Integrated Monitoring in Bird Conservation Regions (IMBCR): 2012 Annual Report

June 2013

Rocky Mountain Bird Observatory
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Tech. Report # SC-IMBCR-03

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.*

Suggested Citation:

White, C. M., N. J. Van Lanen, D.C. Pavlacky Jr., J. A. Blakesley, R. A. Sparks, M. F. McLaren, J. J. Birek and D. J. Hanni. 2013. Integrated Monitoring in Bird Conservation Regions (IMBCR): 2012 Annual Report. Rocky Mountain Bird Observatory. Brighton, Colorado, USA.

Cover Photos:

Chestnut-collared Longspur by Bill Schmoker. Used with permission.

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EXECUTIVE SUMMARY

Rocky Mountain Bird Observatory (RMBO), in conjunction with its partners, conducted landbird monitoring as part of a program entitled “Integrated Monitoring in Bird Conservation Regions” (IMBCR). In 2012, IMBCR encompassed three entire states (Colorado, Montana and Wyoming) and portions of 10 additional states, two entire USFS Regions (Regions 1 and 2) and portions of Regions 3 and 4, in all of the Badlands and Prairies and in part of many Bird Conservation Regions (BCRs) (Northern Rockies, Prairie Potholes, Southern Rockies/Colorado Plateau, Shortgrass Prairie, Central Mixed-grass Prairie, Sonoran and Mohave Deserts, and Sierra Madre Occidental).

IMBCR used a spatially balanced sampling design which allowed inferences to avian species occurrence and population sizes at various scales, from local management units to BCRs and states, facilitating conservation at local and national levels. The sampling design allowed for the estimation of density, population size and occupancy for individual strata or biologically meaningful combinations of strata. In the past, these estimates were calculated in several steps, using Programs Distance, Mark and R. In the past year, Paul Lukacs of the University of Montana created an R package that automates the estimation of density and occupancy. In the future, this will reduce data analysis costs and free up time for more in-depth analyses of the IMBCR data.

In 2012, IMBCR partners completed 990 of 1,001 (99%) planned surveys, with 11,545 point counts conducted. Surveys were conducted between 28 April and 23 July. Field technicians observed more than 131,000 individual birds representing 309 species.

To view interactive maps illustrating survey and detection locations, species counts, and density, population and occupancy results, 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 A of this report and are available on the Avian Data Center itself. Each stratum or combination of strata presented in the results section contains a web link that leads directly to the Avian Data Center with the appropriate queries already populated. Please note that not every stratum or conceivable combinations of strata are summarized in this report. All strata and all biologically meaningful combinations of strata, termed “super strata”, will be found on the Avian Data Center

The IMBCR design provides a spatially consistent and flexible framework for understanding the status and annual changes of bird populations. The collaboration across organizations and spatial scales increased sample sizes, and improved the accuracy and precision of the population estimates. Analyzing the data collectively allowed the estimation of common detection probabilities for species that would have otherwise had insufficient numbers of detections at local scales.

The IMBCR program is well positioned to address conservation and management needs of a wide range of stakeholders, landowners and government entities at various spatial scales. By focusing on multiple scales from local management units to BCRs, IMBCR can easily be integrated within an interdisciplinary approach to bird conservation that combines monitoring, research and management. Recently developed habitat analyses and species distribution maps can be used as the basis of decision support tools for avian conservation.

ACKNOWLEDGEMENTS

Many individuals helped make the 2012 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: 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; US Fish and Wildlife Service Refuge System, Great Northern Landscape Conservation Cooperative, and Intermountain West Joint Venture. 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. 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 also thank Paul Lukacs for writing code in program R to automate data analysis for density and occupancy estimates. 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 many 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
AIC_c	Akaike's Information Criterion corrected for small sample size
ASC	Avian Science Center
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
GRTS	Generalized Random-Tessellation Stratification
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
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 various 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).

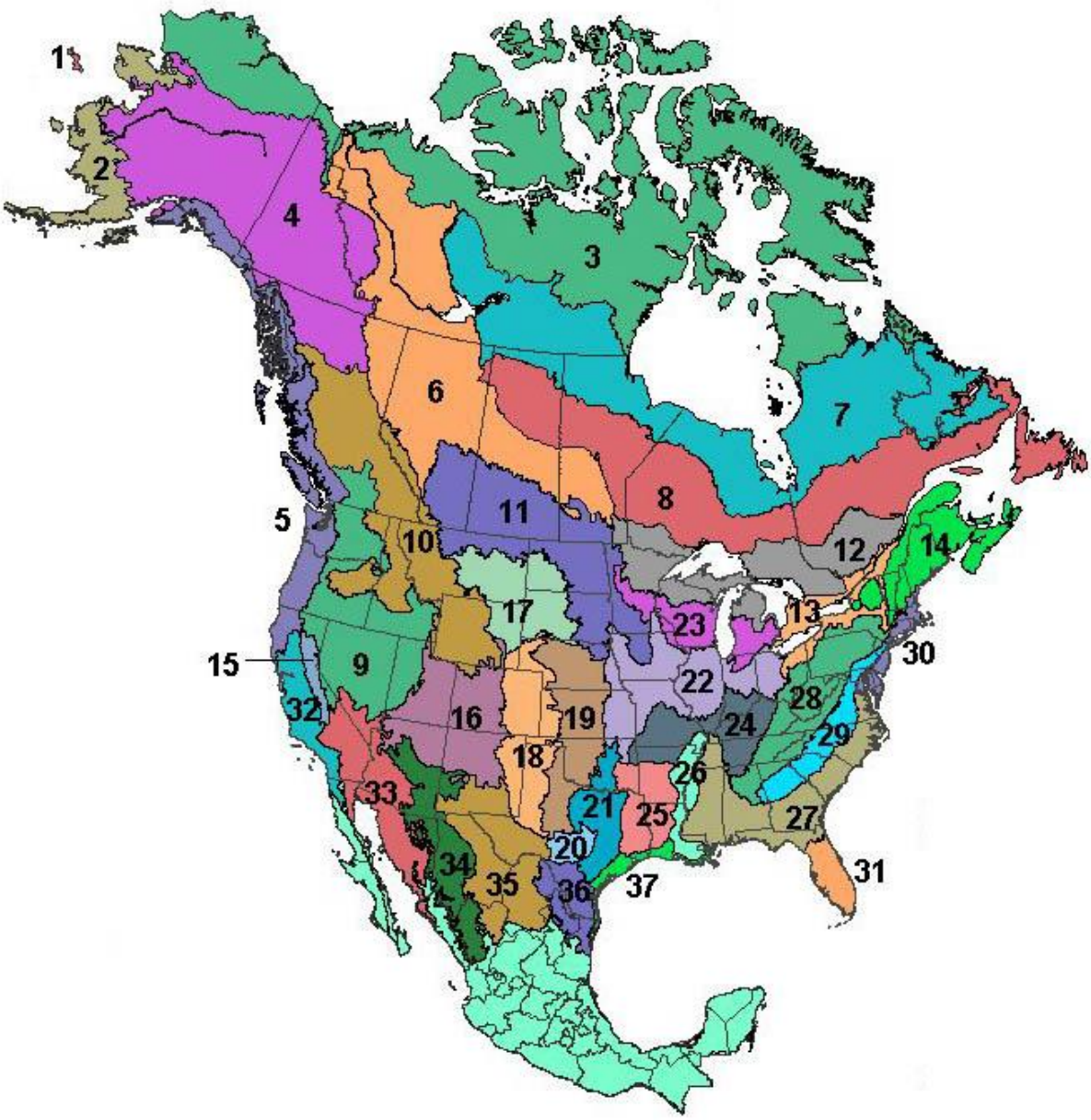

Figure 1. Bird Conservation Regions throughout North America, excluding Hawaii and Mexico (Source: http://www.nabci-us.org/map.html).

