disparities between the geographic scale of management actions and the scale of ecological and species-specific responses is a persistent challenge for natural resource management agencies (Ruggiero et al. 1994). Population monitoring of eco-regional landscapes provides an important context for evaluating population change at local and regional scales, with the potential to identify causal factors and management actions for species recovery (Manley et al. 2005, Sauer and Knutson 2008).

Bird Conservation Regions (BCRs) provide a spatially consistent framework for bird conservation in North America (Figure 1) (US North American Bird Conservation Initiative 2007). The BCRs represent distinct ecological regions with similar bird communities, vegetation types and resource management interests (US North American Bird Conservation Initiative 2000). Population monitoring within BCRs can be implemented with a flexible hierarchical framework of nested units, where information on status of bird populations can be partitioned into smaller units for small-scale conservation planning, or aggregated to support large-scale conservation efforts throughout a species' geographic range. By focusing on scales relevant to management and conservation, information obtained from monitoring in BCRs can be integrated into research and management at a multitude of scales applicable to land managers (Ruth et al. 2003).

The apparent large-scale declines of avian populations and the loss, fragmentation and degradation of native habitats highlight the need for extensive and rigorous landbird monitoring programs (Rich et al. 2004, US North American Bird Conservation Initiative 2007). 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 1993, Sauer 1993).

Before monitoring can be used by land managers to guide conservation efforts, sound program designs and analytic methods are necessary to produce unbiased population estimates (Sauer and Knutson 2008). At the most fundamental level, reliable knowledge about the status of avian populations requires accounting for spatial variation and incomplete detection of the target species (Pollock et al. 2002, Rosenstock et al. 2002, Thompson 2002). Addressing spatial variation entails the use of probabilistic sampling designs that allow population estimates to be extended over the entire area of interest (Thompson et al. 1998). Adjusting for incomplete detection involves the use of appropriate sampling and analytic methods to address the fact that few, if any, species are so conspicuous that they are detected with certainty, even when present during a survey (Pollock et al. 2002, Thompson 2002). Accounting for these two sources of

variation ensures observed trends reflect true population changes rather than artifacts of the sampling and observation processes (Pollock et al. 2002, Thompson 2002).

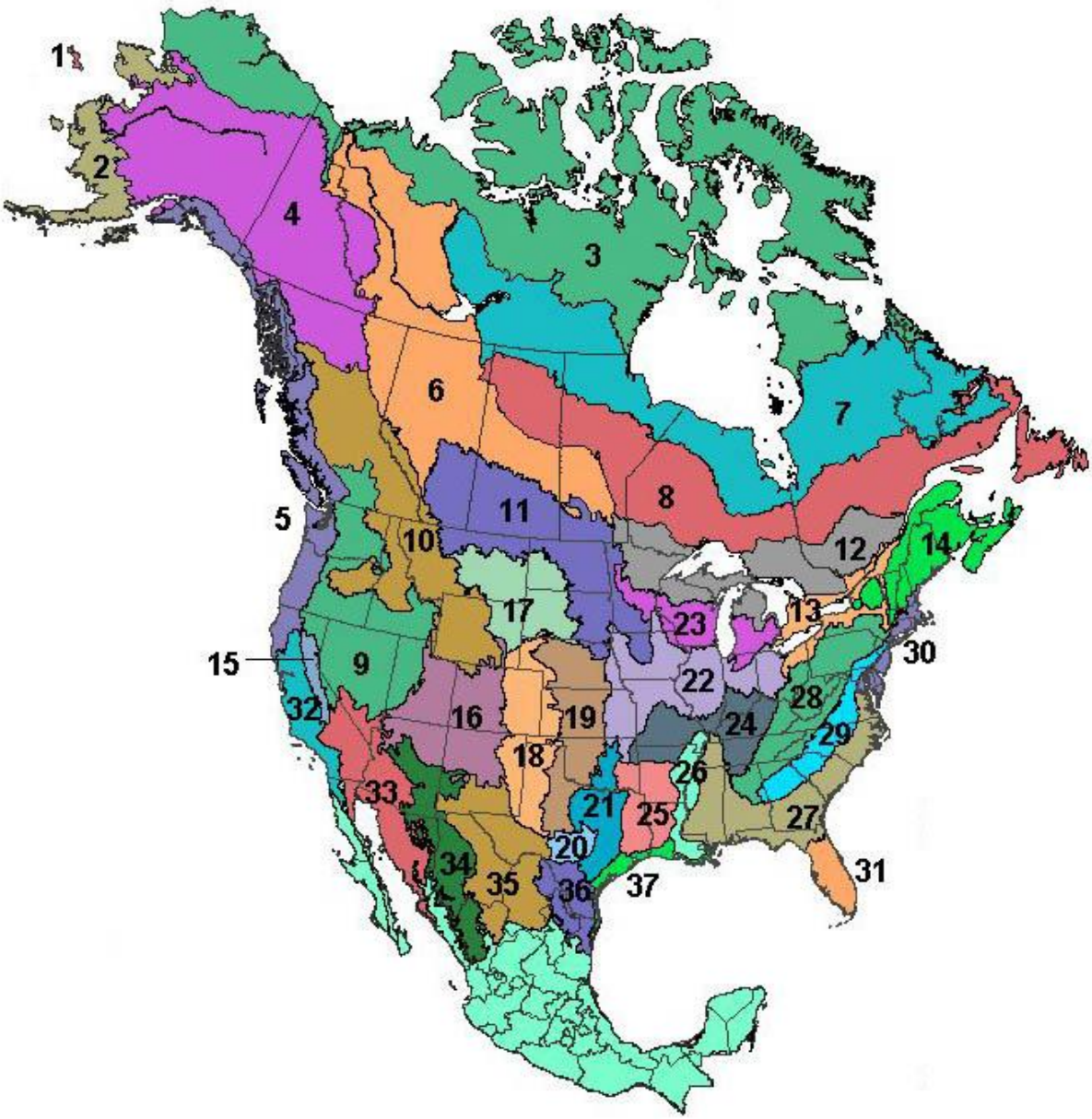


Figure 1. Bird Conservation Regions throughout North America, excluding Hawaii and Mexico (Source: http://www.nabci-us.org/map.html).

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

> 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. Recognize legal, institutional, proprietary and other constraints while still providing greater availability of raw data, associated metadata and summary data for bird monitoring programs.

With the NABCI Monitoring Subcommittee (2007) guidelines in mind, Rocky Mountain Bird Observatory (RMBO) and its partners designed a broad-scale monitoring program entitled "Integrated Monitoring in Bird Conservation Regions" (IMBCR) (Blakesley and Hanni 2009). Important properties of the IMBCR design are:

- All areas are available for sampling including all vegetation types.
- Strata are based on fixed attributes; this will allow us 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 and/or increase efficiencies of monitoring per partner.

Using the IMBCR design, RMBO'S landbird monitoring objectives are to:

1. Provide robust density, population and occupancy estimates that account for incomplete detection and are comparable at different geographic extents;
2. Provide long-term status and trend data for all regularly occurring breeding species throughout the study area;
3. Provide a design framework to spatially integrate existing bird monitoring efforts in the region to provide better information on distribution and abundance of breeding landbirds, especially for high priority species;
4. Provide basic habitat association data for most bird species to address habitat management issues;
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.

# PROGRAM HISTORY

In 1995 RMBO, in conjunction with the Colorado Division of Wildlife (CDOW), the United States Forest Service (USFS), the Bureau of Land Management (BLM) and the National Park Service (NPS), began efforts to create and conduct a Colorado-wide program to monitor breeding-bird populations. This was the first attempt in the nation to develop and implement a statewide landbird monitoring program. In 1999, after a successful pilot year, RMBO implemented the protocol in 13 habitats in Colorado. This methodology was used for 10 years and efforts expanded to all or parts of Arizona, New Mexico, North Dakota, South Dakota, Utah and Wyoming.

In 2007, the US NABCI Monitoring Subcommittee suggested ways to improve bird monitoring efforts in North America. In 2008, IMBCR partners applied NABCI subcommittee suggestions to a new protocol for statewide bird monitoring in Colorado. This protocol used BCRs as the sampling frames, stratified by land ownership within each of the BCRs. IMBCR partners stratified and surveyed the Southern Rockies/Colorado Plateau BCR (BCR 16) and the Shortgrass Prairie BCR (BCR 18) portions of Colorado that year, as well as the BCR 16 portion of Wyoming.

In 2009, the IMBCR program expanded to the Colorado and Wyoming portions of the Northern Rockies BCR (BCR 10); the Great Basin BCR (BCR 9) and Shortgrass Prairie BCR (BCR18) portions of Wyoming; the entire Badlands and Prairies BCR (BCR 17) within Montana, Nebraska, North Dakota, South Dakota and Wyoming; the USFS National Forests and Grasslands within BCR 18; and Coconino and Prescott National Forests in the Sierra Madre Occidental BCR (BCR 34). In 2008 cells were weighted such that higher elevation survey sites were more likely to be selected. Cell weighting was used to target the smaller, higher elevation habitats such as Alpine Tundra. However, IMBCR partners decided after the field season that cell weighting had caused middle-elevations in Colorado to be under-sampled. To correct this, all strata in the Colorado and Wyoming portions of BCR 16 were restratified without the use of cell weighting following the 2008 field season. Additionally, the All Other lands stratum in Wyoming BCR 16 was split into two strata: All Other lands and BLM lands.

In 2010, the program expanded to include the BCR 10 and the Prairie Potholes BCR (BCR 11) portions of Montana, three National Forests in the Idaho portion of BCR 10 and Kaibab National Forest in BCRs 16 and 34. There were several restratifications done in Colorado BCRs 10 and 16 between 2009 and 2010. The Colorado BCR10 stratum was restratified to include the separate easternmost portion of BCR 10 that dips into Colorado so that it now represents all of BCR 10 in Colorado. The NPS Rocky Mountain Network (RMNW) and Northern Colorado Plateau Network (NCPN) were restratified because under the initial design some NCPN park units were included in the RMNW stratum. In Wyoming, the USFS Region 4 stratum was restratified into three separate strata: Bridger-Teton National Forest front-country/managed areas, Bridger-Teton National Forest designated roadless/wilderness areas and the remainder of USFS Region 4 lands in Wyoming BCR 10. This restratification was done to allow for density and occupancy estimation at the National Forest level.

In 2011, the geographic extent of the IMBCR program expanded to the Nebraska portion of the Central Mixed-grass Prairie BCR (BCR 19) and included all of the National Forests and Grasslands in that state. Additionally, there were several restratifications done in Colorado in 2011. The Colorado BCR 10 stratum was split into two strata: BLM lands and All Other lands. This was done to facilitate better tracking of priority species on BLM lands throughout Colorado.

The Rio Grande National Forest and White River National Forest strata were each split into three strata: low, medium, and high elevations. This stratification by elevation allows for adjusting sampling intensity to target Management Indicator Species on the Forests. The Routt and Arapaho-Roosevelt National Forest strata were reorganized and a third stratum, the Williams Fork Area, was created from the two, because it is a portion of the Routt National Forest that is managed by the Arapaho Roosevelt National Forest. The RMNW stratum was restratified to accurately reflect land ownership. There was a land acquisition within Great Sand Dunes National Monument and some samples were removed from Rio Grande National Forest and added to the RMNW stratum. A total of 16 $km^2$ were added to the area of the RMNW strata. In South Dakota, the Black Hills National Forest stratum was split into two strata based on watersheds in the Forest: Hydrologic Code 7 Watersheds and all other watersheds. This stratification by watershed allows for adjusting sampling intensity to target Management Indicator Species on the Forest.

# METHODS

## Study Area

Surveys were conducted across all of BCR 17 and portions of BCR 10, 11, 16, 18, 19 and 34 (Figure 2). A brief description of each BCR and where surveys were conducted is discussed below.

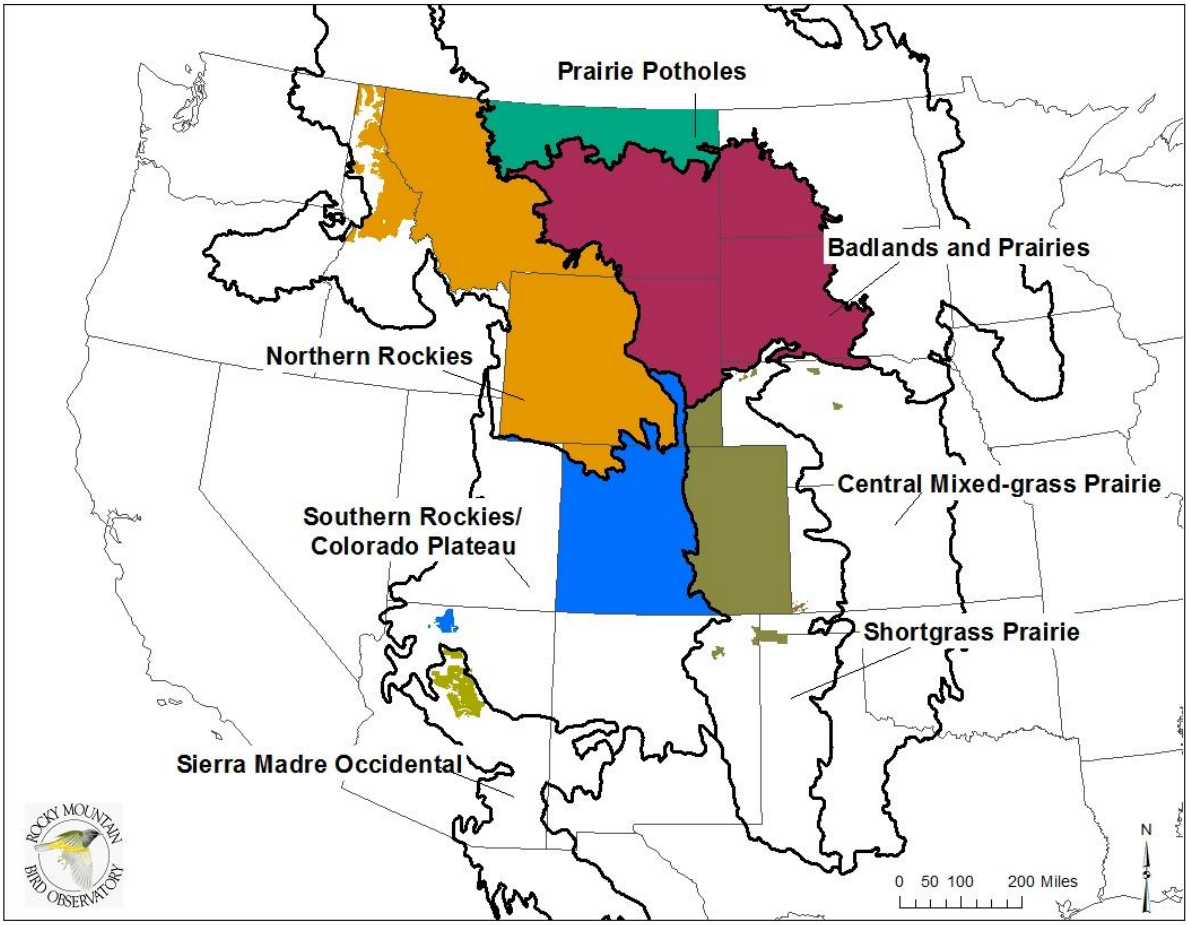


Figure 2. Spatial extent of sampled strata using the IMBCR design, 2011.

***BCR 10: Northern Rockies***

The Northern Rockies Bird Conservation Region (BCR 10) is characterized by high-elevation mountain ranges with mixed conifer forests and intermountain regions dominated by sagebrush steppe and grasslands (Partners In Flight 2000). Higher elevation forests consist mainly of Ponderosa Pine, Douglas-Fir, Lodgepole Pine, Englemann Spruce and Subalpine Fir. Tundra occurs at the highest elevations. BCR 10 covers portions of Wyoming, Montana, Idaho, British Columbia, Oregon and small portions of Colorado, Washington and Alberta.

This was the third year IMBCR was implemented within BCR 10. RMBO, Idaho Bird Observatory (IBO), Wyoming Natural Diversity Database (WYNDD) and Avian Science Center (ASC) conducted field work throughout the Colorado, Montana and Wyoming portions of BCR 10 and on some National Forests in the Idaho portion of BCR 10. Surveys were conducted in 54 strata comprising a total of 358,948 $km^2$.

***BCR 11: Prairie Potholes***

The Prairie Potholes Bird Conservation Region is characterized by mixed grass prairie in the west, tall grass prairie in the east and thousands of small wetlands scattered across its geographical extent (US North American Bird Conservation Initiative 2000). About 70% of BCR 11's original grasslands have been converted to agriculture, but large tracts of grassland still exist on larger ranches and on preserved land (Prairie Pothole Joint Venture 2005). BCR 11 covers portions of Montana, North Dakota, South Dakota, Minnesota, Nebraska, Iowa, Alberta, Saskatchewan and Manitoba.

This was the second year IMBCR was implemented within BCR 11. Surveys were conducted within the Montana portion of BCR 11, which consisted of 5 strata comprising 83,415 $km^2$. This field work was completed by Montana Natural Heritage Program (MTNHP).

***BCR 16:* Southern Rockies and Colorado Plateau**

The Southern Rockies and Colorado Plateau Bird Conservation Region is a diverse area bounded by the southern Rocky Mountains in the east and the Wasatch and Uinta mountains in the west, all of which reach elevations of at least 11,500 ft. In the center of the region are the tablelands of the Colorado Plateau. Within this region vegetation types transition from shrubsteppe; pinyon-juniper; montane shrubland; mixed conifer and aspen; and alpine tundra with increasing elevation (Parrish et al. 2002). BCR 16 is centered on the Four Corners Region and consists mainly of Colorado, Utah, New Mexico and Arizona, with portions extending into southern Wyoming and Idaho.

This was the fourth year IMBCR was implemented within BCR 16. RMBO and WYNDD conducted surveys across the Colorado and Wyoming portions of BCR 16, as well as the BCR16 portion of Kaibab National forest. Surveys were conducted in 21 strata comprising a total of 158,377 $km^2$.

***BCR 17:* Badlands and Prairies**

The Badlands and Prairies Bird Conservation Region is characterized by rolling plains and mixed-grass prairie that contain large, continuous, tracts of intact dry grassland managed predominately as ranchland (US North American Bird Conservation Initiative 2000). The western portion of BCR 17 contains pine and spruce forests at higher elevations. BCR 17 covers portions of five states: Montana; North Dakota; South Dakota; Wyoming and Nebraska.

This was the third year IMBCR was implemented within BCR 17. RMBO, ASC and WYNDD conducted surveys throughout the entire BCR in 2011. Surveys were conducted in 34 strata comprising a total of 367,776 $km^2$.

***BCR 18:* Shortgrass Prairie**

The Shortgrass Prairie Bird Conservation Region is characterized by unique shortgrass prairie. What was once contiguous prairie is now fragmented by agriculture and the remnant grasslands are now exposed to new grazing regimes (Playa Lakes Joint Venture Landbird Team 2007). Numerous playa lakes dot the region and wetlands occur along major river corridors that drain the Rocky Mountains. Because of a change in the hydrology of these rivers, more shrubs and trees have encroached upon the wetlands (US North American Bird Conservation Initiative 2000). BCR 18 stretches north-south in the rain shadow of the Rocky Mountains and covers portions of Colorado, Wyoming, Nebraska, Kansas, Oklahoma, Texas and New Mexico.

This was the fourth year IMBCR was implemented within BCR 18. RMBO conducted surveys throughout the Wyoming and Colorado portions of BCR 18 and USFS lands in the Kansas, Nebraska, New Mexico, Oklahoma and Texas portions of the BCR. Surveys were conducted in 18 strata comprising 128,507 $km^2$.

***BCR 19:* Central Mixed-grass Prairie**

The Central Mixed-grass Prairie Bird Conservation Region borders shortgrass prairie to the west and tallgrass prairie to the east (US North American Bird Conservation Initiative 2000). This region consists of a mixture of shortgrass and tallgrass prairie habitats, with some native and hand-planted Ponderosa Pine forests in northwestern Nebraska. BCR 19 runs north-south from Nebraska through Kansas and Oklahoma down into north-central Texas.

This was the first year IMBCR was implemented within BCR 19. RMBO conducted surveys in USFS lands throughout BCR 19 in Nebraska. Surveys were conducted in 2 strata comprising 944 $km^2$.

***BCR 34:* Sierra Madre Occidental**

The Sierra Madre Occidental Bird Conservation Region is characterized by rugged, high-elevation, mountains supporting oak-pine, pine and fir forests and semi-desert shrubland. BCR 34 stretches from the northwest to the southeast covering portions of New Mexico, Arizona and Mexico.

This was the third year IMBCR was implemented within BCR 34. RMBO conducted surveys in Kaibab and Coconino National Forests within BCR 34. Surveys were conducted in 2 strata comprising 13,416 $km^2$.

## Sampling Design

IMBCR partners defined BCRs 10, 11, 16, 17, 18, 19 and 34 as the sampling frame; the broad-scale area selected to make inferences about bird populations (Figure 2). Within these BCRs, IMBCR partners established strata based on small-scale areas they wanted to make inferences to, such as individual National Forests or BLM Field Offices. The strata within BCRs are based on fixed attributes, most often by land ownership boundaries. These strata can be combined into larger areas of inference (e.g., statewide, all USFS Region 2 National Forests, all BLM lands in a state or BCR) for analysis purposes.

Within each stratum, the IMBCR design used generalized random-tessellation stratification (GRTS), a spatially-balanced sampling algorithm, to select sample units (Stevens and Olsen 2004). 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;

- 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, IMBCR partners can adjust the sampling effort among years within each stratum while still preserving a random, spatially-balanced sampling design.

The IMBCR design defined sampling units as 1 $km^2$ cells that were used to create a uniform grid over the entire BCR. Within each grid cell there is a 4 x 4 grid of 16 points spaced 250 m apart (Figure 3). All spatial data were compiled using ARCGIS 9.2 (Environmental Systems Research Institute 2006). The hierarchical nature of our data analysis required that a minimum of two grid cells were sampled within each stratum. The remaining allocation of sampling effort among strata was based on the priorities of the funding partners.

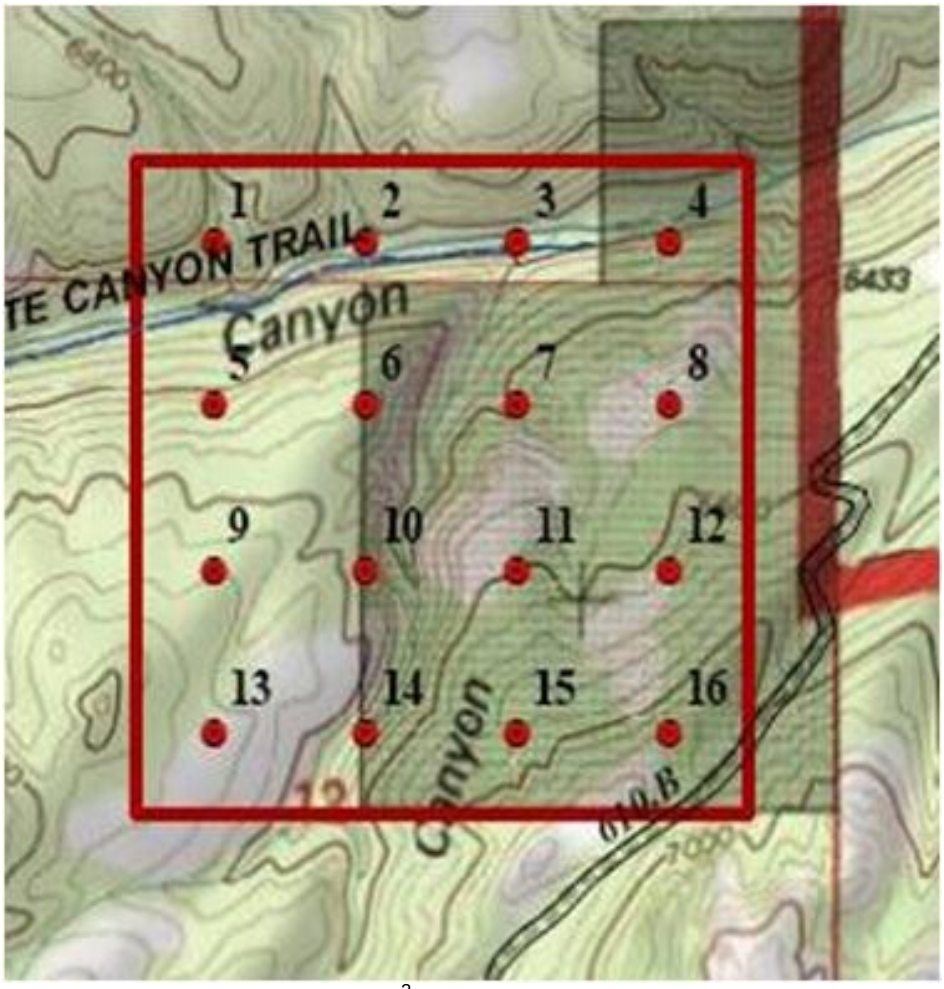


Figure 3. Example 1 $km^2$ grid cell using the IMBCR design.

## Sampling Methods

IMBCR surveyors with excellent aural and visual bird-identification skills conducted field work in 2011. Prior to conducting surveys, technicians completed an intensive five-day training program to ensure full understanding of field protocols, to review bird and plant identification, and to practice distance estimation in a variety of habitats. Field technicians working in Colorado, Wyoming, and North and South Dakota attended a second, three-day mid-season training to review protocol and practice bird and plant identification at high-elevation sites that were inaccessible earlier in the season. 2011 marked the first year a mid-season training was implemented for any of the IMBCR survey crews.

Field technicians conducted point counts (Buckland et al. 2001) following protocol established by IMBCR partners (Hanni et al. 2011). Observers conducted surveys in the morning, beginning ½-hour before sunrise and concluding no later than 11 AM. For every bird detected during the six-minute period, observers recorded species, sex; horizontal distance from the observer; minute and type (e.g., call, song, visual) of detection. Observers measured distances to each bird using laser rangefinders. When it was not possible to measure the distance to a bird, observers estimated the distance by measuring to some nearby object. Observers recorded birds flying over but not using the immediate surrounding landscape. In addition to recording all bird species detected during point counts, observers recorded Abert's and red squirrels. While observers traveled between points within a grid cell they recorded the presence of rare or difficult to detect species (i.e., woodpeckers, raptors). The opportunistic detections of these rare species are used for distribution mapping purposes only.

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 independent observations. Observers recorded the number of birds detected within each cluster along with a letter code to distinguish between multiple clusters.

At the start and end of each survey, observers recorded time, ambient temperature, cloud cover, precipitation and wind speed. Technicians navigated to each point using hand-held Global Positioning System (GPS) units. Before beginning each six-minute count, surveyors recorded vegetation data (within a 50 m radius) and distance from a road (if less than 100 m). Vegetation data included the dominant habitat type; structural stage and the relative abundance; percent cover and mean height of trees and shrubs by species; as well as grass height and ground cover types. Technicians recorded vegetation data quietly to allow birds time to return to their normal habits prior to beginning each count.

The original protocol implemented in 2008 has changed and evolved slightly over time to better facilitate analysis and meet partner needs. In 2009, technicians began recording the primary habitat type at each point count location from a list of habitat options. This was added to facilitate data proofing, to be used in analysis and to link the IMBCR data and results with the habitat-based monitoring program implemented prior to 2008. Technicians also began recording the presence of water and/or snow within 50m of each point count location as a type of ground cover.