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, the IMBCR partnership 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 Parks and Wildlife (CPW; formerly Colorado Division of Wildlife), 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.

After the US NABCI Monitoring Subcommittee suggested ways to improve bird monitoring efforts in North America in 2007, IMBCR partners considered the NABCI subcommittee suggestions to develop a new protocol for statewide bird monitoring in Colorado. This protocol used BCRs as the sampling frames and stratified by land ownership within each of the BCRs. In 2008 IMBCR partners stratified and surveyed the Southern Rockies/Colorado Plateau BCR (BCR 16) and the Shortgrass Prairie BCR (BCR 18) portions of Colorado, as well as the BCR 16 portion of Wyoming. No samples were surveyed in the BCR 10 portion of Colorado that year because of issues getting permission to conduct surveys on private lands.

In 2008, in Colorado BCR 16, we used cell weighting based on Strahler stream order to target higher order rivers and streams, and cell weighting based on elevation target to higher elevation habitats such as Alpine Tundra which occur in a small proportion of the landscape (Blakesley and Hanni 2009). However, IMBCR partners decided after the initial 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 cell weighting in 2009. Additionally, the All Other lands stratum in Wyoming BCR 16 was split into two strata: All Other lands and BLM lands.

Based on the success and lessons learned from the 2008 pilot implementation, the IMBCR program was expanded in 2009 to include the Colorado and Wyoming portions of the Northern Rockies (BCR 10); the Great Basin (BCR 9) and Shortgrass Prairie (BCR18) portions of Wyoming; all of the Badlands and Prairies (BCR 17); the USFS National Forests and Grasslands within BCR 18; and Coconino and Prescott National Forests in the Sierra Madre Occidental (BCR 34).

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. Additionally, there were several restratifications done in Colorado BCRs 10 and 16 between 2009 and 2010. The Colorado BCR10 stratum was restratified to include the tiny easternmost portion of BCR 10 that dips into Colorado so that it now represents all of BCR 10 in Colorado. The NPS Rocky Mountain Inventory and Monitoring (I&M) Network (RMNW) and Northern Colorado Plateau I&M Network (NCPN) were restratified because under the initial design some NCPN park units were mis-classified into 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 for the Bridger-Teton National Forest.

In 2011, the geographic extent of the IMBCR program expanded to the Nebraska portion of the Central Mixed-grass Prairie (BCR 19) and included all of the National Forests and Grasslands in Nebraska. 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. 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 National Forest and Arapaho and Roosevelt National Forests 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 and Roosevelt National Forest but falls within the Routt National Forest Plan. 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; 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.

In 2012, strata were added to the Idaho portion of BCR 10 so that the entirety of this BCR in Idaho was available for sampling. The boundary between USFS Regions 1 and 4 runs through this portion of Idaho and was taken into account when strata were added so that estimates could be generated at the scale of USFS Regions. The new strata include All Other lands in Region 1, All Other lands in Region 4, other USFS lands in Region 1, and USFS designated roadless/wilderness areas within Region 4.

In Arizona in 2012, Tonto National Forest became a part of the IMBCR survey effort. The forest was stratified into two strata based on elevation to allow for adjusting sampling intensity to target Management Indicator Species on the Forests. Kaibab National Forest was restratified into two strata based on elevation for the same reason.

In Montana in 2012, several strata were restratified and combined within BCR 17. The three All Other Lands strata were combined with the Tribal Lands stratum into one All Other Lands stratum. The four BLM strata within Montana BCR 17 were combined into one BLM stratum. These strata were collapsed into larger strata to maximize the number of samples conducted within two strata rather than spread them out amongst eight strata.

To read more about the IMBCR program, please refer to the IMBCR page on RMBO's website: http://rmbo.org/v3/OurWork/Science_/BirdPopulationMonitoring/IntegratedMonitoringinBCRs(IMBCR).aspx

METHODS

Study Area

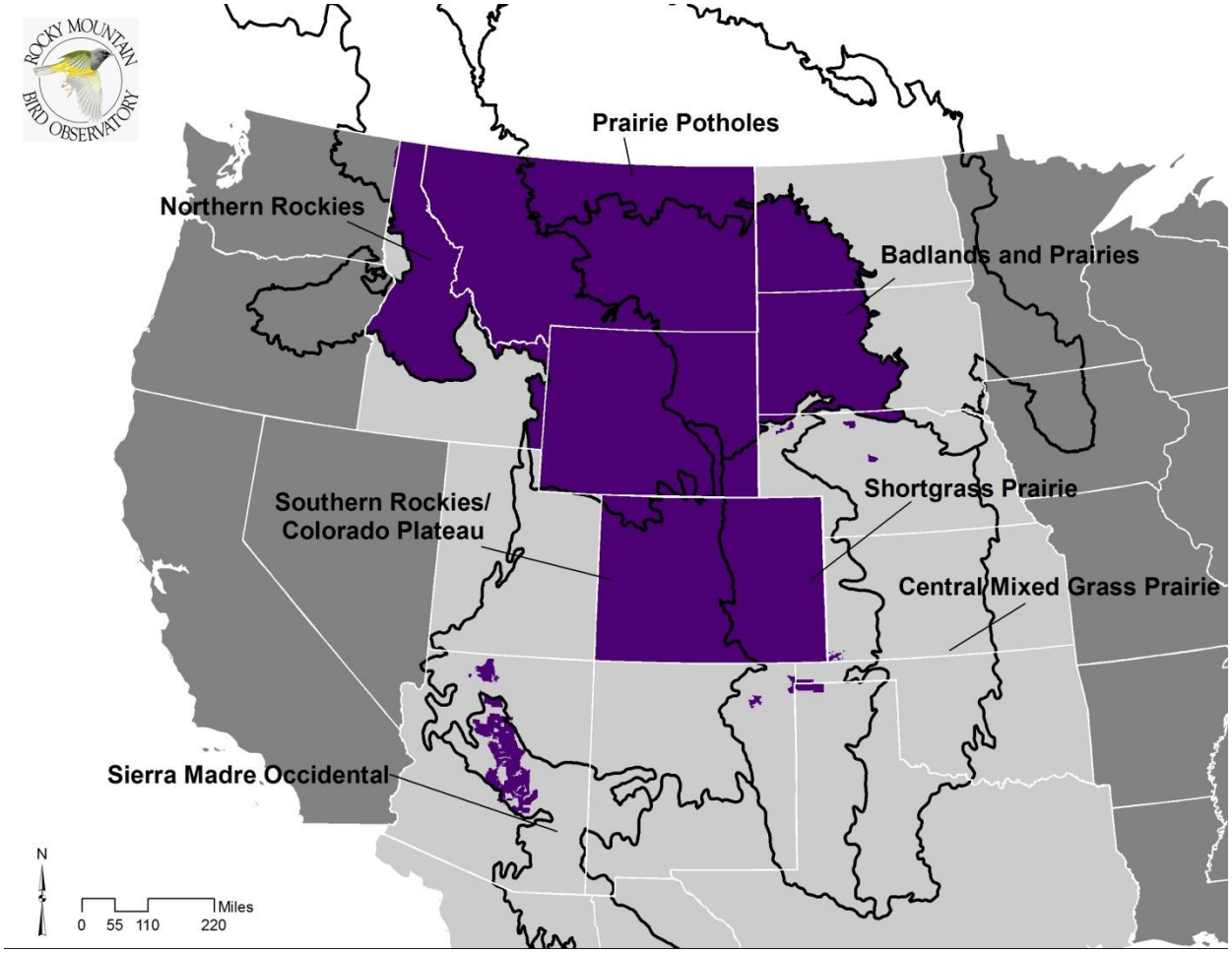

Figure 2. Spatial extent of sampled strata using the IMBCR design, 2012.