Beginning in 2010, the point count duration was increased from five minutes to six minutes to facilitate occupancy estimation, which requires three equal time intervals (in this case, two minutes each). Technicians began recording juvenile birds detected during point counts. Observers placed a "J" in the sex column for these detections. Previously, juvenile birds were not recorded, since this study focuses on recording breeding birds. Juvenile bird detections are

used for distribution mapping purposes only and are not factored into data analysis. A minute column was added to the bird datasheet so technicians could record the actual minute of each bird detection during a point count. Previously, technicians used tick marks to separate minute intervals. A "visual" checkbox was added to the bird datasheet for technicians to check if they visually observed any of the species recorded. This reminds technicians that they need to look around for birds in addition to listening for them, and helps crew leaders make decisions regarding unusual or rare bird detections while proofing data. Technicians were provided an additional datasheet to record the reasons points were not surveyed (e.g., weather issues, unsafe terrain, denied permission by landowner, etc.), to allow crew leaders to track this information. This sheet also provided space to record additional landowner information as needed. Lastly, technicians began recording horizontal distance for each flyover detection. In the past, distances were not recorded since flyover detections are not used in analysis. However, technicians occasionally have difficulty distinguishing flyovers from birds using the surrounding habitat while foraging on the wing (e.g., swallows, swifts and raptors). By having technicians record distances for flyovers, the detection data can still be used in analysis if a technician records a bird as a flyover that is later determined to not be a flyover.

For more detailed information about survey methods and vegetation data collection protocols, refer to RMBO's Field Protocol for Spatially Balanced Sampling of Landbird Populations on our Avian Data Center website at http://rmbo.org/v3/avian/DataCollection.aspx.

## Data Analysis

*Distance Analysis*

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 (Buckland et al. 2001, Thomas et al. 2010). Removal modeling is based on mark-recapture theory; detection probability is estimated based on the number of birds detected during consecutive sampling intervals (Farnsworth et al. 2002). In this design, sampling intervals consist of one minute segments of the six minute sampling period. Removal modeling can also incorporate distance data.

Analysis of distance data was 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, 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.

We used the analysis software Distance 6.0 (Thomas et al. 2010) to estimate detection probabilities using our point count data. We estimated densities of species for which we obtained a sufficient number of independent detections ($n \geq 80$) pooled across years within the entire sampling area. We excluded birds flying over, but not using the immediate surrounding landscape, and birds detected between points from analyses. We fit the following functions to the distribution of distances for each species: Half normal key function with cosine series expansion and Hazard rate key function with cosine series expansion (Buckland et al. 2001). We combined data across years (2008 – 2011) and strata to estimate global detection functions and compared these models with models that estimated detection probability as a function of

year. We modeled year as a covariate using the Multiple Covariate Distance Sampling engine in program Distance. In addition, when sample sizes allowed (n ≥ 80 per year), we modeled year as a categorical variable to allow more flexibility in modeling detection probability. We used Akaike's Information Criterion (AIC) corrected for small sample size (AICc) and model selection theory to select the most parsimonious detection function for each species (Burnham and Anderson 2002).

We used the SPSURVEY package (Kincaid 2008) in Program R (R Development Core Team 2011) to estimate density, population size and its variance for each species. We computed estimates for each stratum as well as aggregations of strata by management unit, landowner, state and BCR. Estimates from multiple strata represent a weighted mean indexed by stratum area. These analyses were facilitated by R code written for us by Paul Lukacs of the University of Montana.

*Occupancy Analysis*

Occupancy estimation is most commonly used to quantify the proportion of sample units (i.e., grid cells) occupied by an organism (MacKenzie et al. 2002). The application of occupancy modeling requires multiple surveys of the sample unit in space or time to estimate a detection probability (MacKenzie et al. 2006). The detection probability adjusts the proportion of sites occupied to account for species that were present but undetected (MacKenzie et al. 2002). The assumptions of occupancy modeling 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).

We used a removal design (MacKenzie et al. 2006) to estimate a detection probability for each species by partitioning the six-minute count into three sequential two-minute sampling intervals. After the target species was detected at a point, we set all subsequent sampling intervals at that point to "missing data" (MacKenzie et al. 2006). The 16 points in each grid cell served as spatial replicates for estimating the proportion of points occupied within the sampled grid cells. We used a multi-scale occupancy model (Nichols et al. 2008, Pavlacky et al. 2012) to estimate 1) the probability of detecting a species given presence (*p*), 2) the proportion of points occupied by a species given presence within sampled grid cells (Theta) and 3) the proportion of grid cells occupied by a species (Psi).

We expected that regional differences in the behavior, habitat use and local abundance of species would correspond to regional variation in detection and the fraction of occupied points. Therefore, we estimated the proportion of grid cells occupied (Psi) for each stratum by evaluating four models with different structure for detection (*p*) and the proportion of points occupied (Theta). Within these models, the estimates of *p* and Theta were held constant across the BCRs and/or allowed to vary by BCR. Models are defined as follows:

Model 1: Constrained *p* and Theta by holding these parameters constant;
Model 2: Held *p* constant, but allowed Theta to vary across BCRs;
Model 3: Allowed *p* to vary across BCRs, but held Theta constant;
Model 4: Allowed both *p* and Theta to vary across BCRs.

We ran model 1 for species with less than 10 detections in all BCRs or less than 10 detections in all but 1 BCR. We ran models 1 through 4 for species with greater than 10 detections in more than 1 BCR. For the purpose of estimating regional variation in detection (*p*) and availability (Theta), we pooled data for BCRs with fewer than 10 detections into adjacent BCRs with

sufficient numbers of detections. As with the Distance analyses, we used Akaike's Information Criterion (AIC) corrected for small sample size (AICc) and model selection theory to evaluate models from which estimates of *p*, Theta and Psi were derived for each species (Burnham and Anderson 2002). We model averaged the estimates of Psi from models 1 through 4 and calculated unconditional standard errors for the estimates (Burnham and Anderson 2002). By allowing *p* and Theta to vary by BCR we accounted for regional variation in detection and availability, which was important for generating robust estimates of the proportion of grid cells occupied (Psi).

Our application of the multi-scale model was analogous to a within-season robust design (Pollock 1982) where the two-minute intervals at each point were the secondary samples for estimating *p* and the points were the primary samples for estimating Theta (Nichols et al. 2008, Pavlacky et al. 2012). We considered both *p* and Theta to be nuisance variables that were important for generating unbiased estimates of Psi. Theta can be considered an availability parameter or the probability a species was present and available for sampling at the points (Nichols et al. 2008, Pavlacky et al. 2012). As mentioned above, we estimated the probability of detection (*p*) using a removal design with three sampling intervals. Using the six one-minute intervals recorded during sampling, we binned minutes one and two, minutes three and four and minutes five and six to meet the assumption of a monotonic decline in the detection rates through time. We truncated the data, using only detections within 125 m of the sample points. Truncating the data at 125 m allowed us to use bird detections over a consistent plot size and ensured that the points were independent (points were spread 250 m apart), which in turn allowed us to estimate Theta (the proportion of points occupied within each grid cell) (Pavlacky et al. 2012).

We used program MARK (White and Burnham 1999) and package RMark (R Development Core Team 2011) to fit the multi-scale occupancy models and estimate model parameters. 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 combined estimates of Psi using the delta method (Powell 2007) in program R (R Development Core Team 2011). The proportion of grid cells occupied was estimated for all species that were detected on a minimum of 5 points after removing detections beyond 125 m of each point. Occupancy estimates for species occurring on fewer than five points are not reported here because of unreliable model convergence.

# RESULTS

This year, field technicians completed 937 of 956 (98%) planned surveys throughout all or portions of BCRs 10, 11, 16, 17, 18, 19 and 34 using the IMBCR design (Table 1, Figure 2). Reasons why surveys were not completed are summarized in Table 2. Technicians conducted 10,467 point counts within the 937 surveyed grid cells between 1 May and 31 July 2011. They detected 283 bird species, including 163 priority species.

RMBO estimated densities and population sizes for 164 species in at least 1 stratum, including 78 priority species (Appendix A). RMBO obtained precise density estimates (CV < 50%) for 153 species in at least 1 stratum.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) for 191 species in at least 1 stratum, including 88 priority species (Appendix A). The data yielded robust occupancy estimates (CV < 50%) for 168 species in at least 1 stratum.

The following results sections contain summaries of data collected and analyzed at a variety of different scales. This study design allows for the calculation of density, population and occupancy estimates for individual strata (like BLM lands in North Dakota BCR 17) or larger scale areas, such as BCR 17. Please note summary information is not presented for every stratum or conceivable combination of strata in this report. 2011 marks the first year where maps, all results, raw count data, and effort are available online and are not presented in this report. To view interactive maps showing survey and detection locations, species counts and density, population and occupancy results using the IMBCR study design please visit RMBO's Avian Data Center at http://rmbo.org/v3/avian/ExploretheData.aspx. For instructions and tips on the use of this site please follow the link or refer to Appendix B.

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).

Table 1. Planned and completed surveys, by stratum, 2011.

| State | BCR | Strata Code | Strata Name | | Area (km²) | Planned | Completed | % Completed |
|---|---|---|---|---|---|---|---|---|
| AZ | 34 | CF | Coconino National Forest | | 7,426 | 50 | 50 | 100% |
| AZ | 34 | KF | Kaibab National Forest | | 5,990 | 45 | 45 | 100% |
| | | | | **Subtotal** | **13,416** | **95** | **95** | **100%** |
| CO | 10 | AO | All Other Lands | | 5,060 | 5 | 5 | 100% |
| CO | 10 | BL | Bureau of Land Management | | 4,288 | 28 | 28 | 100% |
| | | | | **Subtotal** | **9,348** | **33** | **33** | **100%** |
| CO | 16 | AO | All Other Lands | | 51,214 | 26 | 26 | 100% |
| CO | 16 | AR | Arapaho-Roosevelt National Forest | | 6,932 | 13 | 13 | 100% |
| CO | 16 | BL | Bureau of Land Management | | 27,823 | 25 | 25 | 100% |
| CO | 16 | GM | Grand Mesa, Uncompahgre and Gunnison National Forests | | 13,630 | 11 | 11 | 100% |
| CO | 16 | MA | Manti-La Sal National Forest | | 131 | 2 | 2 | 100% |
| CO | 16 | NC | National Park Service - Northern Colorado Plateau Network | | 807 | 2 | 2 | 100% |
| CO | 16 | PS | Pike-San Isabel National Forest | | 10,950 | 15 | 15 | 100% |
| CO | 16 | RA | Rio Grande National Forest - High Elevation | | 866 | 8 | 8 | 100% |
| CO | 16 | RM | National Park Service - Rocky Mountain Network | | 1,644 | 2 | 2 | 100% |
| CO | 16 | RO | Routt National Forest | | 5,734 | 25 | 25 | 100% |
| CO | 16 | RP | Rio Grande National Forest - Middle Elevation | | 5,410 | 6 | 6 | 100% |
| CO | 16 | RS | Rio Grande National Forest - Low Elevation | | 1,896 | 11 | 11 | 100% |
| CO | 16 | SA | San Juan National Forest | | 8,794 | 12 | 12 | 100% |
| CO | 16 | SC | National Park Service - Southern Colorado Plateau Network | | 214 | 2 | 2 | 100% |
| CO | 16 | WA | White River National Forest - High Elevation | | 2,138 | 7 | 6 | 86% |
| CO | 16 | WF | USFS - Williams Fork Management Unit | | 551 | 8 | 7 | 88% |
| CO | 16 | WP | White River National Forest - Middle Elevation | | 5,443 | 7 | 7 | 100% |
| CO | 16 | WS | White River National Forest - Low Elevation | | 2,786 | 8 | 8 | 100% |
| | | | | **Subtotal** | **146,963** | **190** | **188** | **99%** |
| CO | 18 | AR | Arkansas River and Tributaries | | 1,127 | 11 | 11 | 100% |
| CO | 18 | CO | Comanche National Grassland | | 4,836 | 11 | 11 | 100% |
| CO | 18 | DO | Department of Defense | | 1,647 | 2 | 2 | 100% |

| State | BCR | Strata Code | Strata Name | Area (km²) | Planned | Completed | % Completed |
|---|---|---|---|---|---|---|---|
| CO | 18 | IA | Area between I-70 and the Arkansas River | 34,755 | 11 | 11 | 100% |
| CO | 18 | NP | Area North of the Platte River | 11,457 | 11 | 11 | 100% |
| CO | 18 | PA | Pawnee National Grassland | 3,268 | 11 | 11 | 100% |
| CO | 18 | PI | Area between the Platte River and I-70 | 30,365 | 11 | 11 | 100% |
| CO | 18 | PT | Platte River and Tributaries | 970 | 11 | 11 | 100% |
| CO | 18 | SA | Area South of the Arkansas River | 24,985 | 12 | 12 | 100% |
| | | | **Subtotal** | **113,410** | **91** | **91** | **100%** |
| ID | 10 | CL | Clearwater National Forest - Roaded/Managed | 1,946 | 8 | 8 | 100% |
| ID | 10 | CR | Clearwater National Forest - Roadless/Wilderness | 5,036 | 2 | 2 | 100% |
| ID | 10 | IP | Idaho Panhandle National Forest - Roaded/Managed | 8,660 | 8 | 9 | 113% |
| ID | 10 | IR | Idaho Panhandle National Forest - Roadless/Wilderness | 3,155 | 2 | 2 | 100% |
| ID | 10 | NP | Nez Perce National Forest - Roaded/Managed | 2,864 | 8 | 8 | 100% |
| ID | 10 | NR | Nez Perce National Forest - Roadless/Wilderness | 6,370 | 2 | 2 | 100% |
| | | | **Subtotal** | **28,031** | **30** | **31** | **103%** |
| KS | 18 | CI | Cimarron National Grassland | 690 | 8 | 8 | 100% |
| | | | | | | | |
| MT | 10 | AO | All Other Lands | 53,215 | 14 | 14 | 100% |
| MT | 10 | BE | Beaverhead-Deerlodge National Forest - Roaded/Managed | 7,697 | 8 | 8 | 100% |
| MT | 10 | BI | Bitterroot National Forest - Roaded/Managed | 2,324 | 8 | 8 | 100% |
| MT | 10 | BM | Bureau of Land Management - Missoula/Butte | 1,356 | 2 | 2 | 100% |
| MT | 10 | BR | Beaverhead-Deerlodge National Forest - Roadless/Wilderness | 8,236 | 2 | 2 | 100% |
| MT | 10 | BS | Bureau of Land Management - southwestern Montana | 3,447 | 6 | 6 | 100% |
| MT | 10 | BW | Bitterroot National Forest - Roadless/Wilderness | 2,763 | 2 | 2 | 100% |
| MT | 10 | CR | Custer National Forest - Roadless/Wilderness | 1,783 | 2 | 2 | 100% |
| MT | 10 | CU | Custer National Forest - Roaded/Managed | 779 | 2 | 2 | 100% |
| MT | 10 | FL | Flathead National Forest - Roaded/Managed | 4,945 | 8 | 8 | 100% |
| MT | 10 | FR | Flathead National Forest - Roadless/Wilderness | 6,410 | 2 | 2 | 100% |
| MT | 10 | FW | Fish and Wildlife Service - All Refuges | 359 | 2 | 2 | 100% |
| MT | 10 | GA | Gallatin National Forest - Roaded/Managed | 3,479 | 8 | 8 | 100% |
| MT | 10 | GR | Gallatin National Forest - Roadless/Wilderness | 5,787 | 2 | 2 | 100% |

| State | BCR | Strata Code | Strata Name | Area (km²) | Planned | Completed | % Completed |
|---|---|---|---|---|---|---|---|
| MT | 10 | HE | Helena National Forest - Roaded/Managed | 3,024 | 8 | 8 | 100% |
| MT | 10 | HR | Helena National Forest - Roadless/Wilderness | 2,248 | 2 | 2 | 100% |
| MT | 10 | KO | Kootenai National Forest - Roaded/Managed | 7,239 | 8 | 7 | 88% |
| MT | 10 | KR | Kootenai National Forest - Roadless/Wilderness | 1,887 | 2 | 2 | 100% |
| MT | 10 | LC | Lewis and Clark National Forest - Roaded/Managed | 2,778 | 5 | 5 | 100% |
| MT | 10 | LO | Lolo National Forest - Roaded/Managed | 7,742 | 8 | 8 | 100% |
| MT | 10 | LR | Lewis and Clark National Forest - Roadless/Wilderness | 5,007 | 2 | 2 | 100% |
| MT | 10 | LW | Lolo National Forest - Roadless/Wilderness | 3,859 | 2 | 2 | 100% |
| MT | 10 | NG | National Park Service - Glacier National Park | 3,936 | 2 | 2 | 100% |
| MT | 10 | RI | Rivers | 3,515 | 14 | 14 | 100% |
| MT | 10 | TB | Blackfeet and Crow Reservations | 9,349 | 2 | 2 | 100% |
| MT | 10 | TF | Flathead Reservation | 5,043 | 2 | 2 | 100% |
| | | | **Subtotal** | **158,207** | **125** | **124** | **99%** |
| MT | 11 | AO | All Other Lands | 62,631 | 10 | 9 | 90% |
| MT | 11 | BN | Bureau of Land Management - North Valley | 1,588 | 2 | 2 | 100% |
| MT | 11 | BO | Bureau of Land Management - Other | 6,826 | 8 | 8 | 100% |
| MT | 11 | FW | Fish and Wildlife Service - All Refuges and WPA Lands | 541 | 2 | 1 | 50% |
| MT | 11 | TR | Rocky Boys, Fort Peck, Fort Belknap and Blackfeet Reservations | 11,829 | 2 | 2 | 100% |
| | | | **Subtotal** | **83,415** | **24** | **22** | **92%** |
| MT | 17 | AB | All Other Lands – Northern Rolling Plains/Brown Glaciated | 74,351 | 5 | 4 | 80% |
| MT | 17 | AC | All Other Lands – Northern Rocky Mtn Foothills/ Central Rocky Mtns | 13,130 | 2 | 2 | 100% |
| MT | 17 | AS | All Other Lands - Pierre/Soft shale | 8,047 | 2 | 2 | 100% |
| MT | 17 | BB | Bureau of Land Management - Brown Glaciated Plains | 2,049 | 2 | 2 | 100% |
| MT | 17 | BC | Bureau of Land Management - Northern Rocky Mtn Foothills/ Central Rocky Mtns | 495 | 2 | 2 | 100% |
| MT | 17 | BN | Bureau of Land Management – Northern Rolling Plains | 19,171 | 6 | 6 | 100% |
| MT | 17 | BS | Bureau of Land Management - Pierre/Soft shale | 3,298 | 2 | 2 | 100% |
| MT | 17 | CU | Custer National Forest | 2,649 | 5 | 5 | 100% |
| MT | 17 | FW | Fish and Wildlife Service - All Refuges | 4,035 | 2 | 2 | 100% |
| MT | 17 | LC | Lewis and Clark National Forest | 867 | 3 | 3 | 100% |
| MT | 17 | RI | Rivers - Yellowstone, Tongue, Musselshell, Missouri | 4,575 | 8 | 8 | 100% |

| State | BCR | Strata Code | Strata Name | | Area (km²) | Planned | Completed | % Completed |
|---|---|---|---|---|---|---|---|---|
| MT | 17 | TR | Crow, Northern Cheyenne and Fort Belknap Reservations | | 7,251 | 2 | 2 | 100% |
| | | | | **Subtotal** | **139,918** | **41** | **40** | **98%** |
| ND | 17 | AO | All Other Lands | | 48,027 | 10 | 8 | 80% |
| ND | 17 | BL | Bureau of Land Management | | 267 | 5 | 5 | 100% |
| ND | 17 | CR | Cedar River National Grassland | | 84 | 5 | 6 | 120% |
| ND | 17 | LM | Little Missouri National Grassland | | 6,567 | 10 | 10 | 100% |
| ND | 17 | NP | National Park Service - Northern Great Plains Network | | 240 | 2 | 2 | 100% |
| | | | | **Subtotal** | **55,185** | **32** | **31** | **97%** |
| NE | 17 | AO | All Other Lands | | 4,290 | 2 | 2 | 100% |
| NE | 17 | OG | Oglala National Grassland | | 550 | 5 | 5 | 100% |
| NE | 18 | NE | Nebraska National Forest - Pine Ridge District | | 360 | 8 | 7 | 88% |
| NE | 18 | OG | Oglala National Grassland | | 61 | 4 | 4 | 100% |
| NE | 19 | BS | Nebraska National Forest - Bessey District | | 420 | 4 | 3 | 75% |
| NE | 19 | SM | Samuel R. McKelvie National Forest | | 524 | 4 | 3 | 75% |
| | | | | **Subtotal** | **6,205** | **27** | **24** | **89%** |
| NM | 18 | KI | Kiowa National Grassland | | 565 | 5 | 5 | 100% |
| NM | 18 | RI | Rita Blanca National Grassland | | 473 | 2 | 2 | 100% |
| | | | | **Subtotal** | **1,038** | **7** | **7** | **100%** |
| OK | 18 | RI | Rita Blanca National Grassland | | 187 | 2 | 2 | 100% |
| | | | | | | | | |
| SD | 17 | AO | All Other Lands | | 89,931 | 10 | 8 | 80% |
| SD | 17 | BG | Buffalo Gap National Grassland | | 3,611 | 5 | 5 | 100% |
| SD | 17 | BH | Black Hills National Forest - All other Watersheds | | 5,176 | 9 | 9 | 100% |
| SD | 17 | BL | Bureau of Land Management | | 1,448 | 8 | 6 | 75% |
| SD | 17 | BW | Black Hills National Forest - Hydrologic Code 7 Watersheds | | 306 | 5 | 5 | 100% |
| SD | 17 | CU | Custer National Forest | | 446 | 5 | 6 | 120% |
| SD | 17 | FP | Fort Pierre National Grassland | | 716 | 5 | 5 | 100% |
| SD | 17 | GR | Grand River National Grassland | | 1,027 | 5 | 4 | 80% |
| SD | 17 | NP | National Park Service - Northern Great Plains Network | | 1,008 | 2 | 2 | 100% |
| | | | | **Subtotal** | **103,669** | **54** | **50** | **93%** |

| State | BCR | Strata Code | Strata Name | Area (km²) | Planned | Completed | % Completed |
|---|---|---|---|---|---|---|---|
| TX | 18 | RI | Rita Blanca National Grassland | 526 | 5 | 4 | 80% |
| | | | | | | | |
| WY | 10 | AO | All Other Lands | 52,161 | 10 | 10 | 100% |
| WY | 10 | BE | Bridger-Teton National Forest - Roaded/Managed | 3,034 | 7 | 7 | 100% |
| WY | 10 | BH | Bighorn Canyon National Recreation Area | 57 | 2 | 2 | 100% |
| WY | 10 | BI | Bighorn National Forest | 4,712 | 10 | 10 | 100% |
| WY | 10 | BR | Bridger-Teton National Forest - Roadless/Wilderness | 11,364 | 3 | 2 | 67% |
| WY | 10 | BU | Bureau of Land Management - Buffalo Field Office | 547 | 2 | 2 | 100% |
| WY | 10 | CA | Bureau of Land Management - Casper Field Office | 2,509 | 2 | 2 | 100% |
| WY | 10 | CO | Bureau of Land Management - Cody Field Office | 4,704 | 2 | 2 | 100% |
| WY | 10 | GR | Grand Teton National Park | 856 | 2 | 2 | 100% |
| WY | 10 | KE | Bureau of Land Management - Kemmerer Field Office | 5,733 | 2 | 2 | 100% |
| WY | 10 | LA | Bureau of Land Management - Lander Field Office | 9,829 | 2 | 2 | 100% |
| WY | 10 | MB | Medicine Bow National Forest | 773 | 3 | 3 | 100% |
| WY | 10 | PI | Bureau of Land Management - Pinedale Field Office | 3,687 | 8 | 8 | 100% |
| WY | 10 | RA | Bureau of Land Management - Rawlins Field Office | 13,954 | 8 | 8 | 100% |
| WY | 10 | RO | Bureau of Land Management - Rock Springs Field Office | 15,152 | 8 | 8 | 100% |
| WY | 10 | SE | Shoshone National Forest - Roaded/Managed | 2,101 | 18 | 17 | 94% |
| WY | 10 | SR | Shoshone National Forest - Roadless/Wilderness | 8,311 | 5 | 4 | 80% |
| WY | 10 | WO | Bureau of Land Management - Worland Field Office | 8,467 | 2 | 2 | 100% |
| WY | 10 | WR | Wind River Reservation | 7,819 | 2 | 2 | 100% |
| WY | 10 | YE | Yellowstone National Park | 7,592 | 2 | 2 | 100% |
| | | | **Subtotal** | **163,362** | **100** | **97** | **97%** |
| WY | 16 | AO | All Other Lands | 5,438 | 10 | 10 | 100% |
| WY | 16 | BL | Bureau of Land Management | 647 | 2 | 2 | 100% |
| WY | 16 | MB | Medicine Bow National Forest | 5,329 | 27 | 25 | 93% |
| | | | **Subtotal** | **11,414** | **39** | **37** | **95%** |
| WY | 17 | AO | All Other Lands | 52,186 | 12 | 12 | 100% |
| WY | 17 | BH | Black Hills National Forest | 1,085 | 3 | 3 | 100% |
| WY | 17 | BU | Bureau of Land Management - Buffalo Field Office | 2,653 | 2 | 2 | 100% |

| State | BCR | Strata Code | Strata Name | | Area (km²) | Planned | Completed | % Completed |
|---|---|---|---|---|---|---|---|---|
| WY | 17 | CA | Bureau of Land Management - Casper Field Office | | 2,695 | 2 | 2 | 100% |
| WY | 17 | NE | Bureau of Land Management - Newcastle Field Office | | 1,025 | 12 | 12 | 100% |
| WY | 17 | TB | Thunder Basin National Grassland | | 4,520 | 10 | 10 | 100% |
| | | | | **Subtotal** | **64,164** | **41** | **41** | **100%** |
| WY | 18 | AO | All Other Lands | | 12,064 | 10 | 10 | 100% |
| WY | 18 | BL | Bureau of Land Management | | 171 | 2 | 2 | 100% |
| | | | | **Subtotal** | **12,235** | **12** | **12** | **100%** |
| | | | | **Grand Total** | **1,111,383** | **956** | **937** | **98%** |

Table 2. Reasons planned surveys were not completed, 2011.

| Reason Surveys not Completed | AZ | CO | ID | KS | MT | ND | NE | NM | OK | SD | TX | WY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Miscommunication | | | | | 1 | | | | | | | |
| Ran out of time | | | | | | | 2 | | | 3 | | |
| Survey location inaccessible | | 2 | | | 1 | | | | | | | 5 |
| Technician lost data sheets | | | | | | | | | | | 1 | |
| Unable to contact landowner | | | | | 2 | 2 | 1 | | | 2 | | |

# I. Bird Conservation Region 17

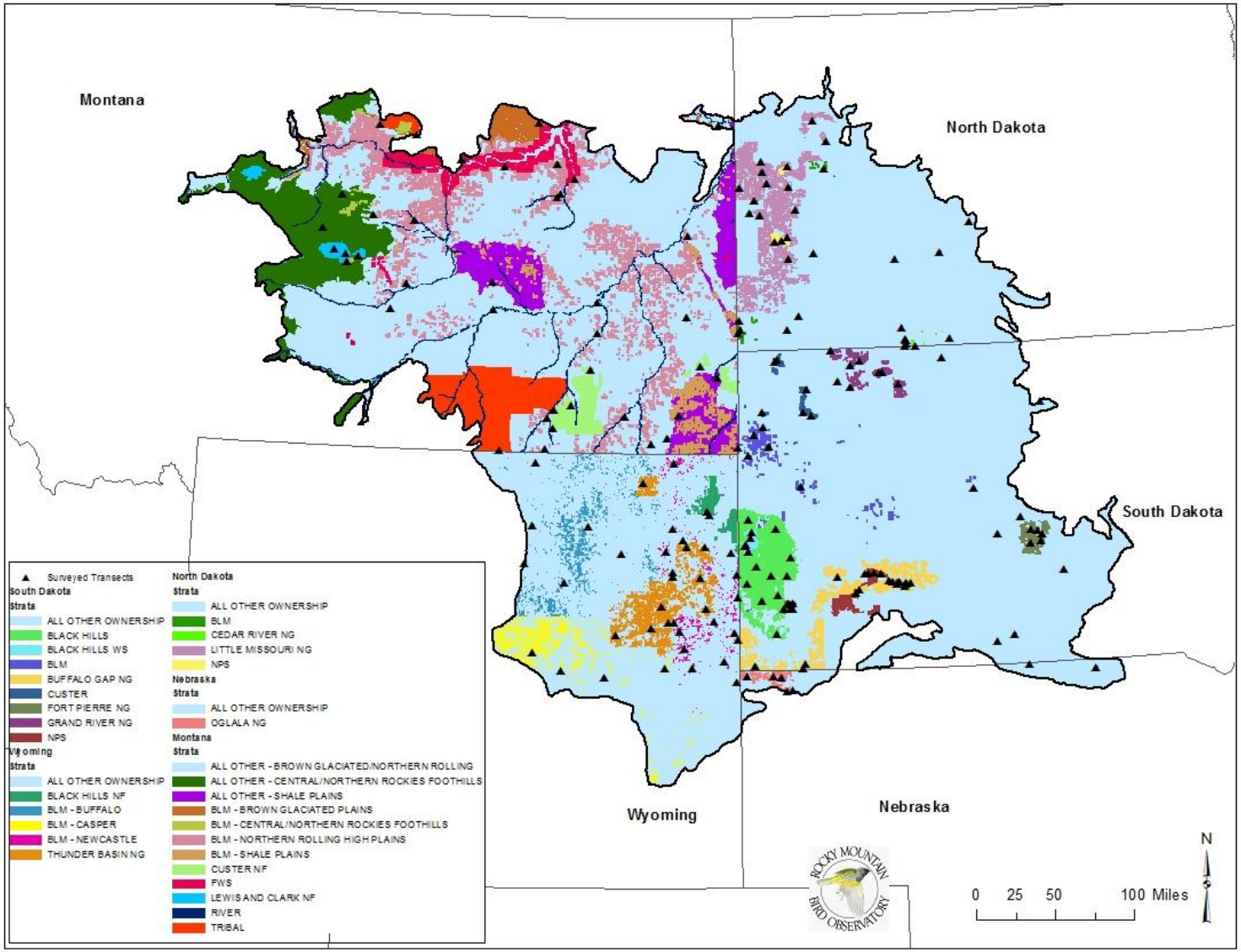


Figure 4. Survey locations in the Badlands and Prairies Bird Conservation Region (BCR 17), 2011.

## A. BCR 17: Total

Results for the entire extent of BCR 17 were obtained by compiling and jointly analyzing data from 34 strata across 5 states (Figure 4).

Field technicians completed 169 of 175 planned surveys (97%) in 2011. Technicians conducted 1,713 point counts within the 169 surveyed grid cells between 13 May and 19 July 2011. They detected 177 bird species, including 32 Partners In Flight (PIF) priority species (Appendix C).

RMBO estimated densities and population sizes for 112 species, 19 of which are priority species in BCR 17 as designated by PIF. The data yielded robust density estimates (CV < 50%) for 64 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BCR17 for 128 species, 20 of which are priority species in BCR 17 as designated by PIF. The data yielded robust occupancy estimates (CV < 50%) for 66 of these species.

## B. Montana BCR 17

Results for the Montana portion of BCR 17 were obtained by compiling and jointly analyzing data from 12 strata (Figure 4). For statewide results within Montana, refer to section II: States. For results on All Other lands, BLM, NPS, Tribal and USFS lands within Montana refer to section III: Land Ownership.

Field technicians completed 40 of 41 planned surveys (98%) in 2011. Technicians conducted 467 point counts within the 40 surveyed grid cells between 25 May and 16 July 2011. They detected 133 bird species, including 22 priority species as designated by Montana Fish, Wildlife and Parks (MTFWP) (Appendix D).

RMBO estimated densities and population sizes for 93 species, 12 of which are priority species as designated by MTFWP. The data yielded robust density estimates (CV < 50%) for 34 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the BCR17 portion of Montana for 94 species, 12 of which are priority species as designated by MTFWP. The data yielded robust occupancy estimates (CV < 50%) for 40 of these species.

## C. North Dakota BCR 17

Results for the North Dakota portion of BCR 17 were obtained by compiling and jointly analyzing data from five strata (Figure 4). For results on All Other lands, BLM, NPS and USFS lands within North Dakota refer to section III: Land Ownership.

Field technicians completed 31of 32 planned surveys (97%) in 2011. Technicians conducted 285 point counts within the 31 surveyed grid cells between 15 May and 2 July 2011. They detected 98 bird species, including 19 priority species as designated by North Dakota Game and Fish Department (NDGFD) (Appendix D).

RMBO estimated densities and population sizes for 65 species, 9 of which are priority species as designated by NDGFD. The data yielded robust density estimates (CV < 50%) for 17 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the BCR 17 portion of North Dakota for 72 species, 11 of which are priority species as designated by NDGFD. The data yielded robust occupancy estimates (CV < 50%) for 20 of these species.

### D. Nebraska BCR 17

Results for the Nebraska portion of BCR 17 were obtained by compiling and jointly analyzing data from two strata (Figure 4). For results on All Other lands and Oglala National Grassland refer to section III: Land Ownership.

Field technicians completed all seven planned surveys (100%) in 2011. Technicians conducted 77 point counts within the 7 surveyed grid cells between 13 June and 17 July 2011. They detected 46 bird species, including 4 priority species as designated by Nebraska Game and Parks Commission (NGPC) (Appendix D).

RMBO estimated densities and population sizes for 27 species, 1 of which is a priority species as designated by NGPC. The data yielded robust density estimates (CV < 50%) for four of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the BCR 17 portion of Nebraska for 31 species, 2 of which are priority species as designated by NGPC. The data yielded robust occupancy estimates (CV < 50%) for six of these species.

### E. South Dakota BCR 17

Results for the South Dakota portion of BCR 17 were obtained by compiling and jointly analyzing data from nine strata (Figure 4). For results on All Other lands, BLM, NPS and USFS lands within South Dakota refer to section III: Land Ownership.

Field technicians completed 50 of 54 planned surveys (93%) in 2011. Technicians conducted 387 point counts within the 50 surveyed grid cells between 14 May and 19 July 2011. They detected 121 bird species, including 12 priority species as designated by South Dakota Game, Fish and Parks (SDGFP) (Appendix D).

RMBO estimated densities and population sizes for 84 species, 5 of which are priority species as designated by SDGFP. The data yielded robust density estimates (CV < 50%) for 33 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the BCR 17 portion of South Dakota for 90 species, 7 of which are priority species as designated by SDGFP. The data yielded robust occupancy estimates (CV < 50%) for 33 of these species.

### F. Wyoming BCR 17

Results for the Wyoming portion of BCR 17 were obtained by compiling and jointly analyzing data from six strata (Figure 4). For additional results within Wyoming, refer to section II: States. For results on All Other lands, BLM, NPS, Tribal and USFS lands within Wyoming refer to section III: Land Ownership.

Field technicians completed all 41 planned surveys (100%) in 2011. Technicians conducted 497 point counts within the 41 surveyed grid cells between 13 May and 16 July 2011. They detected 107 bird species, including 12 priority species as designated by Wyoming Game and Fish Department (WGFD) (Appendix D).

RMBO estimated densities and population sizes for 79 species, 7 of which are priority species as designated by WGFD. The data yielded robust density estimates (CV < 50%) for 22 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the BCR 17 portion of Wyoming for 88 species, 8 of which are priority species as designated by WGFD. The data yielded robust occupancy estimates (CV < 50%) for 32 of these species.

# II. States

## A. Colorado

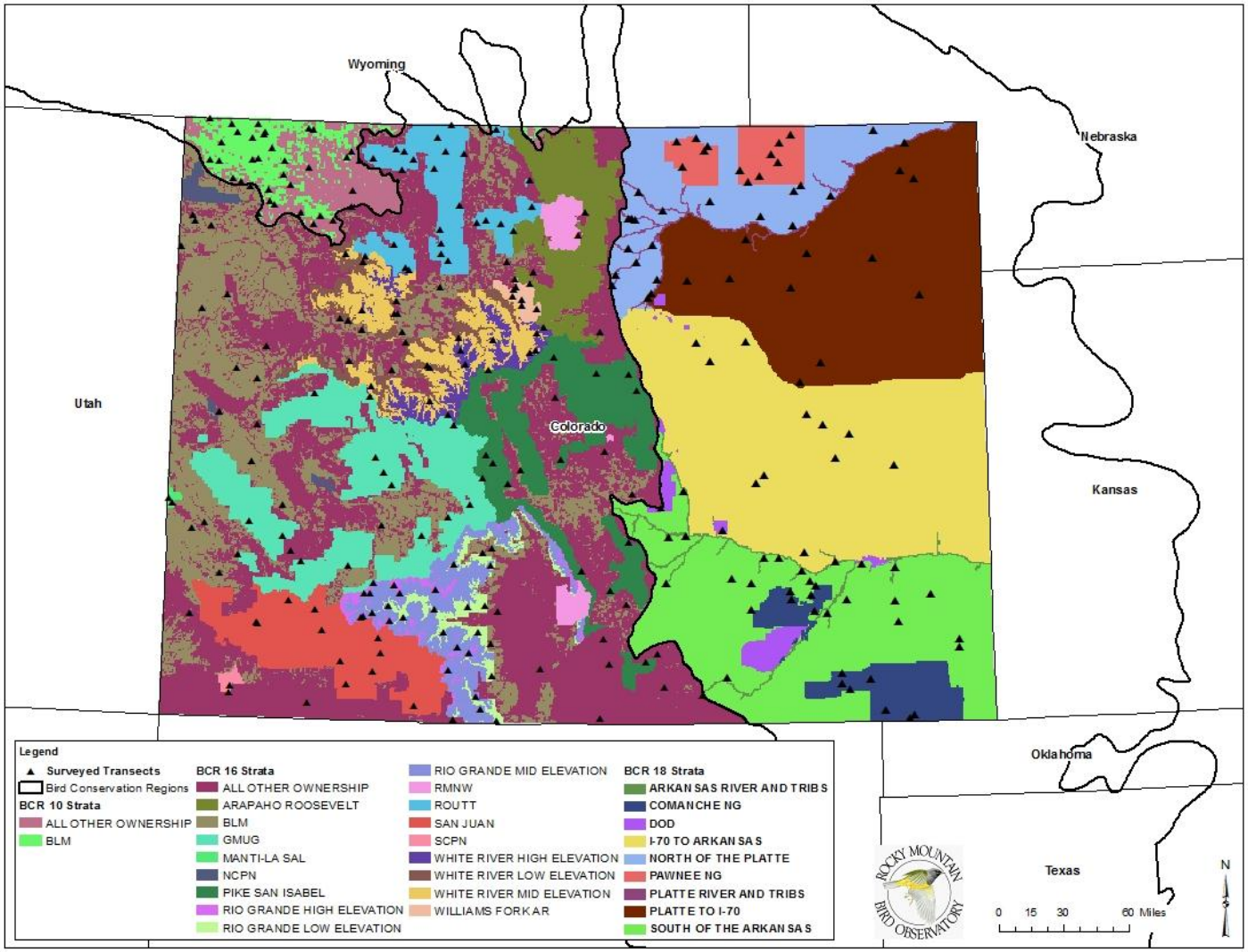


Figure 5. Survey locations in Colorado, 2011.

**1. Colorado Statewide**
Statewide results for Colorado were obtained by compiling and jointly analyzing data from 29 strata (Figure 5). Density and occupancy estimates represent values for the entire state.

Field technicians completed 312 of 314 planned surveys (99%) in 2011. Technicians conducted 3,646 point counts within the 312 surveyed grid cells between 6 May and 31 July 2011. They detected 211 bird species, including 61 priority species as designated by Colorado Parks and Wildlife Department (CPW) (Appendix D).

RMBO estimated densities and population sizes for 142 species, 34 of which are priority species as designated by CPW. The data yielded robust density estimates (CV < 50%) for 112 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the state of Colorado for 152 species, 37 of which are priority species as designated by CPW. The data yielded robust occupancy estimates (CV < 50%) for 107 of these species.

**2. Colorado BCR 10**
Results for the Colorado portion of BCR 10 were obtained by compiling and jointly analyzing data from two strata (Figure 5). For results on All Other lands and BLM lands within Colorado BCR 10 refer to section III: Land Ownership.

Field technicians completed all 33 planned surveys (100%) throughout the BCR 10 portion of Colorado in 2011. Technicians conducted 434 point counts within the 33 surveyed grid cells between 7 May and 18 June 2011. They detected 80 bird species, including 18 priority species as designated by CPW (Appendix D).

RMBO estimated densities and population sizes for 67 species, 13 of which are priority species as designated by CPW. The data yielded robust density estimates (CV < 50%) for 25 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the BCR 10 portion of Colorado for 64 species, 12 of which are priority species as designated by CPW. The data yielded robust occupancy estimates (CV < 50%) for 31 of these species.

**3. Colorado BCR 16**
Results for the Colorado portion of BCR 16 were obtained by compiling and jointly analyzing data from 18 strata (Figure 5). For results on All Other lands, BLM, NPS and USFS lands within Colorado BCR16 refer to section III: Land Ownership.

Field technicians completed 188 of 190 planned surveys (99%) throughout the BCR 16 portion of Colorado in 2011. Technicians conducted 2,150 point counts within the 188 surveyed grid cells between 7 May and 31 July 2011. They detected 145 bird species, including 40 priority species as designated by CPW (Appendix D).

RMBO estimated densities and population sizes for 119 species, 27 of which are priority species as designated by CPW. The data yielded robust density estimates (CV < 50%) for 89 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the BCR 16 portion of Colorado for 120 species, 29 of which are priority species as designated by CPW. The data yielded robust occupancy estimates (CV < 50%) for 85 of these species.

## 4. Colorado BCR 18

### a) Colorado BCR 18: Total

Results for the Colorado portion of BCR 18 were obtained by compiling and jointly analyzing data from nine strata (Figure 5). For results on All Other lands, Department of Defense (DOD) and USFS lands within Colorado BCR18 refer to section III: Land Ownership.

Field technicians completed all 91 planned surveys (100%) throughout the BCR18 portion of Colorado in 2011. Technicians conducted 1,062 point counts within the 91 surveyed grid cells between 6 May and 18 June 2011. They detected 154 bird species, including 38 priority species as designated by CPW (Appendix D).

RMBO estimated densities and population sizes for 95 species, 19 of which are priority species as designated by CPW. The data yielded robust density estimates (CV < 50%) for 43 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the BCR 18 portion of Colorado for 105 species, 18 of which are priority species as designated by CPW. The data yielded robust occupancy estimates (CV < 50%) for 38 of these species.

### b) Colorado BCR 18 Rivers

Results at this scale were obtained by compiling and jointly analyzing data from two rivers strata in the Colorado portion of BCR 18 (Figure 5).

Field technicians completed all 22 planned surveys (100%) throughout the rivers strata in the BCR18 portion of Colorado in 2011. Technicians conducted 246 point counts within the 22 surveyed grid cells between 6 May and 10 June 2011. They detected 135 bird species, including 28 priority species as designated by CPW (Appendix D).

RMBO estimated densities and population sizes for 85 species, 14 of which are priority species as designated by CPW. The data yielded robust density estimates (CV < 50%) for 42 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the rivers strata of the BCR18 portion of Colorado for 96 species, 15 of which are priority species as designated by CPW. The data yielded robust occupancy estimates (CV < 50%) for 42 of these species.

## B. Montana

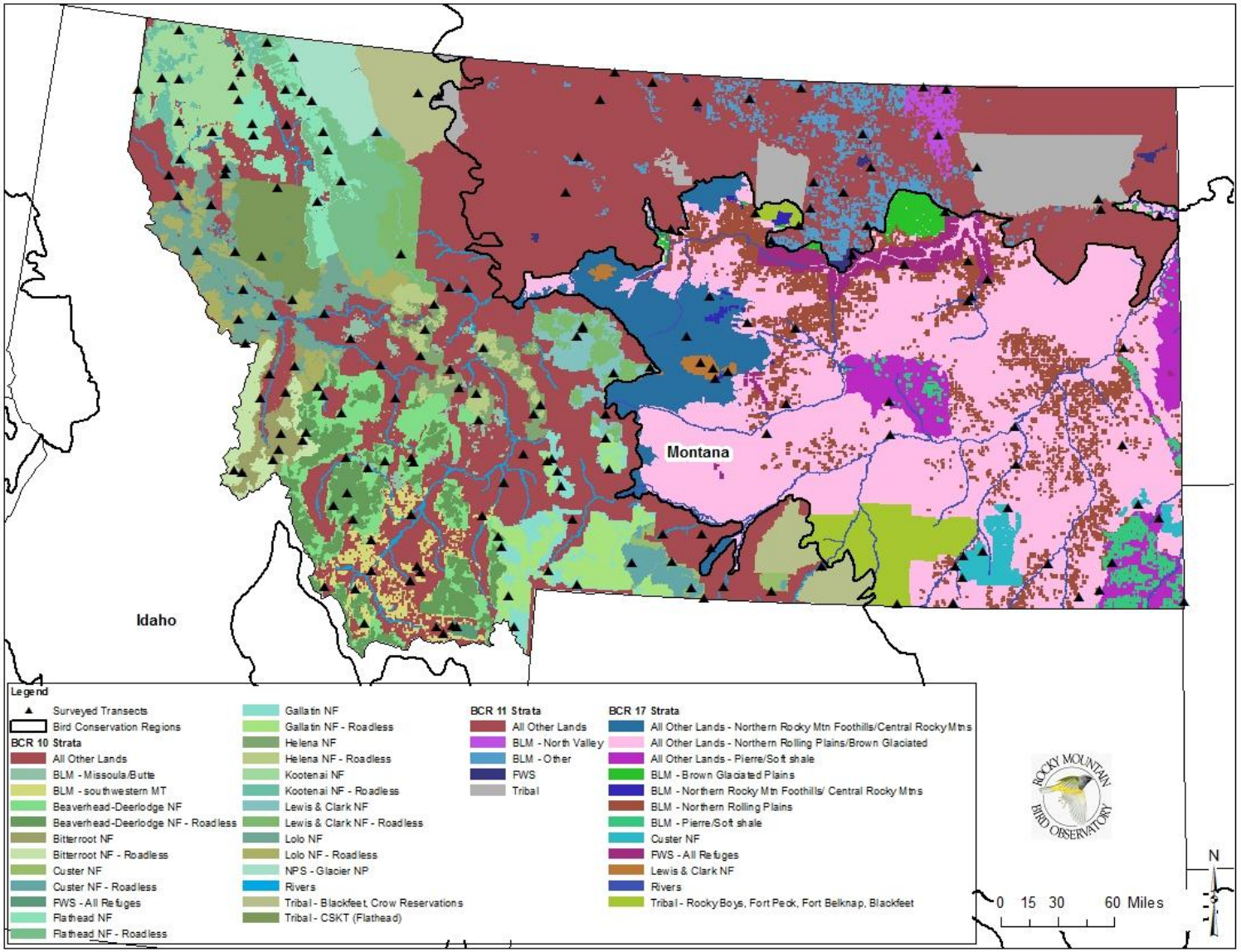


Figure 6. Survey locations in Montana, 2011.

**1. Montana Statewide**

Statewide results for Montana were obtained by compiling and jointly analyzing data from 42 of the 43 strata (Figure 6). The US Fish and Wildlife Service (USFWS) stratum in Montana BCR 11 did not have the minimum number of two samples completed in order to be included in analyses. Density and occupancy estimates for Montana represent values for the entire state excluding USFWS lands in BCR 11.

Field technicians completed 186 of 190 planned surveys (98%) in 2011. Technicians conducted 2,051 point counts within the 186 surveyed grid cells between 25 May and 20 July 2011. They detected 194 bird species, including 33 priority species as designated by MTFWP (Appendix D).

RMBO estimated densities and population sizes for 125 species, 15 of which are priority species as designated by MTFWP. The data yielded robust density estimates (CV < 50%) for 87 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the state of Montana for 140 species, 16 of which are priority species as designated by MTFWP. The data yielded robust occupancy estimates (CV < 50%) for 106 of these species.

**2. Montana BCR 10**

**a) Montana BCR 10: Total**

Results at this scale were obtained by compiling and jointly analyzing data from 26 strata comprising the Montana portion of BCR 10 (Figure 6). For results on All Other lands, BLM, NPS, Tribal and USFS lands within Montana BCR 10 refer to section III: Land Ownership.

Field technicians completed 124 of 125 planned surveys (99%) throughout the BCR 10 portion of Montana in 2011. Technicians conducted 1,273 point counts within the 124 surveyed grid cells between 25 May and 20 July 2011. They detected 171 bird species, including 22 species designated as priorities by MTFWP.

RMBO estimated densities and population sizes for 116 species, 10 of which are priority species as designated by MTFWP. The data yielded robust density estimates (CV < 50%) for 70 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the BCR 10 portion of Montana for 126 species, 10 of which are priority species as designated by MTFWP. The data yielded robust occupancy estimates (CV < 50%) for 80 of these species.

**b) Montana BCR 10 Rivers**

This section consists of one rivers stratum in the Montana portion of BCR 10 (Figure 6).

Field technicians completed all 14 planned surveys (100%) throughout Rivers in the BCR 10 portion of Montana in 2011. Technicians conducted 148 point counts within the 14 surveyed grid cells between 31 May and 3 July 2011. They detected 99 bird species, including 9 priority species as designated by MTFWP (Appendix D).

RMBO estimated densities and population sizes for 79 species, 4 of which are priority species as designated by MTFWP. The data yielded robust density estimates (CV < 50%) for 34 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the BCR 10 portion of Montana for 76 species, 4 of which are priority species as designated by MTFWP. The data yielded robust occupancy estimates (CV < 50%) for 36 of these species.

**c) Montana BCR 10 US Fish and Wildlife Service**
This section consists of one stratum on USFWS lands in the Montana portion of BCR 10 (Figure 6).

Field technicians completed two planned surveys (100%) throughout USFWS lands in the BCR 10 portion of Montana in 2011. Technicians conducted 24 point counts within the 2 surveyed grid cells between 18 June and 20 June 2011. They detected 33 bird species, including 5 priority species as designated by MTFWP (Appendix D).

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

**3. Montana BCR 11**

**a) Montana BCR 11: Total**
Results at this scale were obtained by compiling and jointly analyzing data from four of the five strata comprising the Montana portion of BCR 11 (Figure 6). The USFWS stratum in Montana BCR 11 did not have the minimum number of samples completed (two) in order to be included in analyses. Density and occupancy estimates represent values for the BCR 11 portion of Montana excluding USFWS lands. For results on All Other lands, BLM and Tribal lands within Montana BCR 11 refer to section III: Land Ownership.

Field technicians completed 22 of 24 planned surveys (92%) throughout the BCR 11 portion of Montana in 2011. Technicians conducted 311 point counts within the 22 surveyed grid cells between 1 June and 14 July 2011. They detected 83 bird species, including 14 priority species as designated by MTFWP (Appendix D).

RMBO estimated densities and population sizes for 54 species, 10 of which are priority species as designated by MTFWP. The data yielded robust density estimates (CV < 50%) for 18 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the BCR 11 portion of Montana for 61 species, 9 of which are priority species as designated by MTFWP. The data yielded robust occupancy estimates (CV < 50%) for 27 of these species.

**b) Montana BCR 11 US Fish and Wildlife Service**
This section consists of one stratum on USFWS lands in the Montana portion of BCR 11 (Figure 6).

Field technicians completed one of two planned surveys (50%) throughout the USFWS stratum in the BCR 11 portion of Montana in 2011. Technicians conducted

16 point counts within the single survey location on 5 June 2011. They detected 19 bird species, including 4 priority species as designated by MTFWP (Appendix D).

RMBO did not generate results for this stratum because calculating density or occupancy estimates using data from a single survey is not informative. Additionally, results from this stratum were not included in larger scale density and occupancy estimates because the stratum did not have the required number of surveys completed.

## 4. Montana BCR 17

### a) Montana BCR 17: Total

For the BCR 17-wide results within Montana, refer to section I: BCR 17. For results on All Other lands, BLM, Tribal lands and USFS lands within Montana BCR 17, refer to section III: Land Ownership.

### b) Montana BCR 17 Rivers

This section consists of one rivers stratum in the Montana portion of BCR 17 (Figure 6).

Field technicians completed all eight planned surveys (100%) throughout the rivers stratum in the BCR 17 portion of Montana in 2011. Technicians conducted 68 point counts within the 8 surveyed grid cells between 10 June and 8 July 2011. They detected 76 bird species, including 10 priority species as designated by MTFWP (Appendix D).

RMBO estimated densities and population sizes for 52 species, 4 of which are priority species as designated by MTFWP. The data yielded robust density estimates (CV < 50%) for 17 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the BCR 11 portion of Montana for 50 species, 4 of which are priority species as designated by MTFWP. The data yielded robust occupancy estimates (CV < 50%) for 19 of these species

### c) Montana BCR 17 US Fish and Wildlife Service

This section consists of one stratum on USFWS lands in the Montana portion of BCR 17 (Figure 6).

Field technicians completed two planned surveys (100%) throughout one USFWS stratum in the BCR 17 portion of Montana in 2011. Technicians conducted 24 point counts within the 2 surveyed grid cells between 18 June and 20 June 2011. They detected 32 bird species, including 3 priority species as designated by MTFWP (Appendix D).

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, these data were incorporated into larger scale estimates.