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, Engelmann 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 fourth 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, Idaho, Montana and Wyoming portions of BCR 10. Surveys were conducted in 58 strata comprising 435,771 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 third 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 ranging from the southern Rocky Mountains in the east to the Wasatch and Uinta mountains in the west. 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 fifth 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 158,379 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 fourth year IMBCR was implemented within BCR 17. RMBO, ASC and WYNDD conducted surveys throughout the entire BCR in 2012. Surveys were conducted in 28 strata comprising 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 fifth 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 19 strata comprising 128,530 km^2.

BCR 19: **Central Mixed-grass Prairie**
The Central Mixed-grass Prairie Bird Conservation Region lies between 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 second 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 33: **Sonoran and Mohave Deserts**
The Sonoran and Mohave Deserts Bird Conservation Region is an arid region characterized by creosote, cacti, and other desert shrubs (US North American Bird Conservation Initiative 2000). This BCR covers southeastern California, southern Nevada, southwestern Arizona, and extends south into Mexico.

This was the first year IMBCR was implemented within BCR 33. RMBO conducted surveys in two strata in Tonto National Forest in BCR 33 and BCR 34, covering an area of 11,990 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 fourth year IMBCR was implemented within BCR 34. RMBO conducted surveys in Kaibab and Coconino National Forests within BCR 34. Surveys were conducted in 3 strata comprising 13,927 km^2.

Sampling Design

Sampling Frame and Stratification
The spatial extent of the sampling frame increased from 2008 to 2012 as the number of agencies and organizations participating in the IMBCR program increased (see Program History, above). In 2012, IMBCR encompassed three entire states (Colorado, Montana and Wyoming) and portions of nine additional states (Arizona, Idaho, Kansas, North Dakota, Nebraska, New Mexico, Oklahoma, South Dakota, and Texas), two entire USFS Regions (Regions 1 and 2) and portions of Regions 3 and 4, in all of the Badlands and Prairies and in portions of many BCRs (Northern Rockies, Prairie Potholes, Southern Rockies/Colorado Plateau, Shortgrass Prairie, Central Mixed-grass Prairie, Sonoran and Mohave Deserts, and Sierra Madre Occidental; Figure 2).

A key component of the IMBCR design is the ability to derive inferences across spatial scales, from small management units such as individual National Forests or BLM Field Offices to entire states and BCRs. This is accomplished through hierarchical (nested) stratification, which allows data from smaller-order strata to be combined to make inferences about higher-order strata. For example, data from each individual National Forest stratum in USFS Region 2 are combined to produce Region-wide avian population estimates; data from each individual stratum in Montana

are combined to produce state-wide estimates; data from each individual stratum in BCR 17 are combined to produce BCR-wide estimates.

Strata were defined based on areas to which IMBCR partners wanted to make inferences. The largest scale strata were defined by the intersection of state and BCR boundaries (e.g., Wyoming BCR 10). The smaller-order strata within BCRs were based on fixed attributes such as land ownership boundaries, elevation zones, major river systems, and wilderness/roadless designations.

Sampling Units

The IMBCR design defined sampling units as 1-km^2 cells, each containing 16 evenly-spaced sample points, 250 meters apart (Figure 3). Potential sampling units were defined by superimposing a uniform grid of cells over each state in the study area. Each cell was assigned to a stratum using ARCGIS versions 9.2 and higher (Environmental Systems Research Institute 2006).

Sample Selection

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.

A minimum of two sampling units were required within each stratum to estimate the variances of population parameters. The remaining allocation of sampling effort among strata was based on the priorities of the funding partners.

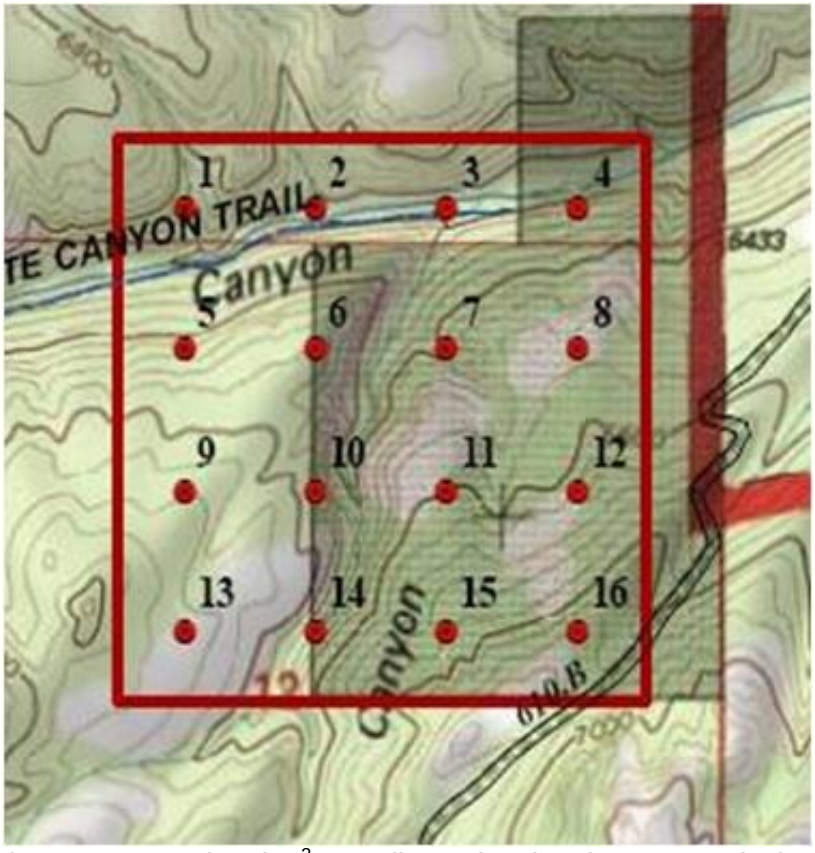

Figure 3. Example 1 km^2 sampling unit using the IMBCR design.

Sampling Methods

IMBCR surveyors with excellent aural and visual bird-identification skills conducted field work in 2012. Prior to conducting surveys, technicians completed an intensive training program to ensure full understanding of the field protocol, to review bird and plant identification, and to practice distance estimation in a variety of habitats. Many field technicians attended a second, shorter mid-season training to review protocol and practice bird and plant identification at high-elevation sites that were inaccessible earlier in the season.

Field technicians conducted point counts (Buckland et al. 2001) following protocols established by IMBCR partners (Hanni et al. 2012). Observers conducted surveys in the morning, beginning ½-hour before sunrise and concluding no later than 5 hours after sunrise. Technicians recorded the start time for every point count conducted. For every bird detected during the six-minute period, observers recorded species, sex; horizontal distance from the observer; minute, type of detection (e.g., call, song, visual), whether the bird was thought to be a migrant, and whether or not the observer was able to visually identify each record.

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 sampling

unit they recorded the presence of any species not recorded during a point count that morning. The opportunistic detections of these 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 units. Before beginning each six-minute count, surveyors recorded vegetation data (within a 50 m radius of the point). Vegetation data included the dominant habitat type and 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.

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. There you will find links to past and current protocols and data sheets.

Protocol Changes Over Time

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 sample point 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 as a type of ground cover that year.

Beginning in 2010, the point count duration was increased from five minutes to six minutes to facilitate occupancy estimation, which is easier to analyze using 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 because 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 and identified 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 because 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.

During the 2012 field season technicians began recording the start time for every point count conducted so that temporal information could be used as a variable in analyses. Start times for the entire transect and for individual points were all recorded in Mountain Standard Time for consistency across projects. Prior to 2012 technicians were allowed to conduct point counts until 11am. In order to account for variability across study areas from Arizona to Montana, technicians were instructed to survey no later than 5 hours after sunrise in 2012. Recording species as migrants was new to the protocol in 2012. Technicians noted if they thought a particular bird was actually a migrant species moving through the study area and not actually breeding there. After the field season the list of species marked as migrants are thoroughly reviewed and those records deemed to be correctly marked as migrants were not included in analyses. In the past technicians were instructed to record birds as male if the bird was singing and it was a warbler, sparrow, or it was singing repeatedly and emphatically. In 2012, technicians were instructed to only identify the sex of a bird if it was a sexually dimorphic species observed visually. Technicians were instructed to record species to the subspecies level only if they visually identified it as such. In the past we used geographic range to assume a bird was of a particular subspecies and recorded as such. Up until the 2012 field season, technicians were given a list of rare or difficult to detect species to record while traveling between points within a sampling unit. In 2012, in order to simplify the protocol and collect more useful information, technicians were instructed to record any species they came across while traveling between points that they had not documented during a point count. That way, any and all species encountered within the sampling unit would be documented for distribution mapping purposes.

Some data that were recorded in the past were removed from the vegetation data sheet in 2012, including the distance to the nearest road, forest structural stage, and human structures. These types of data are no longer collected in the field because they can be obtained through remotely sensed data. In the past, if mid-story vegetation was present technicians would record the species found in that layer. These data were found to be extremely variable from year to year, so the data sheet was modified to simply record whether a mid-story was present. A ground cover category for residual grass was added. In the past technicians were instructed to estimate cover to the nearest percent for all categories where percent cover or relative abundance was recorded. The protocol was modified and the acceptable values for were limited to 1%, 5%, or increments of 10%. This was done in an attempt to get technicians to estimate cover and relative abundance as consistently as possible.

In 2012 field technicians were given two additional data sheets to facilitate working on private lands. The first contained specific information about the land ownership of each point located within a given sampling unit. In cases where a point fell on private property, the name, contact information, and any pertinent notes about the landowner were provided. The second data sheet was a contact log where technicians recorded all contacts or attempted contacts they had with landowners. This information was later entered into the landowner database when the technician had internet access.

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 includes fitting a detection function to the distribution of recorded distances (Buckland et al. 2001). 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 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 estimated bird densities using the new RIMBCR package in Program R (R Core Team 2012) developed by Paul Lukacs of the University of Montana. RIMBCR streamlined data analysis procedures we had previously completed in multiple steps. RIMBCR calls the raw data from the IMBCR SQL server database maintained by RMBO and returns final estimates to the database in tabular format. For each species, RIMBCR fit global detection functions across years (2008 – 2012) as well as detection functions modeling year as a covariate. RIMBCR used Akaike's Information Criterion (AIC) corrected for small sample size (AIC_c) and model selection theory to select the most parsimonious detection function for each species (Burnham and Anderson 2002). RIMBCR incorporated the SPSURVEY package (Kincaid 2008) in Program R to estimate density, population size and confidence intervals for each species. The SPSURVEY package uses spatial information from the survey locations to improve estimates of the variance of density. We computed density estimates for each stratum as well as for aggregations of strata by management unit, landowner, state and BCR. Estimates from multiple strata represent an area-weighted mean.

Occupancy Analysis

Occupancy estimation is most commonly used to quantify the proportion of sample units (i.e., 1-km^2 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 sampling unit served as spatial replicates for estimating the proportion of points occupied within the sampled sampling units. We used a multi-scale occupancy model 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 sampling units (Theta) and 3) the proportion of sampling units 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 sampling units 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 AIC corrected for small sample size (AIC_c) 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 and 90% confidence intervals 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 sampling units 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 sampling unit) (Pavlacky et al. 2012).

The new RIMBCR package streamlined occupancy analyses by calling the raw data from the IMBCR SQL server database and incorporated the R code we created in previous years. This process incorporated program MARK (White and Burnham 1999) and package RMark to fit the multi-scale occupancy models and to estimate model parameters. We combined stratum-level estimates of Psi using an area-weighted mean. Sampling variances and standard errors for the combined estimates of Psi were estimated in RIMBCR using the delta method (Powell 2007). The proportion of sampling units 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 because of unreliable model convergence.

RESULTS

In 2012, field technicians completed 990 of 1,001 (99%) planned surveys throughout all or portions of BCRs 10, 11, 16, 17, 18, 19, 33 and 34 using the IMBCR design (Table 1, Figure 2). Reasons why surveys were not completed are summarized in Table 2. Technicians conducted 11,545 point counts within the 990 surveyed sampling units between 28 April and 23 July 2012. They detected over 131,000 individual birds representing 309 distinct species.

The IMBCR sampling design allowed for the estimation of density, population size and occupancy for individual strata or biologically meaningful combinations of strata, termed “super strata”. In the past, these estimates were calculated in several steps, using Programs Distance, Mark and R. In the past year, Paul Lukacs of the University of Montana created an R package that automated the estimation of density and occupancy. In the future, this will reduce data analysis costs and free up time for more in-depth analyses of the IMBCR data (see “Additional Applications of IMBCR data”, below).

All results, including parameter estimates, distribution maps, 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. Instructions for using the Avian Data Center are included in Appendix A of this report and are available on the Avian Data Center itself. Each stratum or super stratum presented in the Results section contains a web link that leads directly to the Avian Data Center with the appropriate queries already populated. Please note that not every stratum or super stratum was summarized in this report. Results from all strata and all biologically meaningful super strata can be found on the Avian Data Center.

Unless otherwise specified, all bird species names listed in this report are from the American Ornithologists’ Union Check-list of North and Middle American Birds (American Ornithologists' Union 2007)

How IMBCR population estimates can be used to support avian conservation:

The Integrated Monitoring in Bird Conservation Regions Program annually collects breeding bird information in all or portions of 13 states. Each year, occupancy and density estimates are calculated at a variety of spatial scales. This information can be used in the following ways to inform avian conservation:

1. Bird Population estimates can be compared in space and time. For example, stratum-level estimates can be compared to state and regional estimates to determine whether local populations are above or below estimates for the region;
2. Population estimates can be used to make informed management decisions about where to focus conservation efforts. For example, strata with large populations can be targeted for protection and strata with low populations can be prioritized for conservation action; a threshold could be set to trigger a management action when populations reach a predetermined level;
3. Population estimates of treatment areas can also be compared to regional estimates to evaluate effectiveness of management actions. For example, if sagebrush areas are being treated to improve habitat for Greater Sage-Grouse (GRSG) and estimates for sagebrush-obligate birds increase in these areas in relation to regional estimates where treatment is not occurring, the results would suggest that the GRSG management actions are also beneficial to other sagebrush-obligate bird species;
4. Annual estimates of density and occupancy can be compared over time to determine if population changes are a result of population growth or decline and/or range expansion or contraction. For example, if population densities of a species declined over time, but the occupancy rates remained constant, then the population change was due to declines in local abundance. In contrast, if both density and occupancy rates of a species declined, then population change was due to range contraction.

Occupancy rates can be multiplied by the land area in a region of interest to estimate the area occupied by a species. For example, if a stratum comprises 120,000 km^2 and the occupancy estimate for Western Meadowlark is 0.57, managers can estimate that 68,400 km^2 (120,000 km^2 * 0.57) of habitat within that stratum are occupied by Western Meadowlarks.

Table 1. Planned and completed surveys, by stratum, 2012.