## C. Wyoming

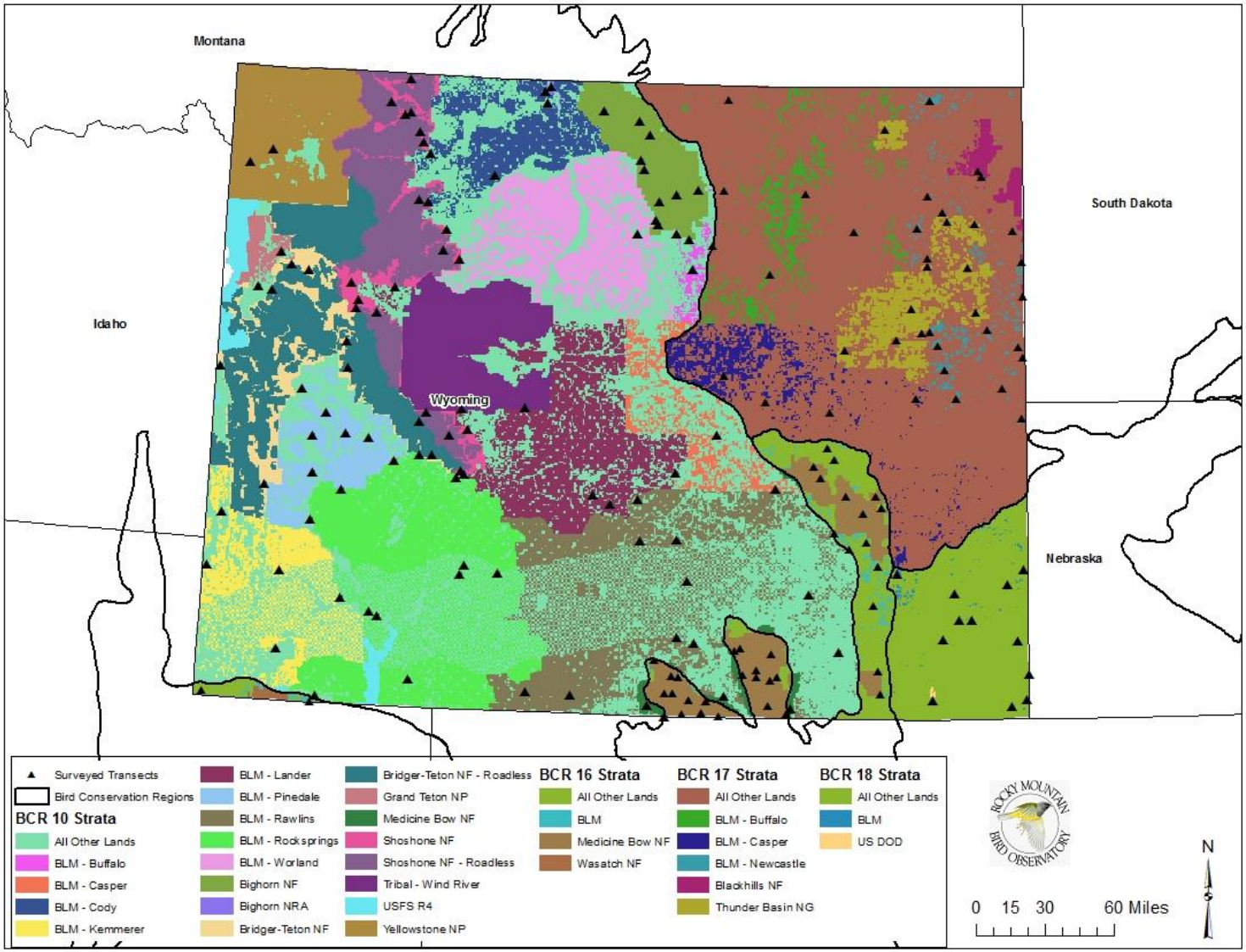


Figure 7. Survey locations in Wyoming, 2011.

**1. Wyoming Statewide**

Statewide results for Wyoming were obtained by compiling and jointly analyzing data from 31 of 35 strata (Figure 7). The BCR 9 portion of Wyoming, the USFS Region 4 stratum in BCR10, the Wasatch NF stratum in BCR 16 and the DOD stratum within BCR 18 were not sampled in 2011 because funding or access for these surveys was unavailable. The Wyoming statewide inferences are therefore restricted to the 31 strata in Wyoming that were sampled.

Field technicians completed 187 of 192 planned surveys (97%) in 2011. Technicians conducted 2,252 point counts within the 187 surveyed grid cells between 13 May and 24 July 2011. They detected 165 bird species, including 28 priority species as designated by WGFD (Appendix D).

RMBO estimated densities and population sizes for 116 species, 12 of which are priority species as designated by WGFD. The data yielded robust density estimates (CV < 50%) for 62 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the state of Wyoming for 123 species, 10 of which are priority species as designated by WGFD. The data yielded robust occupancy estimates (CV < 50%) for 77 of these species.

**2. Wyoming BCR 10**

Results for the Wyoming portion of BCR 10 were obtained by compiling and jointly analyzing data from the 20 strata within Wyoming BCR 10 that were surveyed (Figure 7). For results on All Other lands, BLM, NPS, Tribal and USFS lands within Wyoming BCR 10 refer to section III: Land Ownership.

Field technicians completed 97 of 100 planned surveys (97%) in 2011. Technicians conducted 1,202 point counts within the 97 surveyed grid cells between 28 May and 24 July 2011. They detected 138 bird species, including 21 priority species as designated by WGFD (Appendix D).

RMBO estimated densities and population sizes for 99 species, 9 of which are priority species as designated by WGFD. The data yielded robust density estimates (CV < 50%) for 45 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the BCR 10 portion of Wyoming for 101 species, 7 of which are priority species as designated by WGFD. The data yielded robust occupancy estimates (CV < 50%) for 60 of these species.

**3 Wyoming BCR 16**

Results for the Wyoming portion of BCR 16 were obtained by compiling and jointly analyzing data from the three strata within Wyoming BCR 16 that were surveyed (Figure 7). For results on All Other lands, BLM and USFS lands within Wyoming BCR 16 refer to section III: Land Ownership.

Field technicians completed 37 of 39 planned surveys (95%) in 2011. Technicians conducted 424 point counts within the 37 surveyed grid cells between 24 May and 20 July 2011. They detected 92 bird species, including 7 priority species as designated by WGFD (Appendix D).

RMBO estimated densities and population sizes for 81 species, 6 of which are priority species as designated by WGFD. The data yielded robust density estimates (CV < 50%) for 45 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the BCR 16 portion of Wyoming for 79 species, 6 of which are priority species as designated by WGFD. The data yielded robust occupancy estimates (CV < 50%) for 48 of these species.

#### 4. Wyoming BCR 17

For the Wyoming portion of BCR 17 refer to section I: BCR 17. For results on All Other lands, BLM and USFS lands within Wyoming BCR 17, refer to section III: Land Ownership.

#### 5. Wyoming BCR 18

Results for the Wyoming portion of BCR 18 were obtained by compiling and jointly analyzing data from the two strata within Wyoming BCR 18 that were surveyed (Figure 7). For results on All Other and BLM lands within Wyoming BCR 18 refer to section III: Land Ownership.

Field technicians completed all 12 planned surveys (100%) in 2011. Technicians conducted 129 point counts within the 12 surveyed grid cells between 21 May and 2 July 2011. They detected 49 bird species, including 9 priority species as designated by WGFD (Appendix D).

RMBO estimated densities and population sizes for 37 species, 5 of which are priority species as designated by WGFD. The data yielded robust density estimates (CV < 50%) for eight of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the BCR 18 portion of Wyoming for 34 species, 4 of which are priority species as designated by WGFD. The data yielded robust occupancy estimates (CV < 50%) for 11 of these species.

## III. Land Ownership

### A. All Other Lands

#### 1. All Other Lands in Colorado

##### a) All Other Lands in Colorado: Total

Statewide results for All Other lands in Colorado were obtained by compiling and jointly analyzing data from six strata. Field technicians completed all 76 planned surveys (100%) in 2011. Technicians conducted 885 point counts within the 76 surveyed grid cells between 7 May and 19 July 2011. They detected 144 bird species, including 36 priority species as designated by CPW (Appendix D).

RMBO estimated densities and population sizes for 115 species, 25 of which are priority species as designated by CPW. The data yielded robust density estimates (CV < 50%) for 65 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout All Other lands in Colorado for 115 species, 25 of which are priority species as

designated by CPW. The data yielded robust occupancy estimates (CV < 50%) for 62 of these species.

**b) All Other Lands in Colorado BCR 10**
Results for this section were obtained by analyzing data from the All Other lands stratum in Colorado BCR 10.

Field technicians completed all five planned surveys (100%) in 2011. Technicians conducted 60 point counts within the 5 surveyed grid cells between 17 May and 1 June 2011. They detected 60 bird species, including 9 priority species as designated by CPW (Appendix D).

RMBO estimated densities and population sizes for 45 species, 7 of which are priority species as designated by CPW. The data yielded robust density estimates (CV < 50%) for 11 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout All Other lands in the BCR 10 portion of Colorado for 46 species, 7 of which are priority species as designated by CPW. The data yielded robust occupancy estimates (CV < 50%) for 10 of these species.

**c) All Other Lands in Colorado BCR 16**
Results for this section were obtained by analyzing data from the All Other lands stratum in Colorado BCR 16.

Field technicians completed all 26 planned surveys (100%) in 2011. Technicians conducted 274 point counts within the 26 surveyed grid cells between 7 May and 19 July 2011. They detected 110 bird species, including 26 priority species as designated by CPW (Appendix D).

RMBO estimated densities and population sizes for 94 species, 20 of which are priority species as designated by CPW. The data yielded robust density estimates (CV < 50%) for 44 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout All Other lands in the BCR 16 portion of Colorado for 91 species, 19 of which are priority species as designated by CPW. The data yielded robust occupancy estimates (CV < 50%) for 43 of these species.

**d) All Other Lands in Colorado BCR 18**
Results for All Other lands in Colorado BCR 18 were obtained by compiling and jointly analyzing data from four strata.

Field technicians completed all 45 planned surveys (100%) in 2011. Technicians conducted 551 point counts within the 45 surveyed grid cells between 9 May and 18 June 2011. They detected 79 bird species, including 14 priority species as designated by CPW (Appendix D).

RMBO estimated densities and population sizes for 55 species, 9 of which are priority species as designated by CPW. The data yielded robust density estimates (CV < 50%) for 28 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout All Other lands in the BCR 18 portion of Colorado for 54 species, 8 of which are priority species as designated by CPW. The data yielded robust occupancy estimates (CV < 50%) for 24 of these species.

## 2. All Other Lands in Montana

### a) All Other Lands in Montana: Total

Statewide results for All Other lands in Montana were obtained by compiling and jointly analyzing data from five strata.

Field technicians completed 31 of 33 planned surveys (94%) throughout All Other lands in Montana in 2011. Technicians conducted 369 point counts within the 31 surveyed grid cells between 26 May and 12 July 2011. They detected 129 bird species, including 18 priority species as designated by MTFWP (Appendix D).

RMBO estimated densities and population sizes for 89 species, 11 of which are priority species as designated by MTFWP. The data yielded robust density estimates (CV < 50%) for 41 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout All Other lands for 100 species, 12 of which are priority species as designated by MTFWP. The data yielded robust occupancy estimates (CV < 50%) for 45 of these species.

### b) All Other Lands in Montana BCR 10

Results for this section were obtained by analyzing the All Other lands stratum in the BCR 10 portion of Montana.

Field technicians completed all 14 planned surveys (100%) throughout All Other lands within the BCR 10 portion of Montana in 2011. Technicians conducted 148 point counts within the 14 surveyed grid cells between 31 May and 12 July 2011. They detected 86 bird species, including 9 priority species as designated by MTFWP (Appendix D).

RMBO estimated densities and population sizes for 73 species, 6 of which are priority species as designated by MTFWP. The data yielded robust density estimates (CV < 50%) for 24 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout All Other lands in BCR 10 for 72 species, 7 of which are priority species as designated by MTFWP. The data yielded robust occupancy estimates (CV < 50%) for 21 of these species.

### c) All Other Lands in Montana BCR 11

Results for this section were obtained by analyzing the All Other lands stratum in the BCR 11 portion of Montana.

Field technicians completed 9 of 10 planned surveys (90%) throughout All Other lands in the BCR 11 portion of Montana in 2011. Technicians conducted 118 point counts within the 9 surveyed grid cells between 1 June and 9 July 2011. They detected 68 bird species, including 10 priority species as designated by MTFWP (Appendix D).

RMBO estimated densities and population sizes for 41 species, 8 of which are priority species as designated by MTFWP. The data yielded robust density estimates (CV < 50%) for nine of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout All Other lands in BCR 11 for 51 species, 8 of which are priority species as designated by MTFWP. The data yielded robust occupancy estimates (CV < 50%) for 20 of these species.

**d) All Other Lands in Montana BCR 17**

Results for All Other lands in the BCR 17 portion of Montana were obtained by compiling and jointly analyzing data from three strata.

Field technicians completed eight of nine planned surveys (89%) throughout All Other lands in the BCR 17 portion of Montana in 2011. Technicians conducted 103 point counts within the 8 surveyed grid cells between 26 May and 1 July 2011. They detected 68 species, including 9 priority species as designated by MTFWP (Appendix D).

RMBO estimated densities and population sizes for 52 species, 7 of which are priority species as designated by MTFWP. The data yielded robust density estimates (CV < 50%) for 14 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout All Other lands in BCR 17 for 51 species, 5 of which are priority species as designated by MTFWP. The data yielded robust occupancy estimates (CV < 50%) for 13 of these species.

**3. All Other Lands in North Dakota BCR 17**

Results for this section were obtained by analyzing data from the All Other lands stratum in the BCR 17 portion of North Dakota.

Field technicians completed 8 of 10 planned surveys (80%) throughout All Other lands in North Dakota in 2011. Technicians conducted 72 point counts within the 8 surveyed grid cells between 16 May and 20 June 2011. They detected 77 bird species, including 12 priority species as designated by NDGFD (Appendix D).

RMBO estimated densities and population sizes for 55 species, 7 of which are priority species as designated by NDGFD. The data yielded robust density estimates (CV < 50%) for nine of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout All Other lands in BCR 17 for 59 species, 9 of which are priority species as designated by NDGFD. The data yielded robust occupancy estimates (CV < 50%) for 17 of these species.

**4. All Other Lands in South Dakota BCR 17**

Results for this section were obtained by analyzing data from the All Other lands stratum in the BCR 17 portion of South Dakota.

Field technicians completed 8 of 10 planned surveys (80%) throughout All Other lands in BCR 17 portion of South Dakota in 2011. Technicians conducted 70 point counts within

the 8 surveyed grid cells between 21 May and 9 July 2011. They detected 54 bird species, including 7 priority species as designated by SDGFD (Appendix D).

RMBO estimated densities and population sizes for 30 species, 4 of which are priority species as designated by SDGFD. The data yielded robust density estimates (CV < 50%) for five of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout All Other lands in BCR 17 for 33 species, 5 of which are priority species as designated by SDGFD. The data yielded robust occupancy estimates (CV < 50%) for 11 of these species.

**5. All Other Lands in Wyoming**

**a) All Other Lands in Wyoming: Total**

Statewide results for All Other lands in Wyoming were obtained by compiling and jointly analyzing data from four strata. This BCR-level stratification distinction is made to allow for the summation of the data for individual BCRs.

Field technicians completed all 42 planned surveys (100%) in 2011. Technicians conducted 411 point counts within the 42 surveyed grid cells between 14 May and 10 July 2011. They detected 113 bird species, including 18 priority species as designated by WGFD (Appendix D).

RMBO estimated densities and population sizes for 87 species, 10 of which are priority species as designated by WGFD. The data yielded robust density estimates (CV < 50%) for 31of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout All Other lands in Wyoming for 88 species, 7 of which are priority species as designated by WGFD. The data yielded robust occupancy estimates (CV < 50%) for 37 of these species.

**b) All Other Lands in Wyoming BCR 10**

Results for this section were obtained by analyzing data from the All Other lands stratum in the BCR 10 portion of Wyoming.

Field technicians completed all 10 planned surveys (100%) in 2011. Technicians conducted 91 point counts within the 10 surveyed grid cells between 28 May and 7 July 2011. They detected 85 bird species, including 10 priority species as designated by WGFD (Appendix D).

RMBO estimated densities and population sizes for 63 species, 5 of which are priority species as designated by WGFD. The data yielded robust density estimates (CV < 50%) for 18 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout All Other lands in BCR 10 for 66 species, 3 of which are priority species as designated by WGFD. The data yielded robust occupancy estimates (CV < 50%) for 22 of these species.

**c) All Other Lands in Wyoming BCR 16**
Results for this section were obtained by analyzing data from the All Other lands stratum in the BCR 16 portion of Wyoming.

Field technicians completed all 10 planned surveys (100%) in 2011. Technicians conducted 91 point counts within the 10 surveyed grid cells between 30 May and 10 July 2011. They detected 55 bird species, including 6 priority species as designated by WGFD (Appendix D).

RMBO estimated densities and population sizes for 44 species, 5 of which are priority species as designated by WGFD. The data yielded robust density estimates (CV < 50%) for 11 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout All Other lands in BCR 16 for 44 species, 5 of which are priority species as designated by WGFD. The data yielded robust occupancy estimates (CV < 50%) for 15 of these species.

**d) All Other Lands in Wyoming BCR 17**
Results for this section were obtained by analyzing data from the All Other lands stratum in the BCR 17 portion of Wyoming.

Field technicians completed all 12 planned surveys (100%) in 2011. Technicians conducted 118 point counts within the 12 surveyed grid cells between 14 May and 30 June 2011. They detected 61 bird species, including 5 priority species as designated by WGFD (Appendix D).

RMBO estimated densities and population sizes for 49 species, 5 of which are priority species as designated by WGFD. The data yielded robust density estimates (CV < 50%) for 15 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout All Other lands in BCR 17 for 49 species, 5 of which are priority species as designated by WGFD. The data yielded robust occupancy estimates (CV < 50%) for 13 of these species.

**e) All Other Lands in Wyoming BCR 18**
Results for this section were obtained by analyzing data from the All Other lands stratum in the BCR 18 portion of Wyoming.

Field technicians completed all 10 planned surveys (100%) in 2011. Technicians conducted 111 point counts within the 10 surveyed grid cells between 21 May and 2 July 2011. They detected 45 bird species, including 14 priority species as designated by WGFD (Appendix D).

RMBO estimated densities and population sizes for 35 species, 11 of which are priority species as designated by WGFD. The data yielded robust density estimates (CV < 50%) for seven of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout All Other lands in BCR 18 for 31 species, 9 of which are priority species as designated by WGFD. The data yielded robust occupancy estimates (CV < 50%) for 11 of these species.

## B. Bureau of Land Management

### 1. BLM in Colorado

#### a) BLM in Colorado: Total

Results for all BLM lands in Colorado were obtained by compiling and jointly analyzing data from the two BLM strata in Colorado.

Field technicians completed all 53 planned surveys (100%) in 2011. Technicians conducted 673 point counts within the 53 surveyed grid cells between 7 May and 29 June 2011. They detected 106 bird species, including 1 priority species as designated by BLM Colorado (Appendix E).

RMBO estimated densities and population sizes for 87 species. The data yielded robust density estimates (CV < 50%) for 43 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands in Colorado for 81 species. The data yielded robust occupancy estimates (CV < 50%) for 43 of these species.

#### b) BLM in Colorado BCR 10

Results for this section were obtained by analyzing data from the BLM stratum in Colorado BCR 10. This stratum was created before the 2011 field season when the Colorado BCR 10 stratum was split into two strata: BLM lands and All Other lands. This was done to facilitate better tracking of priority species on BLM lands throughout Colorado.

Field technicians completed all 28 planned surveys (100%) in 2011. Technicians conducted 390 point counts within the 28 surveyed grid cells between 7 May and 18 June 2011. They detected 67 bird species, including 1 priority species as designated by BLM Colorado (Appendix E).

RMBO estimated densities and population sizes for 54 species. The data yielded robust density estimates (CV < 50%) for 23 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands in BCR 10 for 52 species. The data yielded robust occupancy estimates (CV < 50%) for 28 of these species.

#### c) BLM in Colorado BCR 16

Results for this section were obtained by analyzing data from the BLM stratum in Colorado BCR 16.

Field technicians completed all 25 planned surveys (100%) in 2011. Technicians conducted 282 point counts within the 25 surveyed grid cells between 7 May and 29 June 2011. They detected 91 species.

RMBO estimated densities and population sizes for 76 species. The data yielded robust density estimates (CV < 50%) for 38 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands in the BCR 16 portion of Colorado for 73 species. The data yielded robust occupancy estimates (CV < 50%) for 39 of these species.

## 2. BLM in Montana

### a) BLM in Montana: Total

Results for all BLM lands in Montana were obtained by compiling and jointly analyzing data from eight strata across three BCRs.

Field technicians completed all 30 planned surveys (100%) in 2011. Technicians conducted 385 point counts within the 30 surveyed grid cells between 25 May and 14 July 2011. They detected 123 bird species, including 16 priority species as designated by BLM Montana (Appendix E).

RMBO estimated densities and population sizes for 80 species, 9 of which are priority species as designated by BLM Montana. The data yielded robust density estimates (CV < 50%) for 30 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands in Montana for 89 species, 9 of which are priority species as designated by BLM Montana. The data yielded robust occupancy estimates (CV < 50%) for 39 of these species.

### b) BLM in Montana BCR 10

Results for all BLM lands in Montana BCR 10 were obtained by compiling and jointly analyzing data from two strata.

Field technicians completed all eight planned surveys (100%) in 2011. Technicians conducted 92 point counts within the 8 surveyed grid cells between 30 May and 30 June 2011. They detected 57 bird species, including 4 priority species as designated by BLM Montana (Appendix E).

RMBO estimated densities and population sizes for 44 species, 3 of which are priority species as designated by BLM Montana. The data yielded robust density estimates (CV < 50%) for seven of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands in the BCR 10 portion of Montana for 45 species, 3 of which are priority species as designated by BLM Montana. The data yielded robust occupancy estimates (CV < 50%) for 13 of these species.

### c) BLM in Montana BCR 11

Results for all BLM lands in Montana BCR 11 were obtained by compiling and jointly analyzing data from two strata.

Field technicians completed all 10 planned surveys (100%) in 2011. Technicians conducted 147 point counts within the 10 surveyed grid cells between 6 June and 14 July 2011. They detected 57 species, including 12 priority species as designated by BLM Montana (Appendix E).

RMBO estimated densities and population sizes for 37 species, 9 of which are priority species as designated by BLM Montana. The data yielded robust density estimates (CV < 50%) for 10 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands in the BCR 11 portion of Montana for 40 species, 8 of which are priority species as designated by BLM Montana. The data yielded robust occupancy estimates (CV < 50%) for 18 of these species.

**d) BLM in Montana BCR 17**

Results for all BLM lands in Montana BCR 17 were obtained by compiling and jointly analyzing data from four strata.

Field technicians completed all 12 planned surveys (100%) in 2011. Technicians conducted 146 point counts within the 12 surveyed grid cells between 25 May and 12 July 2011. They detected 91 bird species, including 9 priority species as designated by BLM Montana (Appendix E).

RMBO estimated densities and population sizes for 64 species, 5 of which are priority species as designated by BLM Montana. The data yielded robust density estimates (CV < 50%) for 18 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands in the BCR 17 portion of Montana for 65 species, 4 of which are priority species as designated by BLM Montana. The data yielded robust occupancy estimates (CV < 50%) for 18 of these species.

**3. BLM in North Dakota BCR 17**

Results for this section were obtained by analyzing data from the BLM stratum in North Dakota BCR 17.

Field technicians completed all five planned surveys (100%) in 2011. Technicians conducted 50 point counts within the 5 surveyed grid cells between 4 June and 29 June 2011. They detected 62 species, including 4 priority species as designated by BLM North Dakota (Appendix E).

RMBO estimated densities and population sizes for 39 species, 2 of which are priority species as designated by BLM North Dakota. The data yielded robust density estimates (CV < 50%) for seven of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands in North Dakota for 40 species, 2 of which are priority species as designated by BLM North Dakota. The data yielded robust occupancy estimates (CV < 50%) for six of these species.

**4. BLM in South Dakota BCR 17**

Results for this section were obtained by analyzing data from the BLM stratum in South Dakota BCR 17.

Field technicians completed six out of eight planned surveys (75%) in 2011. Technicians conducted 43 point counts within the 6 surveyed grid cells between 28 May and 18 July 2011. They detected 41 species, including 5 priority species as designated by BLM South Dakota (Appendix E).

RMBO estimated densities and population sizes for 19 species, 2 of which are priority species as designated by BLM South Dakota. The data yielded robust density estimates (CV < 50%) for six of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands in the BCR 17 portion of South Dakota for 19 species, 2 of which are priority species as designated by BLM South Dakota. The data yielded robust occupancy estimates (CV < 50%) for five of these species.

**5. BLM in Wyoming**

**a) BLM in Wyoming: Total**

Results for all BLM lands in Wyoming were obtained by compiling and jointly analyzing data from 14 strata across 4 BCRs.

Field technicians completed all 56 planned surveys (100%) in 2011. Technicians conducted 746 point counts within the 56 surveyed grid cells between 22 May and 14 July 2011. They detected 112 bird species, including 6 priority species as designated by BLM Wyoming (Appendix E).

RMBO estimated densities and population sizes for 89 species, 4 of which are priority species as designated by BLM Wyoming. The data yielded robust density estimates (CV < 50%) for 21 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands in Wyoming for 92 species, 3 of which are priority species as designated by BLM Wyoming. The data yielded robust occupancy estimates (CV < 50%) for 36 of these species.

**b) Buffalo Field Office**

Results for the Buffalo BLM Field Office were obtained by compiling and jointly analyzing data from two strata; one in BCR 10 and one in BCR 17. This BCR-level stratification distinction is made to allow for the summation of the data for individual BCRs.

Field technicians completed all four planned surveys (100%) in 2011. Technicians conducted 55 point counts within the 4 surveyed grid cells between 7 June and 5 July 2011. They detected 45 bird species, including 2 priority species as designated by BLM Wyoming (Appendix E).

RMBO estimated densities and population sizes for 34 species, 1 of which is a priority species as designated by BLM Wyoming. The data yielded robust density estimates (CV < 50%) for five of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands within the Buffalo Field Office for 36 species, 1 of which is a priority species as designated by BLM Wyoming. The data yielded robust occupancy estimates (CV < 50%) for one of these species.

**c) Casper Field Office**
Results for the Casper BLM Field Office were obtained by compiling and jointly analyzing data from two strata; one in BCR 10 and one in BCR 17. This BCR-level stratification distinction is made to allow for the summation of the data for individual BCRs.

Field technicians completed all four planned surveys (100%) in 2011. Technicians conducted 57 point counts within the 4 surveyed grid cells between 27 May and 11 June 2011. They detected 41 species, including 4 priority species as designated by BLM Wyoming (Appendix E).

RMBO estimated densities and population sizes for 36 species, 4 of which are priority species as designated by BLM Wyoming. The data yielded robust density estimates (CV < 50%) for six of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands within the Casper Field Office for 36 species, 3 of which are priority species as designated by BLM Wyoming. The data yielded robust occupancy estimates (CV < 50%) for one of these species.

**d) Cody Field Office**
This section consists of the Cody Field Office stratum in the Wyoming portion of BCR 10.

Field technicians completed two planned surveys (100%) in 2011. Technicians conducted 27 point counts within the 2 surveyed grid cells on 12 June and 13 June 2011. They detected 20 species, including 1 priority species as designated by BLM Wyoming (Appendix E).

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

**e) Kemmerer Field Office**
This section consists of the Kemmerer Field Office stratum in the Wyoming portion of BCR 10.

Field technicians completed two planned surveys (100%) in 2011. Technicians conducted 28 point counts within the 2 surveyed grid cells on 31 May and 1 June 2011. Technicians detected 15 species, including 4 priority species as designated by BLM Wyoming (Appendix E).

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

**f) Lander Field Office**
This section consists of the Lander Field Office stratum in the Wyoming portion of BCR 10.

Field technicians completed two planned surveys (100%) in 2011. Technicians conducted 26 point counts within the 2 surveyed grid cells on 22 June and 24 June

2011. They detected 35 bird species, including 2 priority species as designated by BLM Wyoming (Appendix E).

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

**g) Newcastle Field Office**
Results for this section were obtained by analyzing data from the Newcastle Field Office stratum in Wyoming portion of BCR 17.

Field technicians completed all 12 planned surveys (100%) in 2011. Technicians conducted 169 point counts within the 12 surveyed grid cells between 27 May and 15 June 2011. They detected 57 bird species, including 4 priority species as designated by BLM Wyoming (Appendix E).

RMBO estimated densities and population sizes for 43 species, 3 of which are priority species as designated by BLM Wyoming. The data yielded robust density estimates (CV < 50%) for 13 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands within the Newcastle Field Office for 47 species, 2 of which are priority species as designated by BLM Wyoming. The data yielded robust occupancy estimates (CV < 50%) for 15 of these species.