State	BCR	Strata Code	Strata Name	Collected By	Area (km²)	Planned	Completed	% Completed
AZ	34	CF	Coconino National Forest	RMBO	7,426	50	50	100%
AZ	34	KH	Kaibab National Forest - High Elevation	RMBO	4,319	10	10	100%
AZ	34	KH	Kaibab National Forest - Low Elevation	RMBO	2,182	10	10	100%
AZ	34	TH	Tonto National Forest - High Elevation	RMBO	1,892	13	13	100%
AZ	34	TL	Tonto National Forest - Low Elevation	RMBO	10,098	26	24	92%
				Subtotal	**25,917**	**109**	**107**	**98%**
CO	10	AO	All Other Lands	RMBO	5,060	5	5	100%
CO	10	BL	Bureau of Land Management	RMBO	4,288	28	28	100%
				Subtotal	**9,348**	**33**	**33**	**100%**
CO	16	AO	All Other Lands	RMBO	51,214	25	24	96%
CO	16	AR	Arapaho and Roosevelt National Forest	RMBO	6,932	10	10	100%
CO	16	BL	Bureau of Land Management	RMBO	27,825	25	25	100%
CO	16	GM	Grand Mesa, Uncompahgre and Gunnison National Forests	RMBO	13,630	10	10	100%
CO	16	MA	Manti-La Sal National Forest	RMBO	131	2	2	100%
CO	16	NC	National Park Service - Northern Colorado Plateau Network	RMBO	807	2	2	100%
CO	16	PS	Pike and San Isabel National Forests	RMBO	10,950	10	10	100%
CO	16	RA	Rio Grande National Forest - High Elevation	RMBO	866	8	8	100%
CO	16	RM	National Park Service - Rocky Mountain Network	RMBO	1,644	2	2	100%
CO	16	RO	Routt National Forest	RMBO	5,734	30	30	100%
CO	16	RP	Rio Grande National Forest - Middle Elevation	RMBO	5,410	6	6	100%
CO	16	RS	Rio Grande National Forest - Low Elevation	RMBO	1,896	10	9	90%
CO	16	SA	San Juan National Forest	RMBO	8,794	10	10	100%
CO	16	SC	National Park Service - Southern Colorado Plateau Network	RMBO	214	2	2	100%
CO	16	WA	White River National Forest - High Elevation	RMBO	2,138	10	10	100%
CO	16	WF	USFS - Williams Fork Management Unit	RMBO	551	10	10	100%
CO	16	WP	White River National Forest - Middle Elevation	RMBO	5,443	10	10	100%
CO	16	WS	White River National Forest - Low Elevation	RMBO	2,786	10	10	100%
				Subtotal	**146,965**	**192**	**190**	**99%**

State	BCR	Strata Code	Strata Name	Collected By	Area (km²)	Planned	Completed	% Completed
CO	18	AR	Arkansas River and Tributaries	RMBO	1,127	10	10	100%
CO	18	CO	Comanche National Grassland	RMBO	4,836	10	10	100%
CO	18	DO	Department of Defense	RMBO	1,647	2	2	100%
CO	18	IA	Area between I-70 and the Arkansas River	RMBO	34,755	10	9	90%
CO	18	NP	Area North of the Platte River	RMBO	11,457	10	10	100%
CO	18	PA	Pawnee National Grassland	RMBO	3,268	10	10	100%
CO	18	PI	Area between the Platte River and I-70	RMBO	30,365	10	10	100%
CO	18	PT	Platte River and Tributaries	RMBO	970	10	10	100%
CO	18	SA	Area South of the Arkansas River	RMBO	24,985	10	10	100%
				Subtotal	**113,410**	**82**	**81**	**99%**
ID	10	AN	All Other Lands in USFS Region 1	IBO	13,397	9	9	100%
ID	10	AS	All Other Lands in USFS Region 4	IBO	29,617	11	11	100%
ID	10	CL	Clearwater National Forest - Roaded/Managed	IBO	1,946	14	14	100%
ID	10	CR	Clearwater National Forest - Roadless/Wilderness	IBO	5,036	3	3	100%
ID	10	IP	Idaho Panhandle National Forest - Roaded/Managed	IBO	8,660	24	24	100%
ID	10	IR	Idaho Panhandle National Forest - Roadless/Wilderness	IBO	3,155	6	6	100%
ID	10	NP	Nez Perce National Forest - Roaded/Managed	IBO	2,864	15	15	100%
ID	10	NR	Nez Perce National Forest - Roadless/Wilderness	IBO	6,370	3	3	100%
ID	10	OF	Other USFS lands in USFS Region 1	IBO	2,137	2	2	100%
ID	10	WR	USFS Roadless/Wilderness lands within USFS Region 4	IBO	31,672	2	2	100%
				Subtotal	**104,854**	**89**	**89**	**100%**
KS	18	CI	Cimarron National Grassland	RMBO	690	3	3	100%
MT	10	AO	All Other Lands	ASC	53,215	14	14	100%
MT	10	BE	Beaverhead-Deerlodge National Forest - Roaded/Managed	ASC	7,697	8	8	100%
MT	10	BI	Bitterroot National Forest - Roaded/Managed	ASC	2,324	8	8	100%
MT	10	BM	Bureau of Land Management - Missoula/Butte	ASC	1,356	2	2	100%
MT	10	BR	Beaverhead-Deerlodge National Forest - Roadless/Wilderness	ASC	8,236	2	2	100%
MT	10	BS	Bureau of Land Management - southwestern Montana	ASC	3,447	6	6	100%
MT	10	BW	Bitterroot National Forest - Roadless/Wilderness	ASC	2,763	2	2	100%

State	BCR	Strata Code	Strata Name	Collected By	Area (km²)	Planned	Completed	% Completed
MT	10	CR	Custer National Forest - Roadless/Wilderness	ASC	1,783	2	2	100%
MT	10	CU	Custer National Forest - Roaded/Managed	ASC	779	2	2	100%
MT	10	FL	Flathead National Forest - Roaded/Managed	ASC	4,945	8	8	100%
MT	10	FR	Flathead National Forest - Roadless/Wilderness	ASC	6,410	2	2	100%
MT	10	FW	Fish and Wildlife Service - All Refuges	ASC	359	2	2	100%
MT	10	GA	Gallatin National Forest - Roaded/Managed	ASC	3,479	8	8	100%
MT	10	GR	Gallatin National Forest - Roadless/Wilderness	ASC	5,787	2	2	100%
MT	10	HE	Helena National Forest - Roaded/Managed	ASC	3,024	8	8	100%
MT	10	HR	Helena National Forest - Roadless/Wilderness	ASC	2,248	2	2	100%
MT	10	KO	Kootenai National Forest - Roaded/Managed	ASC	7,239	8	8	100%
MT	10	KR	Kootenai National Forest - Roadless/Wilderness	ASC	1,887	2	2	100%
MT	10	LC	Lewis and Clark National Forest - Roaded/Managed	ASC	2,778	5	5	100%
MT	10	LO	Lolo National Forest - Roaded/Managed	ASC	7,742	8	8	100%
MT	10	LR	Lewis and Clark National Forest - Roadless/Wilderness	ASC	5,007	2	2	100%
MT	10	LW	Lolo National Forest - Roadless/Wilderness	ASC	3,859	2	2	100%
MT	10	NG	National Park Service - Glacier National Park	ASC	3,936	2	2	100%
MT	10	RI	Rivers	ASC	3,515	14	14	100%
MT	10	TB	Blackfeet and Crow Reservations	ASC	9,349	2	2	100%
MT	10	TF	Flathead Reservation	ASC	5,043	2	2	100%
				Subtotal	**158,207**	**125**	**125**	**100%**
MT	11	AO	All Other Lands	MTNHP	62,631	10	8	80%
MT	11	BN	Bureau of Land Management - North Valley	MTNHP	1,588	2	1	50%
MT	11	BO	Bureau of Land Management - Other	MTNHP	6,826	8	6	75%
MT	11	FW	Fish and Wildlife Service - All Refuges and WPA Lands	MTNHP	541	2	2	100%
MT	11	TR	Rocky Boys; Fort Peck; Fort Belknap and Blackfeet Reservations	MTNHP	11,829	2	1	50%
				Subtotal	**83,415**	**24**	**18**	**75%**
MT	17	AO	All Other Lands	ASC	102,779	10	11*	110%
MT	17	BL	Bureau of Land Management	ASC	25,013	12	12	100%
MT	17	CU	Custer National Forest	ASC	2,649	5	5	100%
MT	17	FW	Fish and Wildlife Service - all refuges	ASC	4,035	2	2	100%