**h) Pinedale Field Office**
Results for this section were obtained by analyzing data from the Pinedale Field Office stratum in the Wyoming portion of BCR 10.

Field technicians completed all eight planned surveys (100%) in 2011. Technicians conducted 114 point counts within the 8 surveyed grid cells between 9 June and 23 June 2011. They detected 28 species, including 4 priority species as designated by BLM Wyoming (Appendix E).

RMBO estimated densities and population sizes for 20 species, 3 of which are priority species as designated by BLM Wyoming. The data yielded robust density estimates (CV < 50%) for five of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands within the Pinedale Field Office for 18 species, 3 of which are priority species as designated by BLM Wyoming. The data yielded robust occupancy estimates (CV < 50%) for two of these species.

**i) Rawlins Field Office**
Results for this section were obtained by analyzing data from the Rawlins Field Office stratum in the Wyoming portion of BCR 10.

Field technicians completed all eight planned surveys (100%) in 2011. Technicians conducted 99 point counts within the 8 surveyed grid cells between 1 June and 6 July 2011. They detected 24 species, including 4 priority species as designated by BLM Wyoming (Appendix E).

RMBO estimated densities and population sizes for 17 species, 4 of which are priority species as designated by BLM Wyoming. The data yielded robust density estimates (CV < 50%) for six of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands within the Rawlins Field Office for 14 species, 3 of which are priority species as designated by BLM Wyoming. The data yielded robust occupancy estimates (CV < 50%) for six of these species.

**j) Rock Springs Field Office**

Results for this section were obtained by analyzing data from the Rock Springs Field Office stratum in the Wyoming portion of BCR 10.

Field technicians completed all eight planned surveys (100%) in 2011. Technicians conducted 109 point counts within the 8 surveyed grid cells on 28 May and 14 July 2011. They detected 33 bird species, including 5 priority species as designated by BLM Wyoming (Appendix E).

RMBO estimated densities and population sizes for 26 species, 4 of which are priority species as designated by BLM Wyoming. The data yielded robust density estimates (CV < 50%) for five of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout BLM lands within the Rock Springs Field Office for 24 species, 3 of which are priority species as designated by BLM Wyoming. The data yielded robust occupancy estimates (CV < 50%) for six of these species.

**k) Worland Field Office**

This section consists of the Worland Field Office stratum in the Wyoming portion of BCR 10.

Field technicians completed both planned surveys (100%) in 2011. Technicians conducted 20 point counts within the 2 surveyed grid cells on 10 June and 6 July 2011. They detected 20 species, including 2 priority species as designated by BLM Wyoming (Appendix E).

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

**l) BLM in Wyoming BCR 16**

This section consists of the BLM stratum in the Wyoming portion of BCR 16.

Field technicians completed both planned surveys (100%) in 2011. Technicians conducted 24 point counts within the 2 surveyed grid cells on 24 May and 28 June 2011. They detected 23 species, including 3 priority species as designated by BLM Wyoming (Appendix E).

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

**m) BLM in Wyoming BCR18**
This section consists of the BLM stratum in the Wyoming portion of BCR 18.

Field technicians completed both planned surveys (100%) in 2011. Technicians conducted 18 point counts within the 2 surveyed grid cells on 22 May and 30 June 2011. They detected 17 species.

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

## C. Department of Defense

**DOD in Colorado BCR 18**
This section consists of the DOD lands stratum in the Colorado portion of BCR 18.

Field technicians completed both planned surveys (100%) in 2011. Technicians conducted 23 point counts within the 2 surveyed grid cells on 26 May 2011. They detected 48 species, including 11 priority species as designated by CPW (Appendix E).

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

## D. National Park Service

### 1. Greater Yellowstone Network

**a) Greater Yellowstone Network: Total**
Results for the Greater Yellowstone Network (GRYN) were obtained by analyzing data from three strata in the BCR10 portion of Wyoming.

Field technicians completed all six planned surveys (100%) in 2011. Technicians conducted 80 point counts within the 6 surveyed grid cells between 7 June and 20 July 2011. They detected 59 bird species.

RMBO estimated densities and population sizes for 45 species. The data yielded robust density estimates (CV < 50%) for seven of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the Greater Yellowstone Network for 48 species. The data yielded robust occupancy estimates (CV < 50%) for six of these species.

**b) Bighorn Canyon National Recreation Area**
This section consists of the Bighorn Canyon National Recreation Area stratum in Wyoming.

Field technicians completed both planned surveys (100%) in 2011. Technicians conducted 16 point counts within the 2 surveyed grid cells on 7 June and 8 June 2011. They detected 23 species.

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

**c) Grand Teton National Park**
This section consists of the Grand Teton National Park stratum in the BCR 10 portion of Wyoming.

Field technicians completed both planned surveys (100%) in 2011. Technicians conducted 32 point counts within the 2 surveyed grid cells on 17 June and 18 June 2011. They detected 44 bird species.

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

**d) Yellowstone National Park**
This section consists of the Yellowstone National Park stratum in the BCR 10 portion of Wyoming.

Field technicians completed both planned surveys (100%) in 2011. Technicians conducted 32 point counts within the 2 surveyed grid cells on 19 July and 20 July 2011. They detected 15 bird species.

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

**2. Northern Colorado Plateau Network in Colorado**
This section consists of the Northern Colorado Plateau Network stratum within the BCR 16 portion of Colorado.

Field technicians completed both planned surveys (100%) in 2011. Technicians conducted 32 point counts within the 2 surveyed grid cells on 19 July and 20 July 2011. They detected 15 bird species.

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

**3. Northern Great Plains Network**

**a) Northern Great Plains Network in North Dakota BCR 17**
This section consists of the Northern Great Plains Network stratum within the BCR 17 portion of North Dakota.

Field technicians completed both planned surveys (100%) in 2011. Technicians conducted 22 point counts within the 2 surveyed grid cells on 16 June and 17 June 2011. They detected 37 species.

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

**b) Northern Great Plains Network in South Dakota BCR 17**
This section consists of the Northern Great Plains Network

Field technicians completed both planned surveys (100%) in 2011. Technicians conducted 13 point counts within the 2 surveyed grid cells on 6 July and 7 July 2011. They detected 22 species.

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

**4. Rocky Mountain Network**

**a). Rocky Mountain Network in Colorado**
This section consists of the Rocky Mountain Network stratum in the Colorado portion of BCR 16. This stratum was restratified in 2011 to accurately reflect land ownership. There was a land acquisition within Great Sand Dunes National Monument and some samples were removed from Rio Grande National Forest and added to the RMNW stratum. A total of 16 $km^2$ were added to the area of the RMNW strata.

Field technicians completed both planned surveys (100%) in 2011. Technicians conducted 23 point counts within the 2 surveyed grid cells on 7 July and 15 July 2011. They detected 37 bird species.

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

**b) Glacier National Park**
This section consists of the Glacier National Park stratum in the Montana portion of BCR 10.

Field technicians completed both planned surveys (100%) in 2011. Technicians conducted 12 point counts within the 2 surveyed grid cells on 11 July and 13 July 2011. They detected 39 bird species.

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

**5. Southern Colorado Plateau Network in Colorado**
This section consists of the Southern Colorado Plateau Network stratum within the Colorado portion of BCR 16.

Field technicians completed both planned surveys (100%) in 2011. Technicians conducted 23 point counts within the 2 surveyed grid cells on 6 June and 8 June 2011. They detected 35 species.

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

## E. Tribal Lands

### 1. Blackfeet and Crow Tribal Lands in BCR 10

This section consists of the Blackfeet and Crow Tribal lands stratum in the Montana portion of BCR 10.

Field technicians completed both planned surveys (100%) throughout Blackfeet and Crow Tribal lands in the BCR 10 portion of Montana in 2011. Technicians conducted 20 point counts within the 2 surveyed grid cells on 4 June and 5 June 2011. They detected 23 species, including 3 priority species as designated by MTFWP (Appendix D).

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

### 2. Flathead Tribal Lands in BCR 10

This section consists of the Flathead Tribal lands stratum in the Montana portion of BCR 10.

Field technicians completed both planned surveys (100%) throughout Flathead Tribal lands in the BCR10 portion of Montana in 2011. Technicians conducted 21 point counts within the 2 surveyed grid cells between 14 June and 16 June 2011. They detected 57 species, including 3 priority species as designated by MTFWP (Appendix D).

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

### 3. Blackfeet, Fort Belknap, Fort Peck and Rocky Boys Tribal Lands in BCR 11

This section consists of the Blackfeet, Fort Belknap, Fort Peck and Rocky Boys Tribal lands stratum in the Montana portion of BCR 11.

Field technicians completed both planned surveys (100%) throughout Blackfeet, Fort Belknap, Fort Peck and Rocky Boys Tribal lands in the BCR 11 portion of Montana in 2011. Technicians conducted 30 point counts within the 2 surveyed grid cells between 8 June and 12 July 2011. They detected 27 species, including 6 priority species as designated by MTFWP (Appendix D).

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

### 4. Crow, Fort Belknap and Northern Cheyenne Tribal Lands in BCR 17

This section consists of the Crow, Fort Belknap and Northern Cheyenne Tribal lands stratum in the Montana portion of BCR 17.

Field technicians completed both planned surveys (100%) throughout Crow, Fort Belknap and Northern Cheyenne Tribal lands in the BCR 17 portion of Montana in 2011. Technicians conducted 24 point counts within the 2 surveyed grid cells between 27 May and 29 June 2011. They detected 35 species, including 2 priority species as designated by MTFWP (Appendix D).

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

**5. Wind River Tribal Lands in BCR 10**

This section consists of the Wind River Tribal lands stratum in the Wyoming portion of BCR 10.

Field technicians completed both planned surveys (100%) throughout Wind River Tribal lands in Wyoming in 2011. Technicians conducted 24 point counts within the 2 surveyed grid cells on 3 June and 4 June 2011. They detected 42 species, including 4 priority species as designated by WGFD (Appendix D).

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, this data was incorporated into larger scale estimates.

## F. US Forest Service

### 1. US Forest Service Region 1

#### a) National Forests

Within this sampling design each National Forest in Region 1 is stratified separately. This forest-level stratification distinction is made so we can analyze the data separately for each Forest. In this section of the report, we summarize results for all Region 1 Forests combined, followed by summaries for each individual National Forest.

##### (1) Region 1 National Forests: Total

Results for all Region 1 National Forests combined were obtained by compiling and jointly analyzing data from 27 USFS Region 1 strata across 3 states.

Field technicians completed 125 planned surveys (101%) in 2011. Technicians conducted 1,256 point counts within the 125 surveyed grid cells between 25 May and 20 July 2011. They detected 141 bird species, including 18 priority species as designated by USFS Region 1 (Appendix F).

RMBO estimated densities and population sizes for 101 species, 8 of which are priority species in USFS Region 1. The data yielded robust density estimates (CV < 50%) for 69 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Region 1 National Forests for 103 species, 9 of which are priority species in USFS Region 1. The data yielded robust occupancy estimates (CV < 50%) for 73 of these species.

##### (2) Beaverhead-Deerlodge National Forest

Results for Beaverhead-Deerlodge National Forest were obtained by compiling and jointly analyzing data from two strata; front-country/managed areas and designated roadless/wilderness areas. This forest-level stratification distinction was made due to field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit.

Field technicians completed all 10 planned surveys (100%) in 2011. Technicians conducted 106 point counts within the 10 surveyed grid cells between 25 May and 13 July 2011. They detected 51 species, including 6 priority species for the Beaverhead-Deerlodge National Forest (Appendix F).

RMBO estimated densities and population sizes for 44 species, 4 of which are priority species for Beaverhead-Deerlodge National Forest. The data yielded robust density estimates (CV < 50%) for 17 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Beaverhead-Deerlodge National Forest for 41 species, 4 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 18 of these species.

**(3) Bitterroot National Forest**

Results for Bitterroot National Forest were obtained by compiling and jointly analyzing data from two strata; front-country/managed areas and designated roadless/wilderness areas. This forest-level stratification distinction was made due to field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit.

Field technicians completed all 10 planned surveys (100%) in 2011. Technicians conducted 97 point counts within the 10 surveyed grid cells between 9 June and 12 July 2011. They detected 61 bird species, including 7 priority species for Bitterroot National Forest (Appendix F).

RMBO estimated densities and population sizes for 45 species, 4 of which are priority species for Bitterroot National Forest. The data yielded robust density estimates (CV < 50%) for 16 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Bitterroot National Forest for 51 species, 5 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 17 of these species.

**(4) Clearwater National Forest**

Results for Clearwater National Forest were obtained by compiling and jointly analyzing data from two strata; front-country/managed areas and designated roadless/wilderness areas. This forest-level stratification distinction was made due to field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit.

Field technicians completed all 10 planned surveys (100%) in 2011. Technicians conducted 105 point counts within the 10 surveyed grid cells between 8 July and 14 July 2011. They detected 58 bird species, including 5 priority species for Clearwater National Forest (Appendix F).

RMBO estimated densities and population sizes for 46 species, 4 of which are priority species for Clearwater National Forest. The data yielded robust density estimates (CV < 50%) for 16 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Clearwater National Forest for 48 species, 3 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 17 of these species.

This monitoring design and current sampling intensity is providing population information for one of the four species designated as Management Indicators for Clearwater National Forest. This includes density estimates for Pileated Woodpecker.

**(5) Custer National Forest**

Results for Custer National Forest were obtained by compiling and jointly analyzing data from four strata across two states (Montana and South Dakota) and two BCRs (10 and 17). Within Montana BCR 10, Custer National Forest is further split into front-country/managed areas and designated roadless/wilderness areas. This forest-level stratification distinction was made due to field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit. The state-level stratification distinction is made for the benefit of the state partners to allow for the summation of the data for individual states. Likewise, the BCR-level stratification distinction is made to allow for the summation of the data for individual BCRs.

Field technicians completed 15 of 14 planned surveys (107%) in 2011. Technicians conducted 146 point counts within the 15 surveyed grid cells between 4 June and 20 July 2011. They detected 85 bird species, including 15 priority species for Custer National Forest (Appendix F).

RMBO estimated densities and population sizes for 71 species, 12 of which are priority species for Custer National Forest. The data yielded robust density estimates (CV < 50%) for 26 of these species.

RMBO estimated the proportion of 1 km2 grid cells occupied (Psi) throughout Custer National Forest for 71 species, 12 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 31 of these species.

This monitoring design and current sampling intensity is providing population information for 7 of the 18 species designated as Management Indicators for Custer National Forest. This includes density and occupancy estimates for Brewer's Sparrow, Bullock's Oriole, Lark Sparrow, Ovenbird, Spotted Towhee, Western Kingbird and Yellow Warbler.

**(6) Flathead National Forest**

Results for Flathead National Forest were obtained by compiling and jointly analyzing data from two strata; front-country/managed areas and designated roadless/wilderness areas. This forest-level stratification distinction was made due to field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit.

Field technicians completed all 10 planned surveys (100%) in 2011. Technicians conducted 87 point counts within the 10 surveyed grid cells between 15 June and

15 July 2011. They detected 62 bird species, including 3 priority species for Flathead National Forest (Appendix F).

RMBO estimated densities and population sizes for 54 species, 3 of which are priority species for Flathead National Forest. The data yielded robust density estimates (CV < 50%) for 21 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Flathead National Forest for 55 species, 3 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 25 of these species.

**(7) Gallatin National Forest**

Results for Gallatin National Forest were obtained by compiling and jointly analyzing data from two strata; front-country/managed areas and designated roadless/wilderness areas. This forest-level stratification distinction was made due to field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit.

Field technicians completed all 10 planned surveys (100%) in 2011. Technicians conducted 120 point counts within the 10 surveyed grid cells between 18 June and 7 July 2011. They detected 56 bird species, including 6 priority species for Gallatin National Forest (Appendix F).

RMBO estimated densities and population sizes for 51 species, 4 of which are priority species for Gallatin National Forest. The data yielded robust density estimates (CV < 50%) for 24 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Gallatin National Forest for 49 species, 4 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 21 of these species.

**(8) Helena National Forest**

Results for Helena National Forest were obtained by compiling and jointly analyzing data from two strata; front-country/managed areas and designated roadless/wilderness areas. This forest-level stratification distinction was made due to field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit.

Field technicians completed all 10 planned surveys (100%) in 2011. Technicians conducted 110 point counts within the 10 surveyed grid cells between 3 June and 1 July 2011. They detected 57 bird species, including 5 priority species for Helena National Forest (Appendix F).

RMBO estimated densities and population sizes for 54 species, 5 of which are priority species for Helena National Forest. The data yielded robust density estimates (CV < 50%) for 20 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Helena National Forest for 53 species, 5 of which are priority species for this

Forest. The data yielded robust occupancy estimates (CV < 50%) for 22 of these species.

This monitoring design and current sampling intensity is providing population information for one of the five species designated as Management Indicators for Helena National Forest. This includes density and occupancy estimates for Hairy Woodpecker.

**(9) Idaho Panhandle National Forest**

Results for Idaho Panhandle National Forest were obtained by compiling and jointly analyzing data from two strata; front-country/managed areas and designated roadless/wilderness areas. This forest-level stratification distinction was made due to field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit.

Field technicians completed 11 of 10 planned surveys (110%) in 2011. Technicians conducted 105 point counts within the 11 surveyed grid cells between 4 June and 13 July 2011. They detected 68 bird species, including 11 priority species for Idaho Panhandle National Forest (Appendix F).

RMBO estimated densities and population sizes for 52 species, 9 of which are priority species for Idaho Panhandle National Forest. The data yielded robust density estimates (CV < 50%) for 30 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Idaho Panhandle National Forest for 54 species, 8 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 33 of these species.

This monitoring design and current sampling intensity is providing population information for six of the eight species designated as Management Indicators for Idaho-Panhandle National Forest. This includes density and occupancy estimates for Chipping Sparrow, Dusky Flycatcher, Hairy Woodpecker, Hammond's Flycatcher and Olive-sided Flycatcher as well as density estimates for Pileated Woodpecker.

**(10) Kootenai National Forest**

Results for Kootenai National Forest were obtained by compiling and jointly analyzing data from two strata; front-country/managed areas and designated roadless/wilderness areas. This forest-level stratification distinction was made due to field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit.

Field technicians completed 9 of 10 planned surveys (90%) in 2011. Technicians conducted 81 point counts within the 14 surveyed grid cells between 5 June and 10 July 2011. They detected 56 bird species, including 8 priority species for Kootenai National Forest (Appendix F).

RMBO estimated densities and population sizes for 47 species, 7 of which are priority species for Kootenai National Forest. The data yielded robust density estimates (CV < 50%) for 21 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Kootenai National Forest for 50 species, 6 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 22 of these species.

This monitoring design and current sampling intensity is providing population information for five of the eight species designated as Management Indicators for Kootenai National Forest. This includes density and occupancy estimates for Chipping Sparrow, Dusky Flycatcher, Hammond's Flycatcher and Olive-sided Flycatcher as well as density estimates for Pileated Woodpecker.

**(11) Lewis and Clark National Forest**

Results for Kootenai National Forest were obtained by compiling and jointly analyzing data from three strata; one in BCR 17 and two in BCR 10. Within BCR 10, the Forest is split into front-country/managed areas and designated roadless/wilderness areas due to field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit. The BCR-level stratification distinction is made to allow for the summation of the data for individual BCRs.

Field technicians completed all 10 planned surveys (100%) in 2011. Technicians conducted 115 point counts within the 10 surveyed grid cells between 1 June and 16 July 2011. They detected 63 bird species, including 6 priority species for Lewis and Clark National Forest (Appendix F).

RMBO estimated densities and population sizes for 49 species, 4 of which are priority species for Lewis and Clark National Forest. The data yielded robust density estimates (CV < 50%) for 14 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Lewis and Clark National Forest for 51 species, 4 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 19 of these species.

This monitoring design and current sampling intensity is providing population information for one of the seven species designated as Management Indicators for Lewis and Clark National Forest. This includes density and occupancy estimates for American Three-toed Woodpecker.

**(12) Lolo National Forest**

Results for Lolo National Forest were obtained by compiling and jointly analyzing data from two strata; front-country/managed areas and designated roadless/wilderness areas. This forest-level stratification distinction was made due to field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit.

Field technicians completed all 10 planned surveys (100%) in 2011. Technicians conducted 81 point counts within the 10 surveyed grid cells between 2 June and 8 July 2011. They detected 64 bird species, including 6 priority species for Lolo National Forest (Appendix F).

RMBO estimated densities and population sizes for 54 species, 4 of which are priority species for Lolo National Forest. The data yielded robust density estimates (CV < 50%) for 15 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Lolo National Forest for 55 species, 3 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 19 of these species.

This monitoring design and current sampling intensity is providing population information for one of the four species designated as Management Indicators for Lolo National Forest. This includes density estimates for Pileated Woodpecker.

**(13) Nez Perce National Forest**

Results for Nez Perce National Forest were obtained by compiling and jointly analyzing data from two strata; front-country/managed areas and designated roadless/wilderness areas. This forest-level stratification distinction was made due to field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit.

Field technicians completed all 10 planned surveys (100%) in 2011. Technicians conducted 103 point counts within the 10 surveyed grid cells between 11 June and 15 July 2011. They detected 53 bird species, including 5 priority species for Nez Perce National Forest (Appendix F).

RMBO estimated densities and population sizes for 42 species, 3 of which are priority species for Nez Perce National Forest. The data yielded robust density estimates (CV < 50%) for 22 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Nez Perce National Forest for 45 species, 2 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 27 of these species.

This monitoring design and current sampling intensity is providing population information for one of the four species designated as Management Indicators for the Nez Perce National Forest. This includes density estimates for Pileated Woodpecker.

**b) Dakota Prairie National Grasslands (not including Sheyenne NG)**

Results for the Dakota Prairie National Grasslands were obtained by compiling and jointly analyzing data from three strata: Cedar River, Grand River and Little Missouri National Grasslands. This grassland-level stratification is made so we can produce results for each Grassland individually as well as for all three of them as a whole. Since all of the National Grasslands in USFS Region 1 fall within the Dakota Prairie National Grasslands, this section represents all Grasslands in Region 1. We did not survey one National Grassland within Region 1 – Sheyenne National Grassland. 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 2012).

Field technicians completed all 20 planned surveys (100%) in 2011. Technicians conducted 173 point counts within the 20 surveyed grid cells between 14 May and 2 July 2011. They detected 79 species, including 17 priority species for the Dakota Prairie National Grasslands (Appendix F).

RMBO estimated densities and population sizes for 56 species, 9 of which are priority species for the Dakota Prairie National Grasslands. The data yielded robust density estimates (CV < 50%) for 19 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Dakota Prairie National Grasslands for 58 species, 12 of which are priority species for these Grasslands. The data yielded robust occupancy estimates (CV < 50%) for 23 of these species.

This monitoring design and current sampling intensity is providing population information for one of the three species designated as Management Indicators for the Dakota Prairie National Grasslands. This includes occupancy estimates for Sharp-tailed Grouse.

## 2. US Forest Service Region 2

### a) National Forests

Within this sampling design each National Forest in Region 2 is stratified separately. This forest-level stratification distinction is made so we can analyze the data separately for each Forest. In this section of the report, we summarize results for all Region 2 Forests combined, followed by summaries for each individual Forest.

#### (1) Region 2 National Forests: Total

Results for all Region 2 National Forests combined were obtained by compiling and jointly analyzing data from 23 USFS Region 2 strata across 4 states. This forest-level stratification distinction is made to allow for the summation of the data for individual Forests, BCRs and States.

Field technicians completed 218 of 227 planned surveys (96%) in 2011. Technicians conducted 2,471 point counts within the 277 surveyed grid cells between 24 May and 31 July 2011. They detected 153 bird species, including 14 priority species as designated by USFS Region 2 (Appendix G).

RMBO estimated densities and population sizes for 114 species, 5 of which are priority species in USFS Region 2. The data yielded robust density estimates (CV < 50%) for 82 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Region 2 National Forest for 118 species, 6 of which are priority species in USFS Region 2. The data yielded robust occupancy estimates (CV < 50%) for 84 of these species.

#### (2) Arapaho-Roosevelt National Forest

Results for this section were obtained by analyzing data from the Arapaho-Roosevelt National Forest stratum in Colorado BCR 16. In 2011, the Routt and Arapaho-Roosevelt National Forest strata were reorganized and a third stratum, the Williams Fork Area, was created from the two, because it is a portion of the Routt National Forest that is managed by the Arapaho Roosevelt National Forest.

For information on the Williams Fork Management Unit, please refer to the Routt National Forest section.

Field technicians completed all 13 of the planned surveys (100%) in 2011. Technicians conducted 129 point counts within the 13 surveyed grid cells between 24 May and 18 July 2011. They detected 63 bird species, including 7 priority species for the Arapaho-Roosevelt National Forest (Appendix G).

RMBO estimated densities and population sizes for 52 species, 6 of which are priority species for Arapaho-Roosevelt National Forest. The data yielded robust density estimates (CV < 50%) for 15 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Arapaho-Roosevelt National Forest for 56 species, 7 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 19 of these species.

This monitoring design and current sampling intensity is providing population information for 6 of the 10 species designated as Management Indicators for Arapaho-Roosevelt National Forest. This includes density and occupancy estimates for Golden-crowned Kinglet, Hairy Woodpecker, Mountain Bluebird, Pygmy Nuthatch and Warbling Vireo as well as occupancy estimates for Wilson's Warbler.

**(3) Bighorn National Forest**

Results for this section were obtained by analyzing data from the Bighorn National Forest stratum in Wyoming BCR 10.

Field technicians completed all 10 planned surveyed grid cells (100%) in 2011. Technicians conducted 121 point counts within the 10 surveyed grid cells between 15 June and 19 July 2011. They detected 46 bird species, including 1 priority species for Bighorn National Forest (Appendix G).

RMBO estimated densities and population sizes for 40 species, 1 of which is a priority species for Bighorn National Forest. The data yielded robust density estimates (CV < 50%) for 14 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Bighorn National Forest for 42 species, 1 of which is a priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 14 of these species.

This monitoring design and current sampling intensity is providing population information for one of the two species designated as Management Indicators for Bighorn National Forest. This includes density and occupancy estimates for Red-breasted Nuthatch.

**(4) Black Hills National Forest**

Results for the Black Hills National Forest were obtained by compiling and jointly analyzing data from three strata spanning two states. This forest-level stratification distinction is made to allow for the summation of the data for individual BCRs and States. In 2011, the South Dakota Black Hills National Forest stratum was split into two strata based on watersheds in the Forest:

Hydrologic Code 7 Watersheds and All Other Watersheds. This stratification by watershed allows for adjusting sampling intensity to target Management Indicator Species on the Forest.

Field technicians completed all 17 planned surveys (100%) in 2011. Technicians conducted 136 point counts within the 17 surveyed grid cells between 23 June and 17 July 2011. They detected 64 bird species, including 6 priority species, for the Black Hills National Forest (Appendix G).

RMBO estimated densities and population sizes for 56 species, 3 of which are priority species for Black Hills National Forest. The data yielded robust density estimates (CV < 50%) for 25 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Black Hills National Forest for 60 species, 5 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 24 of these species.

This monitoring design and current sampling intensity is providing population information for three of the six species designated as Management Indicators for Black Hills National Forest. This includes density and occupancy estimates for Brown Creeper and Golden-crowned Kinglet as well as occupancy estimates for Ruffed Grouse.

**(5) Grand Mesa, Uncompaghre and Gunnison National Forests**

Results for this section were obtained by analyzing data from the Grand Mesa, Uncompaghre and Gunnison (GMUG) National Forest stratum in Colorado BCR 16.