State	BCR	Strata Code	Strata Name	Collected By	Area (km²)	Planned	Completed	% Completed
MT	17	LC	Lewis and Clark National Forest	ASC	867	3	3	100%
MT	17	RI	Rivers - Yellowstone, Tongue, Musselshell, and Missouri	ASC	4,575	10	9	90%
				Subtotal	**139,918**	**42**	**42**	**100%**
ND	17	AO	All Other Lands	RMBO	48,027	10	10	100%
ND	17	BL	Bureau of Land Management	RMBO	267	5	5	100%
ND	17	CR	Cedar River National Grassland	RMBO	84	5	5	100%
ND	17	LM	Little Missouri National Grassland	RMBO	6,567	10	10	100%
ND	17	NP	National Park Service - Northern Great Plains Network	RMBO	240	2	2	100%
				Subtotal	**55,185**	**32**	**32**	**100%**
NE	17	AO	All Other Lands	RMBO	4,290	2	2	100%
NE	17	OG	Oglala National Grassland	RMBO	550	3	3	100%
NE	18	NE	Nebraska National Forest - Pine Ridge District	RMBO	360	3	3	100%
NE	18	OG	Oglala National Grassland	RMBO	61	3	3	100%
NE	19	BS	Nebraska National Forest - Bessey District	RMBO	420	4	4	100%
NE	19	SM	Samuel R. McKelvie National Forest	RMBO	524	4	4	100%
				Subtotal	**6,205**	**19**	**19**	**100%**
NM	18	KI	Kiowa National Grassland	RMBO	565	2	2	100%
NM	18	RI	Rita Blanca National Grassland	RMBO	473	2	2	100%
				Subtotal	**1,038**	**4**	**4**	**100%**
OK	18	RI	Rita Blanca National Grassland	RMBO	187	2	2	100%
SD	17	AO	All Other Lands	RMBO	89,931	10	10	100%
SD	17	BG	Buffalo Gap National Grassland	RMBO	3,611	5	5	100%
SD	17	BH	Black Hills National Forest - All Other Watersheds	RMBO	5,176	9	9	100%
SD	17	BL	Bureau of Land Management	RMBO	1,448	8	8	100%
SD	17	BW	Black Hills National Forest - Hydrologic Code 7 Watersheds	RMBO	306	5	5	100%
SD	17	CU	Custer National Forest	RMBO	446	5	5	100%
SD	17	FP	Fort Pierre National Grassland	RMBO	716	3	3	100%
SD	17	GR	Grand River National Grassland	RMBO	1,027	5	5	100%
SD	17	NP	National Park Service - Northern Great Plains Network	RMBO	1,008	2	2	100%

State	BCR	Strata Code	Strata Name	Collected By	Area (km²)	Planned	Completed	% Completed
				Subtotal	**103,669**	**52**	**52**	100%
TX	18	RI	Rita Blanca National Grassland	RMBO	526	2	2	100%
WY	10	AO	All Other Lands	RMBO	52,161	10	10	100%
WY	10	BE	Bridger-Teton National Forest - Roaded/Managed	RMBO	3,034	17	17	100%
WY	10	BH	Bighorn Canyon National Recreation Area	RMBO	57	2	2	100%
WY	10	BI	Bighorn National Forest	WYNDD	4,712	10	10	100%
WY	10	BR	Bridger-Teton National Forest - Roadless/Wilderness	RMBO	11,364	3	3	100%
WY	10	BU	Bureau of Land Management - Buffalo Field Office	RMBO	547	2	2	100%
WY	10	CA	Bureau of Land Management - Casper Field Office	RMBO	2,509	2	2	100%
WY	10	CO	Bureau of Land Management - Cody Field Office	RMBO	4,704	2	2	100%
WY	10	GR	Grand Teton National Park	RMBO	856	2	2	100%
WY	10	KE	Bureau of Land Management - Kemmerer Field Office	RMBO	5,733	2	2	100%
WY	10	LA	Bureau of Land Management - Lander Field Office	RMBO	9,829	2	2	100%
WY	10	MB	Medicine Bow National Forest	WYNDD	773	3	3	100%
WY	10	PI	Bureau of Land Management - Pinedale Field Office	RMBO	3,687	8	8	100%
WY	10	RA	Bureau of Land Management - Rawlins Field Office	RMBO	13,954	8	8	100%
WY	10	RO	Bureau of Land Management - Rock Springs Field Office	RMBO	15,152	8	8	100%
WY	10	SE	Shoshone National Forest - Roaded/Managed	RMBO	2,101	17	17	100%
WY	10	SR	Shoshone National Forest - Roadless/Wilderness	RMBO	8,311	3	3	100%
WY	10	WO	Bureau of Land Management - Worland Field Office	RMBO	8,467	2	2	100%
WY	10	WR	Wind River Reservation	RMBO	7,819	2	2	100%
WY	10	YE	Yellowstone National Park	RMBO	7,592	2	2	100%
				Subtotal	**163,362**	**107**	**107**	**100%**
WY	16	AO	All Other Lands	RMBO	5,438	10	10	100%
WY	16	BL	Bureau of Land Management	RMBO	647	2	2	100%
WY	16	MB	Medicine Bow National Forest	WYNDD	5,329	27	27	100%
				Subtotal	11,414	39	39	100%
WY	17	AO	All Other Lands	RMBO	52,186	12	12	100%
WY	17	BH	Black Hills National Forest	RMBO	1,085	3	2	67%

State	BCR	Strata Code	Strata Name	Collected By	Area (km²)	Planned	Completed	% Completed
WY	17	BU	Bureau of Land Management - Buffalo Field Office	RMBO	2,653	2	2	100%
WY	17	CA	Bureau of Land Management - Casper Field Office	RMBO	2,695	2	2	100%
WY	17	NE	Bureau of Land Management - Newcastle Field Office	RMBO	1,025	2	2	100%
WY	17	TB	Thunder Basin National Grassland	WYNDD	4,520	10	11*	110%
				Subtotal	**64,164**	**31**	**31**	**100%**
WY	18	AO	All Other Lands	RMBO	12,064	10	10	100%
WY	18	BL	Bureau of Land Management	RMBO	171	2	2	100%
WY	18	DO	Department of Defense	RMBO	23	2	2	100%
				Subtotal	**12,258**	**14**	**14**	**100%**
				Grand Total	**1,200,732**	**1,001**	**990**	**99%**

*One extra survey was completed in this stratum.

Table 2. Reasons planned surveys were not completed, 2012.