Field technicians completed all 11 planned surveys (100%) in 2011. Technicians conducted 117 point counts within the 11 surveyed grid cells between 10 June and 31 July 2011. They detected 59 bird species, including 3 priority species for the GMUG National Forest (Appendix G).

RMBO estimated densities and population sizes for 49 species, 2 of which are priority species for GMUG National Forest. The data yielded robust density estimates (CV < 50%) for 20 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout GMUG National Forest for 52 species, 2 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 24 of these species.

This monitoring design and current sampling intensity is providing population information for 2 of the 10 species designated as Management Indicators for GMUG National Forests. This includes density and occupancy estimates for Hairy Woodpecker and Red Crossbill.

**(6) Medicine Bow National Forest**

Results for Medicine Bow National Forest were obtained by compiling and jointly analyzing data from two strata, one in BCR 10 and one in BCR 16. This forest-level stratification distinction is made to allow for the summation of the data for individual BCRs.

Field technicians completed 28 of 30 planned surveys (93%) in 2011. Technicians conducted 343 point counts within the 28 surveyed grid cells between 11 June and 20 July 2011. They detected 81 bird species, including 10 priority species for the Medicine Bow National Forest (Appendix G).

RMBO estimated densities and population sizes for 71 species, 8 of which are priority species for Medicine Bow National Forest. The data yielded robust density estimates (CV < 50%) for 40 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Medicine Bow National Forest for 68 species, 8 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 41 of these species.

This monitoring design and current sampling intensity is providing population information for four of the five species designated as Management Indicators for Medicine Bow National Forest. This includes density and occupancy estimates for American Three-toed Woodpecker, Golden-crowned Kinglet, Lincoln's Sparrow and Wilson's Warbler.

**(7) Nebraska National Forests**

Results for Nebraska National Forests were obtained by compiling and jointly analyzing data from three strata: Nebraska National Forest Pine Ridge and Bessey Ranger Districts and Samuel R. McKelvie National Forest. This district-level stratification distinction is made to allow for the summation of the data for individual BCRs and Ranger Districts. This is the first year the Bessey Ranger District and Samuel R. McKelvie National Forest strata were surveyed.

Field technicians completed 13 of 16 planned surveys (81%) in 2011. Technicians conducted 110 point counts within the 13 surveyed grid cells between 29 June and 16 July 2011. They detected 59 bird species, including 5 priority species for the Nebraska National Forests (Appendix G).

RMBO estimated densities and population sizes for 41 species, 3 of which are priority species for the Nebraska National Forests. The data yielded robust density estimates (CV < 50%) for 15 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout the Nebraska National Forests for 46 species, 2 of which are priority species for these Forests. The data yielded robust occupancy estimates (CV < 50%) for 19 of these species.

**(8) Pike-San Isabel National Forest**

Results for this section were obtained by analyzing data from the Pike-San Isabel National Forest stratum in Colorado BCR 16.

Field technicians completed all 15 planned surveys (100%) in 2011. Technicians conducted 188 point counts within the 15 surveyed grid cells between 5 June and 22 July 2011. They detected 66 bird species, including 2 priority species for the Pike-San Isabel National Forest (Appendix G).

RMBO estimated densities and population sizes for 60 species, 1 of which is a priority species for Pike-San Isabel National Forest. The data yielded robust density estimates (CV < 50%) for 28 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Pike-San Isabel National Forest for 59 species, 1 of which is a priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 32 of these species.

**(9) Rio Grande National Forest**

Results for Rio Grande National Forest were obtained by compiling and jointly analyzing data from three strata: low, medium and high elevations. From 2008 - 2010, the Rio Grande National Forest was contained within one forest-wide stratum. The stratum was split into three strata based on elevation prior to the 2011 field season. The new stratification by elevation allows for adjusting sampling intensity to target Management Indicator Species on the Forest.

Field technicians completed all 25 planned surveys (100%) in 2011. Technicians conducted 309 point counts within the 25 surveyed grid cells between 20 June and 29 July 2011. They detected 80 bird species, including 8 priority species for Rio Grande National Forest (Appendix G).

RMBO estimated densities and population sizes for 67 species, 7 of which are priority species for Rio Grande National Forest. The data yielded robust density estimates (CV < 50%) for 33 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Rio Grande National Forest for 66 species, 7 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 34 of these species.

This monitoring design and current sampling intensity is providing population information for all six species designated as Management Indicators for Rio Grande National Forest. This includes occupancy and density estimates for Brown Creeper, Hermit Thrush, Lincoln's Sparrow, Pygmy Nuthatch, Vesper Sparrow and Wilson's Warbler.

**(10) Routt National Forest**

Results for Routt National Forest were obtained by compiling and jointly analyzing data from two strata: Routt National Forest and the Williams Fork Management Unit. In 2011, the Routt and Arapaho-Roosevelt National Forest strata were reorganized and a third stratum, the Williams Fork Area, was created from the two, because it is a portion of the Routt National Forest that is managed by the Arapaho Roosevelt National Forest.

Field technicians completed 32 of 33 planned surveys (97%) in 2011. Technicians conducted 400 point counts within the 32 surveyed grid cells between 16 June and 30 July 2011. They detected 76 bird species, including 4 priority species for Routt National Forest (Appendix G).

RMBO estimated densities and population sizes for 65 species, 3 of which are priority species for Routt National Forest. The data yielded robust density estimates (CV < 50%) for 42 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Routt National Forest for 63 species, 4 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 41 of these species.

This monitoring design and current sampling intensity is providing population information for two of the four species designated as Management Indicators for Routt National Forest. This includes density and occupancy estimates for Golden-crowned Kinglet and Wilson's Warbler.

**(11) San Juan National Forest**
Results for this section were obtained by analyzing data from the San Juan National Forest stratum in Colorado BCR 16.

Field technicians completed all 12 planned surveys (100%) in 2011. Technicians conducted 130 point counts within the 12 surveyed grid cells between 16 June and 27 July 2011. They detected 74 bird species, including 8 priority species for San Juan National Forest (Appendix G).

RMBO estimated densities and population sizes for 58 species, 4 of which are priority species for San Juan National Forest. The data yielded robust density estimates (CV < 50%) for 27 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout San Juan National Forest for 63 species, 6 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 23 of these species.

This monitoring design and current sampling intensity is providing population information for three of the nine species designated as Management Indicators for San Juan National Forest. This includes density and occupancy estimates for Green-tailed Towhee, Hairy Woodpecker and Mountain Bluebird.

**(12) Shoshone National Forest**
Results for Shoshone National Forest were obtained by analyzing data from two strata; front-country/managed areas and designated roadless/wilderness areas. This forest-level stratification distinction was made due to field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit.

Field technicians completed 21 of 23 planned surveys (91%) in 2011. Technicians conducted 266 point counts within the 21 surveyed grid cells between 22 June and 24 July 2011. They detected 77 bird species, including 6 priority species for Shoshone National Forest (Appendix G).

RMBO estimated densities and population sizes for 58 species, 3 of which are priority species for Shoshone National Forest. The data yielded robust density estimates (CV < 50%) for 22 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Shoshone National Forest for 57 species, 3 of which are priority species for this

Forest. The data yielded robust occupancy estimates (CV < 50%) for 21 of these species.

This monitoring design and current sampling intensity is providing population information for two of the seven species designated as Management Indicators for Shoshone National Forest. This includes density and occupancy estimates for Brewer's Sparrow and Hairy Woodpecker.

**(13) White River National Forest**

Results for White River National Forest were obtained by compiling and jointly analyzing data from three strata: low, medium and high elevations. From 2008 - 2010, the White River National Forest was contained within one forest-wide stratum. The stratum was split into three strata based on elevation prior to the 2011 field season. The new stratification by elevation allows for adjusting sampling intensity to target Management Indicator Species on the Forest.

Field technicians completed 21 of 22 planned surveys (95%) in 2011. Technicians conducted 222 point counts within the 21 surveyed grid cells between 2 June and 30 July 2011. They detected 78 bird species, including 6 priority species for the White River National Forest (Appendix G).

RMBO estimated densities and population sizes for 64 species, 4 of which are priority species for White River National Forest. The data yielded robust density estimates (CV < 50%) for 34 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout White River National Forest for 67 species, 5 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 36 of these species.

This monitoring design and current sampling intensity is providing population information for all three species designated as Management Indicators for the White River National Forest. This includes density and occupancy estimates for American Pipit, Brewer's Sparrow and Virginia's Warbler.

**b) National Grasslands**

Within this sampling design each National Grassland in Region 2 is stratified separately. This grassland-level stratification distinction is made so we can analyze the data separately for each Grassland, or together as a whole. In this section of the report, we summarize results for all Region 2 Grasslands combined, followed by summaries for each individual Grassland.

**(1) Region 2 National Grasslands: Total**

Results for all the Region 2 National Grasslands were obtained by compiling and jointly analyzing data from eight USFS Region 2 strata across five states. This grassland-level stratification distinction is made to allow for the summation of the data for individual Grasslands, BCRs and States.

Field technicians completed 59 of 60 planned surveys (98%) in 2011. Technicians conducted 627 point counts within the 59 surveyed grid cells between 9 May and 17 July 2011. They detected 116 bird species, including 15 priority species as designated by USFS Region 2 (Appendix G).

RMBO estimated densities and population sizes for 74 species, 8 of which are priority species in USFS Region 2. The data yielded robust density estimates (CV < 50%) for 32 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Region 2 National Grassland for 83 species, 9 of which are priority species in USFS Region 2. The data yielded robust occupancy estimates (CV < 50%) for 28 of these species.

**(2) Cimarron National Grassland**

Results for this section were obtained by analyzing data from the Cimarron National Grassland stratum in Kansas BCR 18.

Field technicians completed eight of nine planned surveys (89%) in 2011. Technicians conducted 66 point counts within the 8 surveyed grid cells between 31 May and 30 June 2011. They detected 38 species, including 5 priority species for Cimarron National Grassland (Appendix G).

RMBO estimated densities and population sizes for 29 species, 4 of which are priority species for Cimarron National Grassland. The data yielded robust density estimates (CV < 50%) for 11 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Cimarron National Grassland for 34 species, 4 of which are priority species for this Grassland. The data yielded robust occupancy estimates (CV < 50%) for nine of these species.

This monitoring design and current sampling intensity is providing population information for one of the three species designated as Management Indicators for Cimarron National Grassland. This includes density and occupancy estimates for Bullock's Oriole.

**(3) Nebraska National Grasslands (Buffalo Gap NG, Fort Pierre NG, Oglala NG)**

Results for Nebraska National Grasslands were obtained by analyzing data from four strata; Buffalo Gap National Grassland, Fort Pierre National Grassland, Oglala National Grassland in BCR 17 and Oglala National Grassland in BCR 18. This grassland-level stratification distinction is made so we can analyze the data separately for each Grassland, or together as a whole.

Field technicians completed all 19 planned surveys (100%) in 2011. Technicians conducted 182 point counts within the 19 surveyed grid cells between 15 May and 17 July 2011. They detected 77 bird species, including 6 priority species for the Nebraska National Grasslands (Appendix G).

RMBO estimated densities and population sizes for 53 species, 2 of which are priority species for the Nebraska National Grasslands. The data yielded robust density estimates (CV < 50%) for 14 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Nebraska National Grasslands for 41 species, 1 of which is a priority species for these Grasslands. The data yielded robust occupancy estimates (CV < 50%) for 12 of these species.

**(4) Comanche National Grassland**
Results for this section were obtained by analyzing data from the Comanche National Grassland stratum in Colorado BCR 18.

Field technicians completed all 11 planned surveys (100%) in 2011. Technicians conducted 121 point counts within the 11 surveyed grid cells between 9 May and 24 May 2011. They detected 41 species, including 7 priority species for Comanche National Grassland (Appendix G).

RMBO estimated densities and population sizes for 27 species, 4 of which are priority species for Comanche National Grassland. The data yielded robust density estimates (CV < 50%) for 10 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Comanche National Grassland for 27 species, 4 of which are priority species for this Grassland. The data yielded robust occupancy estimates (CV < 50%) for 12 of these species.

This monitoring design and current sampling intensity is providing population information for one of the three species designated as Management Indicators for Comanche National Grassland. This includes density and occupancy estimates for Bullock's Oriole.

**(5) Pawnee National Grassland**
Results for this section were obtained by analyzing data from the Pawnee National Grassland stratum in Colorado BCR 18.

Field technicians completed all 11 planned surveys (100%) in 2011. Technicians conducted 121 point counts within the 11 surveyed grid cells between 13 May and 26 May 2011. They detected 37 species, including 8 priority species for the Pawnee National Grassland (Appendix G).

RMBO estimated densities and population sizes for 26 species, 5 of which are priority species for the Pawnee National Grassland. The data yielded robust density estimates (CV < 50%) for nine of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Pawnee National Grassland for 23 species, 5 of which are priority species for this Grassland. The data yielded robust occupancy estimates (CV < 50%) for nine of these species.

This monitoring design and current sampling intensity is providing population information for one of the four species designated as Management Indicators for the Pawnee National Grassland. This includes density and occupancy estimates for Lark Bunting.

**(6) Thunder Basin National Grassland**
Results for this section were obtained by analyzing data from the Thunder Basin National Grassland stratum in Wyoming BCR 17.

Field technicians completed all 10 planned surveys (100%) in 2011. Technicians conducted 137 point counts within the 10 surveyed grid cells between 13 May

and 5 June 2011. Field technicians detected 48 bird species, including 6 priority species for the Thunder Basin National Grassland (Appendix G).

RMBO estimated densities and population sizes for 41 species, 4 of which are priority species for Thunder Basin National Grassland. The data yielded robust density estimates (CV < 50%) for 15 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Thunder Basin National Grassland for 40 species, 3 of which are priority species for this Grassland. The data yielded robust occupancy estimates (CV < 50%) for 14 of these species.

**3. US Forest Service Region 3**

In this section of the report we summarize results for two National Forests and two National Grasslands in Region 3: Coconino National Forest, Kaibab National Forest, Kiowa National Grassland and Rita Blanca National Grassland.

**a) Coconino National Forest**

Results for this section were obtained by analyzing data from the Coconino National Forest stratum in Arizona BCR 34.

Field technicians completed all 50 planned surveys (100%) in 2011. Technicians conducted 571 point counts within the 50 surveyed grid cells between 1 May and 1 July 2011. They detected 123 bird species, including 10 priority species for Coconino National Forest (Appendix H).

RMBO estimated densities and population sizes for 92 species, 7 of which are priority species for Coconino National Forest. The data yielded robust density estimates (CV < 50%) for 57 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Coconino National Forest for 99 species, 6 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 64 of these species.

This monitoring design and current sampling intensity is providing population information for 5 of the 11 species designated as Management Indicators for Coconino National Forest. This includes density and occupancy estimates for Hairy Woodpecker, Juniper Titmouse and Pygmy Nuthatch as well as occupancy estimates for Lucy's Warbler and density estimates for Wild Turkey.

**b) Kaibab National Forest**

Results for this section were obtained by analyzing data from the Kaibab National Forest stratum in Arizona.

Field technicians completed all 45 planned surveys (100%) in 2011. Technicians conducted 514 point counts within the 45 surveyed grid cells between 11 May and 25 June 2011. They detected 101 bird species, including 8 priority species for Kaibab National Forest and 3 species proposed as MIS. (Appendix H).

RMBO estimated densities and population sizes for 82 species, 7 of which are priority species for Kaibab National Forest and 3 of which are proposed as MIS. The data yielded robust density estimates (CV < 50%) for 55 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Kaibab National Forest for 87 species, 7 of which are priority species for this Forest and 3 of which are proposed MIS. The data yielded robust occupancy estimates (CV < 50%) for 51 of these species.

This monitoring design and current sampling intensity is providing population information for 5 of the 11 species designated as Management Indicators for Kaibab National Forest. This includes density and occupancy estimates for Hairy Woodpecker, Juniper Titmouse, Pygmy Nuthatch, Red-naped Sapsucker and Wild Turkey. Population information is also provided for the three proposed MIS species for Kaibab National Forest. This includes density and occupancy estimates for Grace's Warbler, Western Bluebird, and Ruby-crowned Kinglet.

**c) Kiowa National Grassland**

Results for this section were obtained by analyzing data from the Kiowa National Grassland stratum in New Mexico BCR 18.

Field technicians completed all five planned surveys (100%) in 2011. Technicians conducted 66 point counts within the 5 surveyed grid cells between 31 May and 4 June 2011. They detected 52 species, including 5 priority species for Kiowa National Grassland (Appendix H).

RMBO estimated densities and population sizes for 45 species, 2 of which are priority species for Kiowa National Grassland. The data yielded robust density estimates (CV < 50%) for 12 of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Kiowa National Grassland for 43 species, 2 of which are priority species for this Grassland. The data yielded robust occupancy estimates (CV < 50%) for 11 of these species.

This monitoring design and current sampling intensity is providing population information for one of the two species designated as Management Indicators for Kiowa National Grassland. This includes density and occupancy estimates for Cassin's Sparrow.

**d) Rita Blanca National Grassland**

Results for Rita Blanca National Grassland were obtained by analyzing data from three strata corresponding to the portions of the Rita Blanca National Grassland that lie within Texas, New Mexico and Oklahoma. This state-level stratification distinction is made so we can incorporate Rita Blanca National Grassland data into state-wide estimates.

Field technicians completed eight of nine planned surveys (89%) in 2011. Technicians conducted 95 point counts within the 8 surveyed grid cells between 5 June and 26 June 2011. They detected 33 bird species, including 6 priority species for Rita Blanca National Grassland (Appendix H).

RMBO estimated densities and population sizes for 26 species, 3 of which are priority species for Rita Blanca National Grassland. The data yielded robust density estimates (CV < 50%) for nine of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Rita Blanca National Grassland for 25 species, 3 of which are priority species for this Grassland. The data yielded robust occupancy estimates (CV < 50%) for 11 of these species.

This monitoring design and current sampling intensity is providing population information for the two species designated as Management Indicators for Rita Blanca National Grassland. This includes density and occupancy estimates for Cassin's Sparrow and Grasshopper Sparrow. Population information is also provided for one of the two proposed MIS species for Kiowa National Grassland. This includes occupancy estimates for Burrowing Owl.

**4. US Forest Service Region 4**

In this section, we summarize results for two National Forests in Region 4: Bridger-Teton National Forest in Wyoming and Manti-La Sal National Forest in Colorado. This year we did not conduct surveys in the BCR 9 stratum in Wyoming (Caribou-Targhee NF), the USFS Region 4 stratum in Wyoming BCR10, or the Wasatch NF stratum, also in Wyoming because funds were not available. Like the Manti-La Sal National Forest stratum in Colorado, these samples were added to supplement state-wide estimates in Wyoming and were supported in the past by state and regional partners, not the Forests themselves. The Caribou-Targhee National Forest, mostly in Idaho, comprises a small portion of the extreme west side of Wyoming and was originally stratified as Wyoming BCR 9 Region 4 lands. In this case, all samples fell within the Caribou-Targhee National Forest. The Wasatch National Forest covers a small portion of southwest Wyoming, where distinct vegetation communities occur, similar to those found in other portions of Region 4 (Juniper Woodland, etc.).

**a) Bridger-Teton National Forest**

Results for Bridger-Teton National Forest were obtained by analyzing data from two strata; front-country/managed areas and designated roadless/wilderness areas. This forest-level stratification distinction was made due to field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit.

Field technicians completed 9 of 10 planned surveys (90%) in 2011. Technicians conducted 99 point counts within the 9 surveyed grid cells between 30 June and 22 July 2011. They detected 56 bird species, including 2 priority species for the Bridger-Teton National Forest (Appendix I).

RMBO estimated densities and population sizes for 47 species, 1 of which is a priority species for Bridger-Teton National Forest. The data yielded robust density estimates (CV < 50%) for two of these species.

RMBO estimated the proportion of 1 $km^2$ grid cells occupied (Psi) throughout Bridger-Teton National Forest for 50 species, 2 of which are priority species for this Forest. The data yielded robust occupancy estimates (CV < 50%) for 13 of these species.

This monitoring design and current sampling intensity is providing population information for one of the four species designated as Management Indicators for Bridger-Teton National Forest. This includes occupancy and density estimates for Brewer's Sparrow.

**b) Manti-La Sal National Forest**

Manti-La Sal National Forest is divided into two strata due to the hierarchal design of the IMBCR program. Currently only the Colorado portion of the management unit is being sampled.

Field technicians completed both planned surveys (100%) throughout Manti-La Sal National Forest in 2011. Technicians conducted 16 point counts within the 2 surveyed grid cells between 12 May and 13 June 2011. They detected 37 species.

RMBO did not generate density or occupancy results for this stratum, because results from strata with only two samples are not informative. However, these data were incorporated into larger scale estimates.

# DISCUSSION

The consideration of scale has become an important aspect of ecological monitoring with important consequences for conservation and management (Schneider 2001). For example, apparent avian population declines at small scales may not translate into regional declines at the scale of a species' geographic range (Wiens 1989). In addition, management actions and environmental factors may affect bird populations differently at various scales and may only impact certain species at particular scales (Wiens 1989). Because population responses are scale dependent, the management of wildlife habitats must also be implemented at multiple spatial scales (Block et al. 2001, George and Zack 2001). One advantage of the IMBCR approach is the flexibility to generate valid population estimates at scales relevant to land management agencies, as well as support conservation efforts at both local and regional scales.

This year we collectively analyzed data across the entire IMBCR sampling frame. Increasing the spatial extent of the analysis enabled us to quantify important geographic variation in detection probabilities and increase the precision of occupancy estimates. This approach also allowed us to estimate common detection probabilities for species that would have otherwise had an insufficient number of detections. By utilizing a larger data set we obtained more precise estimates of density, population size and occupancy for regions where sampling intensity was low. In addition, incorporating data collected at small scales to estimate parameters at larger scales allows this design to address the need for large-scale monitoring and research, which has been emphasized in bird conservation initiatives (Ruth et al. 2003). The region-wide population estimates generated from IMBCR data can better assist managers in understanding trends in landbird populations (US North American Bird Conservation Initiative 2009).

Simulations using 10 years of data from a similar avian monitoring program (J. Blakesley, RMBO, unpublished) indicated this monitoring program would have 80% power to detect an average annual decline of 3% in a population within 25 years when % CVs of the estimates are ≤ 40%. A similar trend could be detected within 30 years with a % CV of ≤ 50%. The ability to detect population trends for any species is a function of the sampling effort, abundance and annual variation of abundance for individual species. Some grassland bird species such as Lark Bunting shift their breeding ranges from year to year based on environmental conditions (Shane 2000), resulting in abundance estimates that fluctuate significantly among years. More precise density estimates will be required to monitor population trends within 25-30 years for species exhibiting larger degree annual variation in density and abundance estimates.

Population size estimates presented in this report were produced from density estimates that account for spatial variation and incomplete detection, which allowed the population estimates to be extended over the entire area of interest (Pollock et al. 2002, Thompson 2002, Nichols et al. 2009). Avian population size estimates at the BCR level can also be found in the PIF Population Estimates Database (http://rmbo.org/pif_db/laped/). Initial comparisons between IMBCR and PIF population size estimates for several species showed substantial differences. For example, in 2010 the PIF population size estimates for Brewer's Sparrow and Horned Lark within BCR 17 were 670,000 and 8 million, while the IMBCR estimates were greater than 5 million and less than 6 million; respectively. The population size estimates presented by PIF were extrapolated to the BCR level from the road-based Breeding Bird Survey (BBS) after applying several *post hoc* correction factors in an attempt to account for incomplete detection (Blancher et al. 2007). While changes in population indices may or may not correspond to true trends in bird populations, direct inference about absolute populations are limited by non-random sampling with respect to roads and lack of information about detection probabilities (Pollock et al. 2002, Nichols et al. 2009). The large differences between the IMBCR and PIF

population estimates suggest the effects of non-random sampling and estimating detection probabilities warrant further research.

This year we estimated the proportion of sites occupied for all species for which we had sufficient data. By evaluating the strength of evidence for four occupancy estimation models, we accounted for regional variation in detection and availability, resulting in robust estimates of Psi. Occupancy estimation increases the number of bird species that we are able to effectively monitor and provides managers with information about populations of rare and uncommon species (MacKenzie et al. 2005). By aggregating BCRs in the occupancy analyses, we were able to estimate site occupancy for a wider range of strata and regions that individually had an insufficient number of samples and detections (MacKenzie and Royle 2005). The 2011 analysis marked the first year occupancy estimates were produced using model-averaging. We feel this technique improved our estimates because all models with any probability of being the top-ranked model influenced the presented estimates. In contrast, our 2010 estimates were produced from a single model with the highest probability of being the top-ranked model. Although we only incorporated data collected in 2011 to produce this year's estimates we anticipate that our analyses will be further improved by incorporating multiple years of data to estimate detection probability in the future. Utilizing multiple years of data in the future will allow us to provide our partners with occupancy estimates for additional species, including some of the most difficult to detect and/or rare species encountered.

The data for avian density, occupancy and vegetation collected with the IMBCR design can be used to develop habitat models to support conservation and management. For example, we can post-stratify the data using vegetation variables collected at each point to generate habitat-specific density estimates. Analytic methods for modeling covariate effects on density using Distance sampling theory may be particularly useful for evaluating population responses to habitat management (Royle et al. 2004). The multi-scale occupancy model can also be extended to investigate habitat relationships for priority species. This approach may be especially useful for guiding habitat management and evaluating population responses to habitat conditions at both local and regional scales. Habitat modeling may ultimately reveal spatial trends related to land use or habitat loss that are symptomatic of population declines and provide land management strategies for species recovery.

The primary limitation in estimating avian population parameters using the IMBCR approach is sample size within strata. The minimum number of samples per stratum necessary to estimate regional density and occupancy is two samples. However, reliable stratum-level occupancy estimates require larger samples sizes, with a minimum of approximately 10 samples per stratum. Furthermore, additional samples may be required for strata comprising large geographic areas. Because we estimate regional site occupancy using a weighted mean indexed by stratum area and estimate regional density using a similar weighting scheme, biased estimates can result when estimates for large strata are produced from small-sample sizes because these estimates receive more weight than large-sample estimates from small strata. For example, the occupancy estimate for Sprague's Pipit in Tribal lands in Montana BCR 11 is 1.0, an artificially high estimate resulting from a low sample size. Because of the large geographic area, this artificially high estimate will receive considerable weight for state-wide and regional estimates due to the relatively large geographic area encompassed by this stratum. Although the importance of long-term and intensive population monitoring is well known, it is expensive, with costs typically determining the sampling effort. The IMBCR design reduces costs through cooperation with multiple partners; one of the stated goals of effective collaboration and coordinated bird monitoring (US North American Bird Conservation Initiative 2007). Partners and managers can investigate other priority species and taxa with only slight modifications to the IMBCR design, further reducing costs associated with developing new studies and monitoring programs. Ideally, these cost savings can be used to increase sample

efforts, particularly in under-sampled strata, and conducting additional avian-habitat relationship analyses.

The IMBCR design allows sampling of all habitats, allowing mangers to relate changes in bird populations to changes on the landscape over time. Because all vegetation classes are available for sampling and samples are spatially balanced, rare habitats are sampled less frequently than others. Sampling of these rare habitats does appear to be proportional to land cover classifications. For example, within Colorado in 2011, 2.7% of all points surveyed were primarily riparian habitat, compared to 3% overall riparian land cover throughout the state (Lowry et al. 2005). The slight difference may be attributed to particular sampling intensities within strata classifications such as Arkansas River and tributaries (CO-BCR18-AR) and the Platte River and tributaries (CO-BCR18-PT), where points fall close to major rivers (Figure 5). Further explorations of sampled habitat types can be done through post-stratification of the data by vegetation cover type and primary habitat to determine if some species and habitats are under-sampled. Additional analyses of avian-habitat relationships using our vegetation data can help guide future conservation and management.