Stratum	Reasons Surveys Not Completed
AZ-TONTO-TL	Fire
AZ-TONTO-TL	Backup too low in elevation to survey
CO-BCR16-AO	miscommunication
CO-BCR16-RS	miscommunication
CO-BCR18-IA	miscommunication
MT-BCR11-AO	weather/time
MT-BCR11-AO	Lack of landowner permission
MT-BCR11-BN	weather/time
MT-BCR11-BO	weather/time
MT-BCR11-BO	weather/time
MT-BCR11-TR	Lack of landowner permission
MT-BCR17-RI	miscommunication
WY-BCR17-BH	miscommunication

I. Bird Conservation Region 17

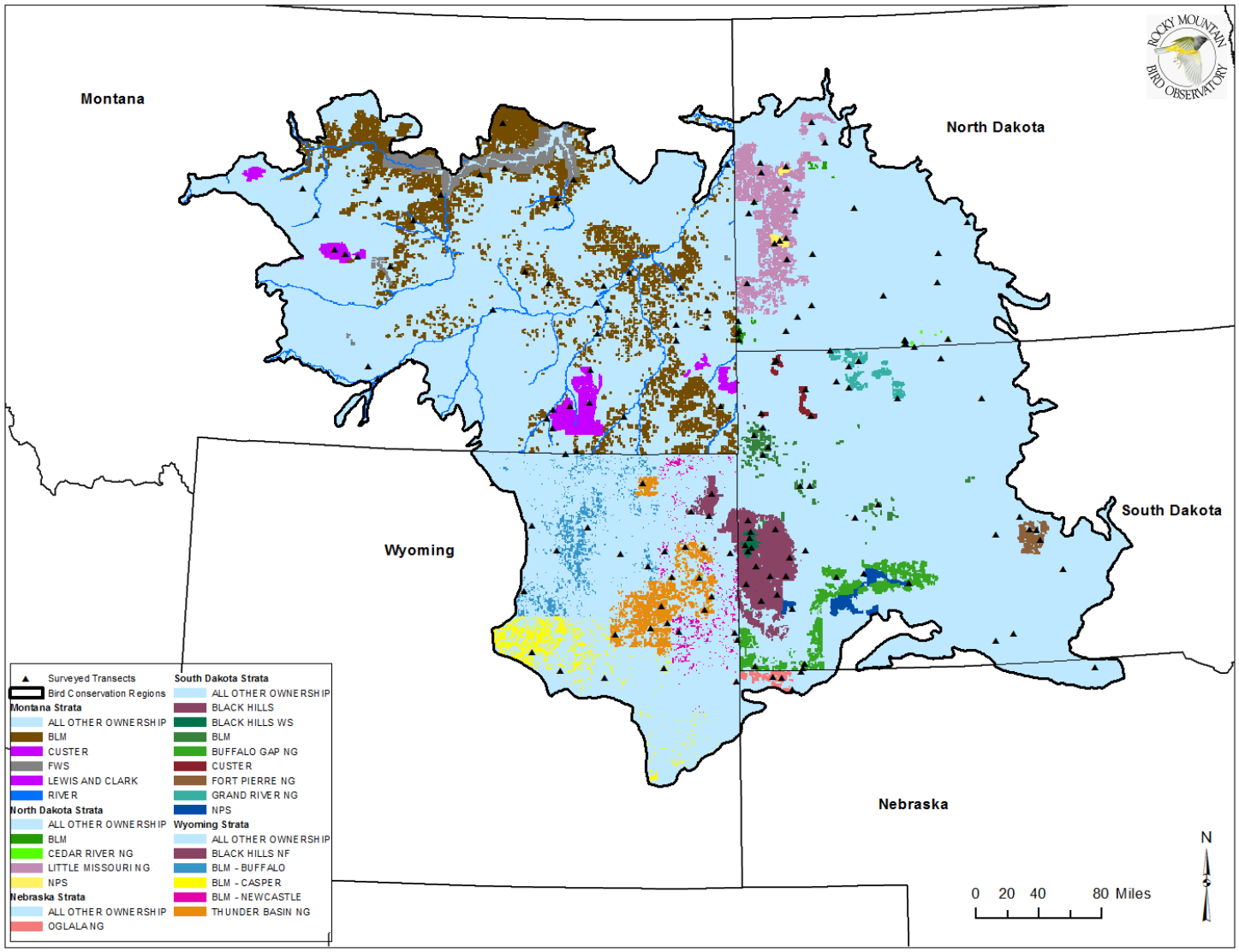

Figure 4. Survey locations in the Badlands and Prairies Bird Conservation Region (BCR 17), 2012.

A. BCR 17: Total

The IMBCR program was expanded in 2009 to include all of the Badlands and Prairies (BCR 17). This is currently the only BCR that is entirely stratified and sampled through this program. Most of the strata in this BCR have remained unchanged since the start of sampling in 2009. However, there have been some changes made to allow for greater efficiency and to provide land managers with the more useful data. In 2011, the Black Hills National Forest stratum in South Dakota BCR 17 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. In Montana in 2012, several strata were restratified and combined within BCR 17. The three All Other Lands strata were combined with the Tribal Lands stratum into one All Other Lands stratum. The four BLM strata within Montana BCR 17 were combined into one BLM stratum. These strata were collapsed into larger strata to maximize the number of samples conducted within two strata rather than spread them out amongst eight strata.

Results for the entire extent of BCR 17 were obtained by compiling and jointly analyzing data from 28 strata in 5 states (Figure 4).

Field technicians completed 162 of 162 planned surveys (100%) in 2012. Technicians conducted 1,752 point counts within the 162 surveyed sampling units between 20 May and 7 July. They detected 175 bird species, including 39 priority species (Appendix B).

To view a map of survey locations, density and occupancy results, and species counts within BCR 17 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page. If you want to limit results to 2012, after you click on the link below select “Year” from the Filter drop down box on the top left of the screen. Hit the “Add” button, select 2012, hit “Add Filter” then “Run Query”.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'BCR17'}

B. Montana BCR 17

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

Field technicians completed all 42 planned surveys (100%) in 2012. Technicians conducted 491 point counts within the 42 surveyed sampling units between 23 May and 7 July. They detected 138 bird species, including 21 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within Montana BCR17 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘MT-BCR17’}

C. North Dakota BCR 17

Results for North Dakota BCR 17 were obtained by compiling and jointly analyzing data from 5 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 all 32 planned surveys (100%) in 2012. Technicians conducted 316 point counts within the 32 surveyed sampling units between 30 May and 4 July. They detected 101 bird species, including 18 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within North Dakota BCR 17 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'ND-BCR17'}

D. Nebraska BCR 17

Results for Nebraska 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 five planned surveys (100%) in 2012. Technicians conducted 62 point counts within the 5 surveyed sampling units between 24 May and 27 June. They detected 46 bird species, including 8 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within Nebraska BCR 17 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'NE-BCR17'}

E. South Dakota BCR 17

Results for South Dakota 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 all 52 planned surveys (100%) in 2012. Technicians conducted 510 point counts within the 52 surveyed sampling units between 21 May and 7 July. They detected 127 bird species, including 11 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within South Dakota BCR 17 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'SD-BCR17'}

F. Wyoming BCR 17

Results for Wyoming 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 BLM, NPS, Tribal and USFS lands within Wyoming refer to section III: Land Ownership.