The IMBCR design 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. IMBCR monitoring represents one method for achieving effective collaboration in North American bird monitoring and could be applied to other BCRs and regions across the continent.

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# APPENDIX A

Species for which density or occupancy estimates were produced in at least one stratum in 2011.

| Species | Density | Occupancy |
|---|---|---|
| Acorn Woodpecker | X | X |
| American Avocet | | X |
| American Coot | | X |
| American Crow | X | X |
| American Goldfinch | X | X |
| American Kestrel | X | X |
| American Pipit | X | X |
| American Redstart | X | X |
| American Robin | X | X |
| Ash-throated Flycatcher | X | X |
| American Three-toed Woodpecker | X | X |
| Baird's Sparrow | X | X |
| Bank Swallow | | X |
| Barn Swallow | X | X |
| Black-and-white Warbler | | X |
| Black-billed Magpie | X | X |
| Black-capped Chickadee | X | X |
| Black-chinned Hummingbird | X | X |
| Brown-capped Rosy-Finch | | X |
| Black-chinned Sparrow | X | X |
| Bell's Vireo | X | X |
| Bewick's Wren | X | X |
| Blue-gray Gnatcatcher | X | X |
| Brown-headed Cowbird | X | X |
| Black-headed Grosbeak | X | X |
| Blue Grosbeak | X | X |
| Blue Jay | X | X |
| Bobolink | X | X |
| Brewer's Blackbird | X | X |
| Brown Creeper | X | X |
| Brewer's Sparrow | X | X |
| Black-tailed Gnatcatcher | | X |
| Brown Thrasher | X | |
| Broad-tailed Hummingbird | X | X |
| Band-tailed Pigeon | | X |
| Black-throated Sparrow | X | X |
| Black-throated Gray Warbler | X | X |
| Bullock's Oriole | X | X |
| Burrowing Owl | | X |
| Bushtit | X | X |
| Blue-winged Teal | X | X |
| Cactus Wren | X | X |
| Cassin's Finch | X | X |
| Cassin's Kingbird | X | X |
| Canada Goose | X | X |
| Canyon Towhee | X | X |
| Canyon Wren | X | X |
| Cassin's Sparrow | X | X |
| Cassin's Vireo | X | X |
| Chestnut-backed Chickadee | X | X |
| Curve-billed Thrasher | X | X |
| Chestnut-collared Longspur | X | X |
| Clay-colored Sparrow | X | X |
| Cedar Waxwing | | X |

| Species | Density | Occupancy |
|---|---|---|
| Chihuahuan Raven | | X |
| Chipping Sparrow | X | X |
| Chimney Swift | | X |
| Clark's Nutcracker | X | X |
| Cliff Swallow | X | X |
| Cordilleran Flycatcher | X | X |
| Common Grackle | X | X |
| Common Nighthawk | X | X |
| Common Raven | X | X |
| Common Yellowthroat | X | X |
| Dark-eyed Junco | X | X |
| Dickcissel | X | X |
| Downy Woodpecker | X | X |
| Dusky Flycatcher | X | X |
| Eastern Bluebird | | X |
| Eastern Kingbird | X | X |
| Eastern Meadowlark | X | X |
| Eurasian Collared-Dove | X | X |
| European Starling | X | X |
| Evening Grosbeak | X | X |
| Field Sparrow | X | X |
| Fox Sparrow | X | X |
| Gadwall | | X |
| Gambel's Quail | X | X |
| Golden-crowned Kinglet | X | X |
| Gray Jay | X | X |
| Gray Catbird | X | X |
| Gray Flycatcher | X | X |
| Greater Roadrunner | | X |
| Grasshopper Sparrow | X | X |

| Species | Density | Occupancy |
|---|---|---|
| Gray Vireo | X | X |
| Grace's Warbler | X | X |
| Great-tailed Grackle | | X |
| Green-tailed Towhee | X | X |
| Hammond's Flycatcher | X | X |
| Hairy Woodpecker | X | X |
| Hepatic Tanager | X | X |
| Hermit Thrush | X | X |
| House Finch | X | X |
| Horned Lark | X | X |
| House Sparrow | X | X |
| House Wren | X | X |
| Juniper Titmouse | X | X |
| Killdeer | X | X |
| Lark Bunting | X | X |
| Lark Sparrow | X | X |
| Lazuli Bunting | X | X |
| Long-billed Curlew | X | X |
| Least Flycatcher | X | X |
| Lesser Goldfinch | X | X |
| Lesser Nighthawk | | X |
| Lewis's Woodpecker | | X |
| Lincoln's Sparrow | X | X |
| Loggerhead Shrike | X | |
| Lucy's Warbler | | X |
| Marbled Godwit | | X |
| Mallard | X | X |
| Marsh Wren | | X |
| McCown's Longspur | X | X |
| MacGillivray's Warbler | X | X |

| Species | Density | Occupancy |
|---|---|---|
| Mountain Bluebird | X | X |
| Mountain Chickadee | X | X |
| Mourning Dove | X | X |
| Northern Cardinal | | X |
| Northern Flicker | X | X |
| Northern Harrier | X | X |
| Northern Mockingbird | X | X |
| Northern Shoveler | | X |
| Northern Rough-winged Swallow | X | |
| Orange-crowned Warbler | X | X |
| Olive Warbler | | X |
| Orchard Oriole | | X |
| Olive-sided Flycatcher | X | X |
| Ovenbird | X | X |
| Phainopepla | X | |
| Pine Grosbeak | X | X |
| Pinyon Jay | X | X |
| Pine Siskin | X | X |
| Pileated Woodpecker | X | |
| Plumbeous Vireo | X | X |
| Purple Martin | | X |
| Pygmy Nuthatch | X | X |
| Pyrrhuloxia | | X |
| Ring-billed Gull | | X |
| Red-breasted Nuthatch | X | X |
| Ruby-crowned Kinglet | X | X |
| Rufous-crowned Sparrow | X | X |
| Red Crossbill | X | X |
| Red-eyed Vireo | | X |
| Red-faced Warbler | | X |

| Species | Density | Occupancy |
|---|---|---|
| Red-headed Woodpecker | | X |
| Ring-necked Pheasant | X | X |
| Red-naped Sapsucker | X | X |
| Rock Pigeon | X | X |
| Rock Wren | X | X |
| Ruffed Grouse | | X |
| Red-tailed Hawk | X | |
| Rufous Hummingbird | | X |
| Red-winged Blackbird | X | X |
| Sandhill Crane | X | |
| Sage Sparrow | X | X |
| Say's Phoebe | X | X |
| Sage Thrasher | X | X |
| Savannah Sparrow | X | X |
| Scott's Oriole | X | X |
| Scaled Quail | X | X |
| Sora | | X |
| Song Sparrow | X | X |
| Sprague's Pipit | X | X |
| Spotted Towhee | X | X |
| Sharp-tailed Grouse | | X |
| Steller's Jay | X | X |
| Swainson's Hawk | X | |
| Swainson's Thrush | X | X |
| Townsend's Solitaire | X | X |
| Townsend's Warbler | X | X |
| Tree Swallow | X | X |
| Turkey Vulture | X | X |
| Upland Sandpiper | X | X |
| Vaux's Swift | | X |

| Species | Density | Occupancy |
|---|---|---|
| Varied Thrush | X | X |
| Verdin | X | X |
| Vesper Sparrow | X | X |
| Violet-green Swallow | X | X |
| Virginia's Warbler | X | X |
| Warbling Vireo | X | X |
| White-breasted Nuthatch | X | X |
| White-crowned Sparrow | X | X |
| Western Bluebird | X | X |
| Western Flycatcher | X | X |
| Western Kingbird | X | X |
| Western Meadowlark | X | X |
| Western Scrub-Jay | X | X |
| Western Tanager | X | X |
| Western Wood-Pewee | X | X |
| Willet | | X |
| Wilson's Phalarope | | X |
| Williamson's Sapsucker | | X |
| Wilson's Snipe | X | X |
| Wild Turkey | X | X |
| Wilson's Warbler | X | X |
| Winter Wren | X | X |
| White-throated Swift | X | X |
| White-winged Dove | X | X |
| Yellow-breasted Chat | X | X |
| Yellow-headed Blackbird | X | X |
| Yellow-rumped Warbler | X | X |
| Yellow Warbler | X | X |

# APPENDIX B: AVIAN DATA CENTER USAGE TIPS

## Overview

The Avian Data Center has been designed to provide information for specific questions and therefore works best when users select multiple filters for a query. To run a query, click the arrow for the drop down "Filter" menu (located in the extreme upper left corner of the screen) and select one of the following filter types: Study Design, Species, Stratum, Super Stratum, BCR, State, County, Habitat, Year, Priority Species List, or Management Entity. After selecting the filter type, click the "Add" button immediately to the right of the drop down menu. A box will appear with options for the filter that you may select. Use the drop down menu in the box to select the specific filter and then click "Add filter". The selected filter will appear near the top of the screen. Users may add multiple filter types to view results for a very specific inquiry (e.g., to view IMBCR results for BRSP in CO you would apply the following filters: Study Design = IMBCR, Species = Brewer's Sparrow, and State = CO) or to view multiple outputs at once (e.g., to view data and results for Brewer's Sparrow and Vesper Sparrow at the same time select Species = Brewer's Sparrow and Species =Vesper Sparrow). Below is an explanation of the different filter types you may choose from.

Study Design: This filter will allow users to select data and results for IMBCR, Habitat-based, GRTS, or NPS study designs. Currently, only the IMBCR data and results are available.

Species: This filter allows users to select data and results for a particular species.

Stratum: This filter allows users to select data and results for a particular stratum.

Super Stratum: This filter allows users to select data and results for multiple stratum that were analyzed jointly (e.g., the entire Bridger-Teton National Forest which consists of 2 strata or the entire state of Colorado which consists of 29 strata).

BCR: This filter will allow users to select data and results for a particular BCR.

State: This filter will allow users to select data and results for a particular state.

County: This filter will allow users to select data and results for a particular county. Please note that only raw count data and survey locations are available at the county level because we do not currently stratify based on state counties.

Habitat: This filter will allow users to select data and results for a particular habitat type. This will only show data and results from habitat-based surveys.

Year: This filter will allow users to select data and results for a particular year.

Priority Species List: This filter will allow users to select data and results for multiple priority species at once. The query will display data and results for all species included on the selected management indicator list, species of conservation concern list, etc.

Management Entity: This filter will allow users to select data and results for All Other Lands, Bureau of Land Management, National Park Service, Bureau of Indian Affairs, Department of Defense, US Fish and Wildlife Service, or US Forest Service. Once a management entity is chosen, users may notice that additional filter types are available in the filters drop down list. These additional filter types, listed from most general to most specific, are customized for each management unit. Following is a list of options you will have for each management entity selected.

All Other Lands:
Tier One –All Other Lands

Bureau of Land Management (BLM):
Tier One – BLM
Tier Two – BLM Field Office

National Park Service (NPS):
Tier One – NPS
Tier Two – NPS Inventory and Monitoring Network
Tier Three – Individual Park Unit

US Bureau of Indian Affairs (BIA):
Tier One – BIA
Tier Two – Indian Reservation

US Department of Defense (DOD):
Tier One – DOD
Tier Two – Installation Unit

US Fish and Wildlife Service (USFWS):
Tier One – US Fish and Wildlife Service
Tier Two – USFWS Region
Tier Three – USFWS Unit

US Forest Service:
Tier One – US Forest Service
Tier Two – USFS Regions
Tier Three – National Forest or National Grassland Management Units
Tier Four – Individual National Forest or Grassland
Tier Five – Ranger Districts (Management District)

***Clearing Filters***
Filters can be cleared in one of two ways. You may click on the circled "X" to the left of an individual filter at the top of the screen to remove it or you may click the "clear all filters" button at the top of the screen to start building a new query.

***Running Queries***
Once you have selected your desired filters, please click on the "Run Query" button located at the top of the screen. The amount of time it takes for the desired data and results to be displayed will depend on how specific your query is.

***Comparing Multiple Queries***
Users may view results of more than one query at once. To do this, run the first query as described above and then click the button "New Query Window" (located at the top of the screen). A new window will appear where a new query can be run and the two windows can then be viewed side by side.

## Viewing Maps (Map Tab)

***What is displayed?***
By default, the map tab is the initial start-up page. After clicking the "Run Query" button, the ADC will display a map of all survey locations corresponding to your set of filters (surveyed grid cells are represented by blue semi-transparent circles) in Google Maps. If you have filtered by species, survey locations where that species was not detected will be represented by the blue circle. Locations where that species was detected will have a pink dot in the center of the blue circle. To see the specific name of a survey location, move the mouse arrow over the blue circle. After a moment the name of the surveyed grid cell should appear. You may view the bird detection info for a grid cell and the survey dates by left clicking your mouse on the blue circle.

By default, the zoom capability of the maps page is restricted to protect the privacy of private landowners. Partner organizations wishing for more precise location information should contact an RMBO staff member to obtain a password.

***Adding boundary layers***
You may add the following layers to the map: BCR boundaries, BIA boundaries, DOD boundaries, NPS boundaries, and USFS boundaries. To do this, left click on the drop down menu at the top left corner of the map, select the desired layer, and click the "add layer" button. It is possible to add multiple layers to the map by repeating this process. If you left click your mouse inside of any of these boundaries a text box will appear that contains the name of the region encompassed by the boundary.

## Viewing Occupancy/Density Results (Occupancy and Density Tabs)

***Viewing Tables***
You may view a table of occupancy or density results and a chart for all appropriate strata (based on the set of filters) for which we have results by clicking on the tabs labeled "Occupancy" or "Density". These tabs are located just below the drop down filter menu in the upper left corner of the screen. The occupancy tables will display the species for which the estimate was produced, the stratum the estimate pertains to, the year, Psi (proportion of grid cells expected to be occupied), the number of grid cells the species was detected on, the standard error (SE) of the estimate, and the percent coefficient of variation (% CV). The density tables will display the species for which the estimate was produced, the stratum or habitat type that the estimate pertains to, the year, the number of birds expected per $km^2$ (D), the total number of individuals expected to reside within the stratum (N), the percent coefficient of variation (% CV), and the number of individuals used in analysis (*n*). You may view a description of the column headings by moving the mouse arrow over the column heading. You may also sort the table by clicking on any of the column headings.

***Viewing the Charts***
When viewing the occupancy and density charts, the point estimate of Psi or D is indicated with a dot. Additionally, short horizontal dashes above and below the point estimate represent values one standard error away from the point estimate. To view the species, stratum, and year that correspond to an estimate on the chart, simply move your mouse arrow over the point estimate or standard error bar. A message will pop up with the appropriate information. If you have queried out multiple years of data the point estimates for each year will be connected with a solid line. You may remove an individual estimate from the chart by clicking on the corresponding row of the table on the left side of the screen. Estimates that are not displayed on the chart will turn a peach color in the table. You may add the estimate back onto the chart simply by clicking on the peach colored row in the table.

***Knowing which species have estimates***
To restrict the species filter to display only those species for which occupancy or density estimates have been produced, click on the "View Options" button on the very top of the screen and then check the box next to "Only show species for which occupancy/density results are available". This will prevent you from querying out numerous species for which occupancy or density estimates are not available.

***Saving results of your query***
You may easily save the results of your query by clicking the "Copy to clipboard" button and pasting the results into another program such as excel or by clicking the "Save to CSV" button. Similarly, to save a chart click on the "View Image" button below the chart, right click on anywhere on the image, and select "Copy image" or "Save image as".

***Functionality***
Please keep in mind that queries with very generic filters will result in long wait times and may not function optimally (your browser may end up crashing). For instance, if a user selects only the IMBCR filter, occupancy results will be displayed for every species and strata/super strata combination for which there are occupancy and/or density results. If your query is not specific enough, the chart on the right side of the screen will not be displayed or a pop-up box will appear asking if you'd like to continue. This pop-up box is designed to prevent your web browser from crashing while the ADC attempts to create a chart that would be extremely difficult to interpret. We recommend that you cancel the proposed query and add additional filters to make your query less generic.

## Viewing Raw Count Statistics (Species Counts Tab)

You may view the raw count of detections for each species (left table) and the effort (expressed as the number of points surveyed) (right table) for your query by clicking on the "Species Counts" tab located next to the "Density Tab" in the upper left corner of your screen. Both the counts and effort tables may be sorted by clicking on the row header. Additionally, you may view the counts and effort by BCR, State, County, Stratum, or Management Entity by clicking on the "Count by" drop down menu located above the counts table. If you have filtered using "Super Strata", viewing counts by Stratum is an excellent way of getting a list of all the strata that comprise a Super Strata. If you would prefer to view effort expressed as the number of grid cells surveyed, click on the "View Options" button located at the top of the screen and check the box labeled "Show effort by number of grid cells instead of by point".

# APPENDIX C

Priority species detected in all Bird Conservation Regions (BCRs) surveyed in 2011, as designated by Partners in Flight (PIF). An X in the Occupancy or Density Estimated column indicates that occupancy or density estimates were generated for a Badland and Prairies BCR (BCR 17) priority species at the BCR scale. Only BCR 17 estimates are marked in this table, because it is currently the only BCR completely surveyed using the IMBCR study design.

| | PIF* | | | | | | | Occupancy | Density |
|---|---|---|---|---|---|---|---|---|---|
| Species | BCR 10 | BCR 11 | BCR 16 | BCR 17 | BCR 18 | BCR 19 | BCR34 | Estimated | Estimated |
| American Dipper | RS | | | | | | | | |
| Ash-throated Flycatcher | | | | | | | RS | | |
| Baird's Sparrow | | CC,RC,CS,RS | | CC,RC | | | | X | X |
| Band-tailed Pigeon | | | CC | | | | CC | | |
| Bell's Vireo | | | | | | CC,RC | | | |
| Black Rosy-Finch | CC,CS,RS | | | | | | | | |
| Black-backed Woodpecker | | | | RC | | | | | |
| Black-billed Cuckoo | | | | RC | | | | | |
| Black-billed Magpie | | | RS | RC | | | | X | X |
| Black-chinned Sparrow | | | CC | | | | CC,RS | | |
| Black-throated Gray Warbler | | | RC | | | | RC | | |
| Black-throated Sparrow | | | RC | | | | RS | | |
| Brewer's Sparrow | CC,RC | | CC,RC | CC,RC | CC,RC | | | X | X |
| Broad-tailed Hummingbird | | | RS | | | | | | |
| Brown Thrasher | | RC | | | | | | | |
| Brown-capped Rosy-Finch | | | CC,CS,RS | | | | | | |
| Burrowing Owl | | | | RC | RC,RS | | | X | |
| Cactus Wren | | | | | | | RC | | |
| Calliope Hummingbird | CC,CS,RS | | CC | | | | | | |
| Canyon Towhee | | | | | | | RC,CS,RS | | |
| Canyon Wren | | | RC | | | | RS | | |
| Cassin's Finch | RC,CS,RS | | RC | | | | | | |
| Cassin's Kingbird | | | | | | | RC,RS | | |
| Cassin's Sparrow | | | | | RC,RS | RC | RC | | |
| Cassin's Vireo | RS | | | | | | | | |
| Chestnut-collared Longspur | | RC,CS,RS | | RC,CS,RS | | | | X | X |

| Species | PIF* | | | | | | | Occupancy Estimated | Density Estimated |
|---|---|---|---|---|---|---|---|---|---|
| | BCR 10 | BCR 11 | BCR 16 | BCR 17 | BCR 18 | BCR 19 | BCR34 | | |
| Chihuahuan Raven | | | | | RS | | | | |
| Clark's Nutcracker | CS,RS | | CS,RS | | | | | | |
| Clay-colored Sparrow | | RC,RS | | | | | | | |
| Common Nighthawk | | | RC | | RC | | | | |
| Cooper's Hawk | | | | | | | RS | | |
| Cordilleran Flycatcher | | | RS | | | | RS | | |
| Crissal Thrasher | | | | | | | CS,RS | | |
| Dickcissel | | | | CC,RC | CC | CC,RC,CS,RS | | X | X |
| Dusky Flycatcher | CS,RS | | | | | | | | |
| Dusky Grouse | CC,RC | | CC | | | | | | |
| Eastern Kingbird | | | | | | RS | | | |
| Eastern Meadowlark | | | | | | | RC | | |
| Ferruginous Hawk | RC | RC,RS | | RC,RS | RC,RS | | | | |
| Field Sparrow | | | | | | RC | | | |
| Gambel's Quail | | | | | | | CS,RS | | |
| Golden Eagle | | | RC | RC | | | | | |
| Golden-crowned Kinglet | RS | | | | | | | | |
| Grace's Warbler | | | CC,RC | | | | CC,RS | | |
| Grasshopper Sparrow | | RC | | RC,CS,RS | RC,CS,RS | RC,CS,RS | | X | X |
| Gray Vireo | | | CC,RC,RS | | | | CC,RC,RS | | |
| Greater Prairie-Chicken | | | | CC,RC | | CC,RC,CS,RS | | | |
| Greater Sage-Grouse | CC,RC,CS,RS | CC,RC | CC,RC | CC,RC,CS,RS | | | | | |
| Green-tailed Towhee | | | CS,RS | | | | | | |
| Hammond's Flycatcher | RS | | | | | | | | |
| Hepatic Tanager | | | | | | | RS | | |
| Horned Lark | | RC,RS | | | | | | | |
| Juniper Titmouse | | | RC,RS | | | | RC,RS | | |
| Lark Bunting | RC | RC | | RC,CS,RS | RC,CS,RS | | | X | X |
| Lark Sparrow | | | | | RC | | | | |
| Lazuli Bunting | RS | | | | | | | | |
| Lewis's Woodpecker | CC,RC | | CC,RC,CS,RS | CC,RC | CC,RC | | CC,RC | X | |
| Loggerhead Shrike | RC | RC | RC | RC | RC | RC | RC | | X |

| Species | PIF* | | | | | | | Occupancy Estimated | Density Estimated |
|---|---|---|---|---|---|---|---|---|---|
| | BCR 10 | BCR 11 | BCR 16 | BCR 17 | BCR 18 | BCR 19 | BCR34 | | |
| Lucy's Warbler | | | | | | | CC,RC,CS,RS | | |
| McCown's Longspur | CC,RC | CC,RC,CS,RS | | | CC,CS,RS | | | | |
| Mountain Bluebird | | | RC,CS,RS | RC | | | | X | X |
| Northern Bobwhite | | | | | | RS | | | |
| Northern Flicker | | RC | | | | | | | |
| Northern Goshawk | RC,RS | | | RC | | | | | |
| Northern Harrier | RC | RC,RS | | RC | RC | | | X | X |
| Northern Rough-winged Swallow | | | | RC | | | | | X |
| Olive Warbler | | | | | | | RS | | |
| Olive-sided Flycatcher | CC,RC | | CC | | | | CC | | |
| Phainopepla | | | | | | | RC,CS,RS | | |
| Pine Siskin | | | RC,RS | | | | | | |
| Pinyon Jay | CC | | CC,RC,CS,RS | CC,RC | CC | | CC,RC | X | X |
| Plumbeous Vireo | | | RS | | | | RS | | |
| Prairie Falcon | | | RC | | RC | | | | |
| Pygmy Nuthatch | | | RC | | | | RS | | |
| Red Crossbill | RS | | | | | | | | |
| Red-faced Warbler | | | | | | | CC,CS,RS | | |
| Red-headed Woodpecker | | | | CC,RC | CC,RC | | | X | |
| Red-naped Sapsucker | CS,RS | | | | | | | | |
| Rock Wren | | | RS | | | | | | |
| Ruffed Grouse | RS | | | | | | | | |
| Rufous Hummingbird | CC,CS,RS | | | | | | | | |
| Rufous-crowned Sparrow | | | | | | | RS | | |
| Sage Sparrow | | | RC | | | | | | |
| Sage Thrasher | | | | RC | | | | X | X |
| Say's Phoebe | | | RS | RS | RS | | | X | X |
| Scaled Quail | | | | | CC,RC | | | | |
| Scott's Oriole | | | | | | | CS,RS | | |
| Sharp-tailed Grouse | RC | | | CS,RS | RC | | | X | |
| Short-eared Owl | CC | CC,RC | | CC,RC | | | | | |
| Spotted Towhee | | | | | | | RC,RS | | |

| Species | PIF* | | | | | | | Occupancy Estimated | Density Estimated |
|---|---|---|---|---|---|---|---|---|---|
| | BCR 10 | BCR 11 | BCR 16 | BCR 17 | BCR 18 | BCR 19 | BCR34 | | |
| Sprague's Pipit | | CC,RC,CS,RS | | CC,RC | | | | X | X |
| Swainson's Hawk | CC,RC | CC,RC,RS | CC,RC | CC | CC,RS | | CC,RC | | X |
| Townsend's Solitaire | RS | | | | | | | | |
| Townsend's Warbler | RS | | | | | | | | |
| Vesper Sparrow | | | | RC,RS | | | | X | X |
| Violet-green Swallow | | | RS | | | | | | |
| Virginia's Warbler | | | CC,RC,RS | | | | CC,RS | | |
| Warbling Vireo | | | RS | | | | | | |
| Western Bluebird | | | RS | | | | RS | | |
| Western Meadowlark | | RC | | RS | RS | RC,RS | | X | X |
| White-throated Swift | CC | | CC,RS | CC | CC | | CC,RS | X | X |
| Williamson's Sapsucker | CS,RS | | CS,RS | | | | | | |
| Willow Flycatcher | CC,RS | | CC,RC | CC | | | | | |
| Yellow Warbler | | | | | RC | | | | |

*CC = Continental Concern Species; RC = Regional Concern Species; CS = Continental Stewardship Species; RS = Regional Stewardship Species (Partners In Flight 2005).

# APPENDIX D

Priority species detected in 2011, by state, with management designations as designated by state agencies. Agencies included: Colorado Division of Parks and Wildlife (CPW), Montana Fish, Wildlife and Parks (MTFWP), North Dakota Game and Fish Department (NDGFD), Nebraska Game and Parks Commission (NGPC), South Dakota Game, Fish and Parks (SDGFP) and Wyoming Game and Fish Department (WGFD). States where only USFS surveys were conducted are not included on this list. An "X" in the Occupancy or Density Estimated columns indicates that estimates were generated for that species in at least one stratum in one or more of the states where it holds a priority designation.

| | State Agencies | | | | | | Occupancy | Density |
|---|---|---|---|---|---|---|---|---|
| **Species** | **CPW** | **MTFWP** | **NDGFD** | **NEGP** | **SDGFP** | **WGFD** | **Estimated** | **Estimated** |
| American Three-toed Woodpecker | SGCN | | | | | SGCN | X | X |
| American White Pelican | SGCN | S3B | | | | SGCN | | |
| Ash-throated Flycatcher | | | | | | SGCN | | |
| Baird's Sparrow | | S3 | SoCP LI | | SGCN | | X | X |
| Bald Eagle | SGCN,ST | S3 | | | | SGCN | | |
| Band-tailed Pigeon | SGCN | | | | | | X | |
| Bell's Vireo | | | | Tier I | | | X | X |
| Black Rosy-Finch | | | | | | SGCN | | |
| Black Tern | | | SoCP LI | | SGCN | | | |
| Black-backed Woodpecker | | | | | SGCN | | | |
| Black-billed Cuckoo | | S3B | SoCP LI | | | | | |
| Black-chinned Hummingbird | SGCN | | | | | | X | X |
| Black-throated Gray Warbler | SGCN | | | | | | X | X |
| Blue-gray Gnatcatcher | | S2B | | | | | X | |
| Bobolink | | S3B | SoCP LII | | | | X | X |
| Brewer's Sparrow | SGCN | S3B | | | | SGCN | X | X |
| Broad-tailed Hummingbird | SGCN | | | | | | X | X |
| Brown Creeper | | S3 | | | | | X | X |
| Brown-capped Rosy-Finch | SGCN | | | | | | X | |
| Burrowing Owl | SGCN,ST | S3B | | Tier I | | SGCN | X | |
| Cassin's Finch | SGCN | S3 | | | | | X | X |
| Cassin's Sparrow | SGCN | | | | | | X | X |

| Species | State Agencies | | | | | | Occupancy Estimated | Density Estimated |
|---|---|---|---|---|---|---|---|---|
| | CPW | MTFWP | NDGFD | NEGP | SDGFP | WGFD | | |
| Chestnut-collared Longspur | | S2B | SoCP LI | Tier II | SGCN | SGCN | X | X |
| Clark's Nutcracker | | S3 | | | | | X | X |
| Common Tern | | S3B | | | | | | |
| Cordilleran Flycatcher | SGCN | | | Tier II | | | X | X |
| Curve-billed Thrasher | SGCN | | | | | | X | X |
| Dark-eyed Junco | | | | Tier II | | | X | X |
| Dusky Flycatcher | SGCN | | | | | | X | X |
| Dusky Grouse | SGCN | | | | | | | |
| Evening Grosbeak | SGCN | | | | | | X | X |
| Ferruginous Hawk | SGCN,SC | S3B | SoCP LI | | SGCN | | | |
| Forster's Tern | SGCN | S3B | | | | | | |
| Franklin's Gull | | S3B | | | | | | |
| Golden Eagle | SGCN | | SoCP LII | | | | | |
| Grace's Warbler | SGCN | | | | | | X | X |
| Grasshopper Sparrow | | S3B | SoCP LI | | | SGCN | X | X |
| Gray Flycatcher | SGCN | | | | | | X | X |
| Gray Vireo | SGCN | | | | | | X | X |
| Great Blue Heron | | S3 | | | | SGCN | | |
| Greater Prairie-Chicken | | | | Tier I | SGCN | | | |
| Greater Sage-Grouse | SGCN,SC | S2 | | | SGCN | SGCN | | |
| Juniper Titmouse | SGCN | | | | | | X | X |
| Lark Bunting | SGCN | | SoCP LI | | SGCN | SGCN | X | X |
| Lazuli Bunting | SGCN | | | | | | X | X |
| Lesser Scaup | | | | | | SGCN | | |
| Lewis's Woodpecker | SGCN | | | | | SGCN | X | |
| Loggerhead Shrike | SGCN | S3B | SoCP LII | Tier II | | | | X |
| Long-billed Curlew | SGCN,SC | S3B | | Tier I | SGCN | SGCN | X | X |
| Marbled Godwit | SGCN | | SoCP LI | | SGCN | | X | |

| Species | State Agencies | | | | | | Occupancy Estimated | Density Estimated |
|---|---|---|---|---|---|---|---|---|
| | CPW | MTFWP | NDGFD | NEGP | SDGFP | WGFD | | |
| McCown's Longspur | SGCN | S3B | | | | SGCN | X | X |
| Mountain Bluebird | | | | Tier II | | | X | X |
| Mountain Plover | SGCN,SC | | | | | SGCN | | |
| Northern Bobwhite | | | | Tier II | | | | |
| Northern Goshawk | | S3 | | | | SGCN | | |
| Northern Harrier | SGCN | | SoCP LII | | | | X | X |
| Northern Pintail | | | SoCP LII | | | SGCN | | |
| Olive-sided Flycatcher | SGCN | | | | | | X | X |
| Osprey | SGCN | | | | | | | |
| Peregrine Falcon | SGCN,SC | S3 | | | | | | |
| Pileated Woodpecker | | S3 | | | | | | X |
| Pine Siskin | | | | Tier II | | | | |
| Pinyon Jay | SGCN | S3 | | | | | X | X |
| Prairie Falcon | SGCN | | | | | | | |
| Purple Martin | SGCN | | | | | | X | |
| Pygmy Nuthatch | SGCN | | | | | SGCN | X | X |
| Red Crossbill | SGCN | | | Tier II | | | X | X |
| Redhead | | | | | | SGCN | | |
| Red-headed Woodpecker | | S3B | | | | | X | |
| Red-naped Sapsucker | SGCN | | | | | | X | X |
| Rufous Hummingbird | SGCN | | | | | | X | |
| Sage Sparrow | SGCN | | | | | SGCN | X | X |
| Sage Thrasher | | S3B | | | | SGCN | X | X |
| Sandhill Crane | SGCN,SC | | | | | SGCN | | X |
| Scaled Quail | SGCN | | | | | | X | X |
| Sharp-tailed Grouse | | S1,S4 | SoCP LII | | | | X | |
| Sharp-tailed Grouse (Columbian) | SGCN,SC | S1 | | | | SGCN | | |
| Sharp-tailed Grouse (Plains) | SGCN,SE | S4 | | | | | | |

| Species | State Agencies | | | | | | Occupancy Estimated | Density Estimated |
|---|---|---|---|---|---|---|---|---|
| | CPW | MTFWP | NDGFD | NEGP | SDGFP | WGFD | | |
| Snowy Egret | SGCN | | | | | | | |
| Sprague's Pipit | | S3B | SoCP LI | | SGCN | | X | X |
| Swainson's Hawk | SGCN | | SoCP LI | Tier II | | SGCN | | X |
| Trumpeter Swan | | S3 | | | | | | |
| Upland Sandpiper | SGCN | | SoCP LI | | | SGCN | X | X |
| Veery | SGCN | S3B | | | | | | |
| Vesper Sparrow | SGCN | | | | | | X | X |
| Violet-green Swallow | | | | Tier II | | | X | X |
| Virginia's Warbler | SGCN | | | | | | X | X |
| Western Grebe | SGCN | | | | | SGCN | | |
| Western Tanager | | | | Tier II | | | X | X |
| White-faced Ibis | SGCN | S3B | | | | SGCN | | |
| White-tailed Ptarmigan | SGCN | | | | | | | |
| White-throated Swift | SGCN | | | Tier II | | | X | X |
| White-winged Junco | | | | | SGCN | | X | X |
| Willet | | | SoCP LI | | | | | |
| Williamson's Sapsucker | SGCN | | | | | | X | |
| Willow Flycatcher | SGCN,FE,SE | | | | | | | |
| Wilson's Phalarope | SGCN | | SoCP LI | | SGCN | | X | |
| Yellow-breasted Chat | | | | Tier II | | | X | X |

*CPW: SGCN = Species of Greatest Conservation Need; FE = Federally Endangered; SE = State Endangered; ST = State Threatened; SC = State Candidate (Colorado Division of Wildlife (CDOW) 2006;2007); MTFWP: 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 (Montana Natural Heritage Program (MTNHP) and Montana Fish Wildlife and Parks (MTFWP) 2009); NDGFD: 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); NGPC: Tier I = Globally or nationally most at-risk of extinction; Tier II = State Critically Imperiled, State Imperiled or State Vulnerable; SDGFP: SGCN = Species of Greatest Conservation Need; ST = State Threatened Species; SE = State Endangered (South Dakota Department of Game Fish and Parks (SDGFP) 2006;2008); WGFD: SGCN = Species of Greatest Conservation Need (Wyoming Game and Fish Department (WGFD) 2005).

# APPENDIX E

Priority species detected on Bureau of Land Management (BLM) lands in 2011, with management designations by state. An "X" in the Occupancy or Density Estimated columns indicates that estimates were generated for that species in at least one BLM stratum in one or more of the states where it holds a priority designation.

| | BLM* | | | | | | |
|---|---|---|---|---|---|---|---|
| **Species** | **Colorado** | **Montana** | **North Dakota** | **South Dakota** | **Wyoming** | **Occupancy Estimated** | **Density Estimated** |
| Baird's Sparrow | | SS | | SS | | X | X |
| Bobolink | | SS | SS | | | X | X |
| Brewer's Sparrow | | SS | | | SS | X | X |
| Burrowing Owl | | SS | | | | X | |
| Chestnut-collared Longspur | | SS | SS | SS | | X | X |
| Dickcissel | | | | SS | | X | |
| Ferruginous Hawk | | SS | | | | | |
| Franklin's Gull | | SS | | | | | |
| Golden Eagle | | | SS | | | | |
| Greater Sage-Grouse | SS | SS | | SS | SS | | |
| Loggerhead Shrike | | SS | | | SS | | X |
| Long-billed Curlew | | SS | | | | X | X |
| Marbled Godwit | | SS | SS | | | X | |
| McCown's Longspur | | SS | | | | X | X |
| Northern Goshawk | | | | | SS | | |
| Sage Sparrow | | | | | SS | X | |
| Sage Thrasher | | SS | | | SS | X | X |
| Sprague's Pipit | | SS | | | | X | X |
| Swainson's Hawk | | SS | | SS | | | X |
| Trumpeter Swan | | SS | | | | | |

*SS = Sensitive Species; MT, ND, SD (Bureau of Land Management 2009); WY (Bureau of Land Management 2010); CO (Bureau of Land Management 2000).

# APPENDIX F

Priority species detected on US Forest Service lands in Region 1 in 2011, with management designations by region and unit. Codes for Region/Units: Beaverhead/Deerlodge NF (BDNF), Bitterroot NF (BINF), Clearwater NF (CLNF), Custer NF (CUNF), Flathead NF (FLNF), Gallatin NF (GANF), Helena NF (HENF). An "X" in the Occupancy or Density Estimated columns indicates that estimates were generated for that species in at least one USFS stratum where it holds a priority designation.

| | USFS Region 1* | | | | | | | | Occupancy | Density |
|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | **Region 1** | **BDNF** | **BINF** | **CLNF** | **CUNF** | **FLNF** | **GANF** | **HENF** | **Estimated** | **Estimated** |
| American Dipper | Other | | | | | | | | | |
| American Three-toed Woodpecker | | | | | | | | | X | X |
| Baird's Sparrow | R1SS | | | | | | | | X | |
| Black-and-White Warbler | Other | | | | | | | | X | |
| Bobolink | Other | | | | | | | | X | |
| Boreal Chickadee | Other | | | | | | | | | |
| Brewer's Sparrow | | | | | MIS | | | | X | X |
| Bullock's Oriole | | | | | MIS | | | | X | X |
| Chestnut-collared Longspur | Other | | | | | | | | X | |
| Chipping Sparrow | | | | | | | | | X | X |
| Clark's Nutcracker | Other | | | | | | | | X | X |
| Dusky Flycatcher | | | | | | | | | X | X |
| Ferruginous Hawk | Other | | | | | | | | | |
| Grasshopper Sparrow | Other | | | | | | | | X | X |
| Gray Jay | Other | | | | | | | | X | X |
| Hairy Woodpecker | | | | | | | | MIS | X | X |
| Hammond's Flycatcher | | | | | | | | | X | X |
| Lark Bunting | Other | | | | | | | | X | X |
| Lark Sparrow | | | | | MIS | | | | X | X |
| Lewis's Woodpecker | Other | | | | | | | | | |
| Loggerhead Shrike | R1SS | | | | | | | | | |
| Long-billed Curlew | R1SS | | | | | | | | | |
| Marbled Godwit | Other | | | | | | | | X | |

| Species | USFS Region 1* | | | | | | | | Occupancy Estimated | Density Estimated |
|---|---|---|---|---|---|---|---|---|---|---|
| | Region 1 | BDNF | BINF | CLNF | CUNF | FLNF | GANF | HENF | | |
| Northern Goshawk | | | | | | | MIS | | | |
| Northern Harrier | Other | | | | | | | | X | X |
| Olive-sided Flycatcher | Other | | | | | | | | X | X |
| Ovenbird | | | | | MIS | | | | X | X |
| Peregrine Falcon | R1SS | | | | | | | | | |
| Pileated Woodpecker | | | MIS | MIS | | | | | | X |
| Pygmy Nuthatch | R1SS | | | | | | | | | |
| Red-headed Woodpecker | Other | | | | | | | | X | |
| Red-naped Sapsucker | Other | | | | | | | | X | X |
| Sandhill Crane | Other | | | | | | | | | X |
| Sharp-tailed Grouse | | | | | | | | | X | |
| Short-eared Owl | Other | | | | | | | | | |
| Spotted Towhee | | | | | MIS | | | | X | X |
| Sprague's Pipit | R1SS | | | | | | | | X | |
| Swainson's Hawk | Other | | | | | | | | | X |
| Upland Sandpiper | Other | | | | | | | | X | X |
| Western Kingbird | | | | | MIS | | | | X | X |
| Willet | Other | | | | | | | | | |
| Williamson's Sapsucker | Other | | | | | | | | X | |
| Wilson's Phalarope | Other | | | | | | | | X | |
| Yellow Warbler | | | | | MIS | | | | X | X |

*R1SS = Region 1 sensitive species; Other = Other Priority Species in Region 1; MIS = management indicator species (Skorkowsky and Hahn 2010).

**Appendix F continued**. Codes for Region/Units: Idaho Panhandle NF (IPNF), Kootenai NF (KONF), Lewis and Clark NF (LCNF), Lolo NF (LONF) and Nez Perce NF (NPNF), Cedar River National Grassland (CRNG), Grand River National Grassland (GRNG), Little Missouri National Grassland (LMNG). An "X" in the Occupancy or Density Estimated columns indicates that estimates were generated for that species in at least one USFS stratum where it holds a priority designation.

| | USFS Region 1* | | | | | | | | | Occupancy | Density |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | Region 1 | IPNF | KONF | LCNF | LONF | NPNF | CRNG | GRNG | LMNG | Estimated | Estimated |
| American Dipper | Other | | | | | | | | | | |
| American Three-toed Woodpecker | | | | MIS | | | | | | X | X |
| Baird's Sparrow | R1SS | | | | | | | | | X | |
| Black-and-White Warbler | Other | | | | | | | | | X | |
| Bobolink | Other | | | | | | | | | X | |
| Boreal Chickadee | Other | | | | | | | | | | |
| Brewer's Sparrow | | | | | | | | | | X | X |
| Bullock's Oriole | | | | | | | | | | X | X |
| Chestnut-collared Longspur | Other | | | | | | | | | X | |
| Chipping Sparrow | | MIS | MIS | | | | | | | X | X |
| Clark's Nutcracker | Other | | | | | | | | | X | X |
| Dusky Flycatcher | | MIS | MIS | | | | | | | X | X |
| Ferruginous Hawk | Other | | | | | | | | | | |
| Grasshopper Sparrow | Other | | | | | | | | | X | X |
| Gray Jay | Other | | | | | | | | | X | X |
| Hairy Woodpecker | | MIS | MIS | | | | | | | X | X |
| Hammond's Flycatcher | | MIS | MIS | | | | | | | X | X |
| Lark Bunting | Other | | | | | | | | | X | X |
| Lark Sparrow | | | | | | | | | | X | X |
| Lewis's Woodpecker | Other | | | | | | | | | | |
| Loggerhead Shrike | R1SS | | | | | | | | | | |
| Long-billed Curlew | R1SS | | | | | | | | | X | |
| Marbled Godwit | Other | | | | | | | | | X | |
| Northern Goshawk | | | | MIS | | MIS | | | | | |
| Northern Harrier | Other | | | | | | | | | X | X |

| Species | USFS Region 1* | | | | | | | | | Occupancy Estimated | Density Estimated |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Region 1 | IPNF | KONF | LCNF | LONF | NPNF | CRNG | GRNG | LMNG | | |
| Olive-sided Flycatcher | Other | MIS | MIS | | | | | | | X | X |
| Ovenbird | | | | | | | | | | X | X |
| Peregrine Falcon | R1SS | | | | | | | | | | |
| Pileated Woodpecker | | MIS | MIS | | MIS | MIS | | | | | X |
| Pygmy Nuthatch | R1SS | | | | | | | | | | |
| Red-headed Woodpecker | Other | | | | | | | | | X | |
| Red-naped Sapsucker | Other | | | | | | | | | X | X |
| Sandhill Crane | Other | | | | | | | | | | X |
| Sharp-tailed Grouse | | | | | | | MIS | MIS | MIS | X | |
| Short-eared Owl | Other | | | | | | | | | | |
| Spotted Towhee | | | | | | | | | | X | X |
| Sprague's Pipit | R1SS | | | | | | | | | X | |
| Swainson's Hawk | Other | | | | | | | | | | X |
| Upland Sandpiper | Other | | | | | | | | | X | X |
| Western Kingbird | | | | | | | | | | X | X |
| Willet | Other | | | | | | | | | | |
| Williamson's Sapsucker | Other | | | | | | | | | X | |
| Wilson's Phalarope | Other | | | | | | | | | X | |
| Yellow Warbler | | | | | | | | | | X | X |

*R1SS = Region 1 sensitive species; Other = Other Priority Species in Region 1; MIS = management indicator species (Skorkowsky and Hahn 2010).

# APPENDIX G

Priority species detected on US Forest Service lands in Region 2 in 2011, with management designations by region and unit. Codes for Region/Units: Arapahoe-Roosevelt NF (ARNF), Bighorn NF (BINF), Black Hills NF (BHNF), Grand Mesa, Uncompaghre and Gunnison NF (GMUG), Medicine Bow NF (MBNF), Nebraska NF (NENF), Pike/San Isabel NF (PSINF), Rio Grande NF (RGNF). An "X" in the Occupancy or Density Estimated columns indicates that estimates were generated for that species in at least one USFS stratum where it holds a priority designation.

| | USFS Region 2* | | | | | | | | | Occupancy | Density |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | Region 2 | ARNF | BINF | BHNF | GMUGNF | MBNF | NENF | PSINF | RGNF | Estimated | Estimated |
| American Pipit | | | | | | | | | | X | X |
| American Three-toed Woodpecker | | | | | | MIS | | | | X | X |
| Bald Eagle | R2SS | | | | | | | | | | |
| Black Tern | R2SS | | | | | | | | | | |
| Black-and-White Warbler | | | | SOLC | | | | | | | |
| Brewer's Sparrow | R2SS | | | | | | | | | X | X |
| Brown Creeper | | | | MIS | | SOSC | | | MIS | X | X |
| Bullock's Oriole | | | | | | | | | | X | X |
| Burrowing Owl | R2SS | | | | | | | | | X | |
| Cassin's Sparrow | R2SS | | | | | | | | | x | X |
| Chestnut-collared Longspur | R2SS | | | | | | | | | X | X |
| Dusky Grouse | | | | | | | | | | | |
| Ferruginous Hawk | R2SS | | | | | | | | | | |
| Golden-crowned Kinglet | | MIS | | MIS | | MIS | | | | X | X |
| Grasshopper Sparrow | R2SS | | | | | | | | | X | X |
| Greater Prairie-Chicken | R2SS | | | | | | | | | | |
| Greater Sage-Grouse | R2SS | | | | | | | | | | |
| Green-tailed Towhee | | | | | | | | | | X | X |
| Hairy Woodpecker | | MIS | | | MIS | | | | | X | X |
| Hermit Thrush | | | | | | | | | MIS | X | X |
| Lark Bunting | | | | | | | | | | X | X |
| Lewis's Woodpecker | R2SS | | | | | | | | | X | |
| Lincoln's Sparrow | | | | | | MIS | | | MIS | X | X |

| Species | USFS Region 2* | | | | | | | | | Occupancy Estimated | Density Estimated |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Region 2 | ARNF | BINF | BHNF | GMUGNF | MBNF | NENF | PSINF | RGNF | | |
| Loggerhead Shrike | R2SS | | | | | | | | | | X |
| Long-billed Curlew | R2SS | | | | | | | | | X | X |
| Mallard | | | | | | | | | | | |
| McCown's Longspur | R2SS | | | | | | | | | X | X |
| Mountain Bluebird | | MIS | | | | | | | | X | X |
| Mountain Plover | R2SS,TEPS | | | | | | | | | | |
| Northern Goshawk | R2SS | | | | | | | | | | |
| Northern Harrier | R2SS | | | | | | | | | | |
| Olive-sided Flycatcher | R2SS | | | | | | | | | X | X |
| Purple Martin | R2SS | | | | | | | | | X | |
| Pygmy Nuthatch | | MIS | | SOLC | | | | | MIS | X | X |
| Red Crossbill | | | | | MIS | | | | | X | X |
| Red-Breasted Nuthatch | | | MIS | | | | | | | X | X |
| Ruffed Grouse | | | | MIS | | | | | | X | |
| Sage Sparrow | R2SS | | | | | | | | | X | X |
| Sharp-tailed Grouse | | | | | | | | | | X | |
| Vesper Sparrow | | | | | | | | | MIS | X | X |
| Virginia's Warbler | | | | | | | | | | X | X |
| Warbling Vireo | | MIS | | | | | | | | X | X |
| White-tailed Ptarmigan | R2SS | | | | | | | | | | |
| Wilson's Warbler | | | | | | MIS | | | MIS | X | X |

*R2SS = Region 2 sensitive species (US Forest Service 2008b); MIS = management indicator species; SOLC = species of local concern; SOC = species of concern; SOVC = species of viability concern; SOSC = species of special concern.

**Appendix G continued.** Codes for Region/Units: Routt NF (RONF), Samuel McKelvie NF (SMNF), San Juan NF (SJNF), Shoshone NF (SHNF) and White River NF (WRNF), Pawnee NG (PANG), Comanche and Cimarron NG (CO and CING), Nebraska NG (NBNG) and Thunder Basin NG (TBNG). An "X" in the Occupancy or Density Estimated columns indicates that estimates were generated for that species in at least one USFS stratum where it holds a priority designation.

| | USFS Region 2* | | | | | | | | | | Occupancy | Density |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | Region 2 | RONF | SMNF | SJNF | SHNF | WRNF | PANG | CO and CING | NBNG | TBNG | Estimated | Estimated |
| American Pipit | | | | | | MIS | | | | | X | X |
| American Three-toed Woodpecker | | | | | | | | | | | X | X |
| Bald Eagle | R2SS | | | | | | | | | | | |
| Black Tern | R2SS | | | | | | | | | | | |
| Black-and-White Warbler | | | | | | | | | | | | |
| Brewer's Sparrow | R2SS | | | | MIS | MIS | | | | | X | X |
| Brown Creeper | | | | | | | | | | | X | X |
| Bullock's Oriole | | | | | | | | MIS | | | X | X |
| Burrowing Owl | R2SS | | | | | | MIS | | | | X | |
| Cassin's Sparrow | R2SS | | | | | | | | | | X | X |
| Chestnut-collared Longspur | R2SS | | | | | | | | | | X | X |
| Dusky Grouse | | | | | MIS | | | | | | | |
| Ferruginous Hawk | R2SS | | | | | | MIS | | | | | |
| Golden-crowned Kinglet | | MIS | | | | | | | | | X | X |
| Grasshopper Sparrow | R2SS | | | | | | | | | | X | X |
| Greater Prairie-Chicken | R2SS | | MIS | | | | | | MIS | | | |
| Greater Sage-Grouse | R2SS | | | | | | | | | MIS | | |
| Green-tailed Towhee | | | | MIS | | | | | | | X | X |
| Hairy Woodpecker | | | | MIS | MIS | | | | | | X | X |
| Hermit Thrush | | | | | | | | | | | X | X |
| Lark Bunting | | | | | | | MIS | | | | X | X |
| Lewis's Woodpecker | R2SS | | | | | | | | | | X | |
| Lincoln's Sparrow | | | | | | | | | | | X | X |
| Loggerhead Shrike | R2SS | | | | | | | | | | | X |
| Long-billed Curlew | R2SS | | | | | | | MIS | | | X | X |

| Species | USFS Region 2* | | | | | | | | | | Occupancy Estimated | Density Estimated |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Region 2 | RONF | SMNF | SJNF | SHNF | WRNF | PANG | CO and CING | NBNG | TBNG | | |
| Mallard | | | | MIS | | | | | | | | |
| McCown's Longspur | R2SS | | | | | | | | | | X | X |
| Mountain Bluebird | | | | MIS | | | | | | | X | X |
| Mountain Plover | R2SS,TEPS | | | | | | | | | | | |
| Northern Goshawk | R2SS | | | | MIS | | | | | | | |
| Northern Harrier | R2SS | | | | | | | | | | | |
| Olive-sided Flycatcher | R2SS | | | | | | | | | | X | X |
| Purple Martin | R2SS | | | | | | | | | | X | |
| Pygmy Nuthatch | | | | | | | | | | | X | X |
| Red Crossbill | | | | | | | | | | | X | X |
| Red-Breasted Nuthatch | | | | | | | | | | | X | X |
| Ruffed Grouse | | | | | MIS | | | | | | X | |
| Sage Sparrow | R2SS | | | | | | | | | | X | X |
| Sharp-tailed Grouse | | | MIS | | | | | | MIS | | X | |
| Vesper Sparrow | | | | | | | | | | | X | X |
| Virginia's Warbler | | | | | | MIS | | | | | X | X |
| Warbling Vireo | | MIS | | | | | | | | | X | X |
| White-tailed Ptarmigan | R2SS | | | | | | | | | | | |
| Wilson's Warbler | | MIS | | | | | | | | | X | X |

*R2SS = Region 2 sensitive species (US Forest Service 2008b); MIS = management indicator species; SOLC = species of local concern; SOC = species of concern; SOVC = species of viability concern; SOSC = species of special concern.

# APPENDIX H

Priority species detected on US Forest Service lands in Region 3 in 2011, with management designations by region and unit. An "X" in the Occupancy or Density Estimated columns indicates that estimates were generated for that species in at least one USFS stratum where it holds a priority designation.

| | USFS Region 3* | | | | Occupancy Estimated | Density Estimated |
|---|---|---|---|---|---|---|
| **Species** | **Region 3** | **Coconino NF** | **Kaibab NF** | **Kiowa/Rita Blanca NG** | | |
| Burrowing Owl | R3SS | | | MIS | X | |
| Cassin's Sparrow | | | | MIS | X | X |
| Ferruginous Hawk | R3SS | | | | | |
| Grace's Warbler | R3SS | | | | X | X |
| Grasshopper Sparrow | R3SS | | | MIS | X | X |
| Gray Vireo | R3SS | | | | X | X |
| Hairy Woodpecker | | MIS | MIS | | X | X |
| Juniper Titmouse | | MIS | MIS | | X | X |
| Loggerhead Shrike | R3SS | | | | | X |
| Lucy's Warbler | | MIS | | | X | |
| Mountain Plover | R3SS | | | | | |
| Peregrine Falcon | R3SS | | | | | |
| Pygmy Nuthatch | | MIS | MIS | | X | X |
| Red-naped Sapsucker | | | MIS | | X | X |
| Swainson's Hawk | R3SS | | | | | X |
| Western Bluebird | | | | MIS | X | X |
| Wild Turkey | R3SS | MIS | MIS | | X | X |
| Zone-tailed Hawk | R3SS | | | | | |

*R3SS = USFS Region 3 sensitive species (US Forest Service 2010); MIS = management indicator species; SOC = species of concern.

# APPENDIX I

Priority species detected on US Forest Service lands in Region 4 in 2011, with management designations by region and unit. An “X” in the Occupancy or Density Estimated columns indicates that estimates were generated for that species in at least one USFS stratum where it holds a priority designation.

| Species | USFS Region 4* | | | Occupancy Estimated | Density Estimated |
|---|---|---|---|---|---|
| | Region 4 | Bridger-Teton NF | Manti-La Sal NF | | |
| American Three-toed Woodpecker | R4SS | | | X | |
| Brewer's Sparrow | MIS | | | X | X |

*R4SS = Region 4 sensitive species (US Forest Service 2008a); MIS = management indicator species; SS = sensitive species.