Field technicians completed all 31 planned surveys (100%) in 2012. Technicians conducted 375 point counts within the 31 surveyed sampling units between 20 May and 4 July. They detected 107 bird species, including 14 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within Wyoming BCR 17 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'WY-BCR17'}

II. States

A. Colorado

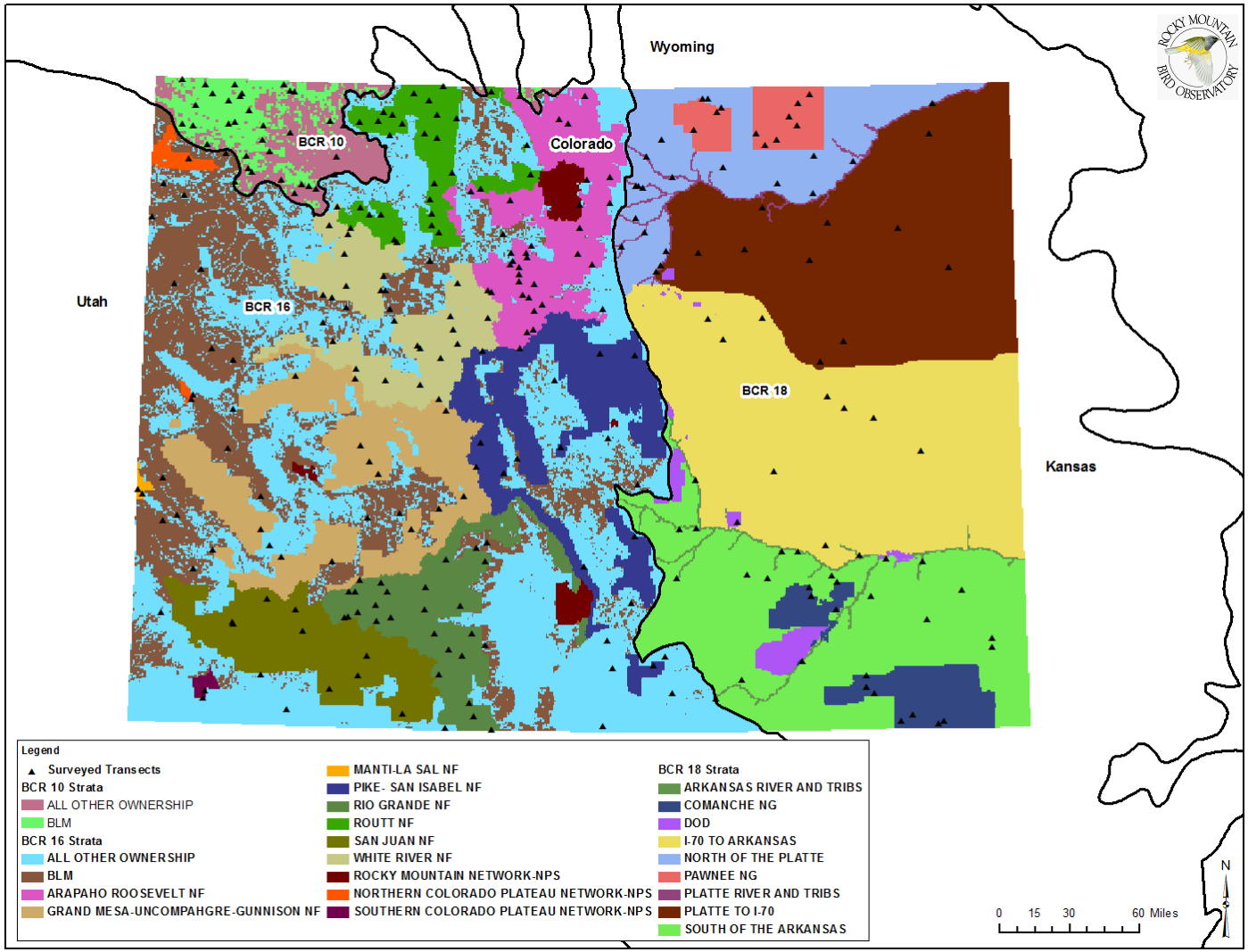

Figure 5. Survey locations in Colorado, 2012.

1. Colorado Statewide

Colorado was the first state to implement the IMBCR design in 2008. In Colorado BCR 16 the first season, we used cell weighting based on Strahler stream order to target higher order rivers and streams, and cell weighting based on elevation target to higher elevation habitats such as Alpine Tundra which occur in a small proportion of the landscape (Blakesley and Hanni 2009). However, IMBCR partners decided after the initial field season that cell weighting had caused middle-elevations in Colorado to be under-sampled. To correct this, all strata in the Colorado BCR 16 were restratified without cell weighting in 2009. No samples were surveyed in the BCR 10 portion of Colorado that year because of issues getting permission to conduct surveys on private lands.

There were several restratifications done in Colorado BCRs 10 and 16 between 2009 and 2010. The Colorado BCR10 stratum was restratified to include the tiny easternmost portion of BCR 10 that dips into Colorado so that it now represents all of BCR 10 in Colorado. The NPS Rocky Mountain Inventory and Monitoring (I&M) Network (RMNW) and Northern Colorado Plateau I&M Network (NCPN) were restratified because under the initial design some NCPN park units were mis-classified into the RMNW stratum.

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. 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 National Forest and Arapaho and 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 and Roosevelt National Forests but falls within the Routt National Forest Plan. 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; 16 km^2 were added to the area of the RMNW strata.

a) Colorado Statewide: Total

Results for Colorado were obtained by compiling and jointly analyzing data from 29 strata (Figure 5).

Field technicians completed 304 of 307 planned surveys (99%) in 2012. Technicians conducted 3,648 point counts within the 304 surveyed sampling units between 7 May and 21 July. They detected 204 bird species, including 57 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within Colorado across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘CO’}

b). All Other Lands in Colorado

Results for All Other Lands in Colorado were obtained by compiling and jointly analyzing data from six strata.

Field technicians completed 68 of 70 planned surveys (97%) in 2012. Technicians conducted 809 point counts within the 68 surveyed sampling units between 8 May and 14 July. They detected 143 bird species, including 39 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in Colorado across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'CO-All Other'}

2. Colorado BCR 10

a) Colorado BCR 10: Total

Results for Colorado 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%) in 2012. Technicians conducted 452 point counts within the 33 surveyed sampling units between 8 May and 16 June. They detected 89 bird species, including 22 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within Colorado BCR 10 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'CO-BCR10'}

b) All Other Lands in Colorado BCR 10

Results for All Other Lands in Colorado BCR 10 were obtained by analyzing data from one stratum (Figure 5).

Field technicians completed all five planned surveys (100%) in 2012. Technicians conducted 67 point counts within the 5 surveyed sampling units between 22 May and 6 June. They detected 54 bird species, including 13 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in Colorado BCR 10 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'CO-BCR10-AO: All Other Lands'}

3. Colorado BCR 16

a) Colorado BCR 16: Total

Results for Colorado 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 190 of 192 planned surveys (99%) in 2012. Technicians conducted 2,235 point counts within the 190 surveyed sampling units between 7 May and 21 July. They detected 150 bird species, including 42 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within Colorado BCR 16 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘CO-BCR16’}

b) All Other Lands in Colorado BCR 16

Results for All Other Lands in Colorado BCR 16 were obtained by analyzing data from one stratum (Figure 5).

Field technicians completed 24 of 25 planned surveys (96%) in 2012. Technicians conducted 262 point counts within the 24 surveyed sampling units between 17 May and 14 July. They detected 114 bird species, including 27 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in Colorado BCR 16 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘CO-BCR16-AO: All Other Lands’}

4. Colorado BCR 18

a) Colorado BCR 18: Total

Results for Colorado BCR 18 were obtained by compiling and jointly analyzing data from 9 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 81 of 82 planned surveys (99%) in 2012. Technicians conducted 961 point counts within the 81 surveyed sampling units between 7 May and 13 June. They detected 141 bird species, including 28 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within Colorado BCR 18 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'CO-BCR18'}

b) Colorado BCR 18 Rivers
Results for Rivers in eastern Colorado were obtained by compiling and jointly analyzing data from two strata (Figure 5).

Field technicians completed all 20 planned surveys (100%) in 2012. Technicians conducted 216 point counts within the 20 surveyed sampling units between 7 May and 7 June. They detected 122 bird species, including 17 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts for Rivers in Colorado across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'CO-Rivers'}

c) 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 (Figure 5).

Field technicians completed 39 of 40 planned surveys (98%) in 2012. Technicians conducted 480 point counts within the 39 surveyed sampling units between 8 May and 10 June. They detected 69 bird species, including 15 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in Colorado BCR 16 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'CO-BCR18-All Other'}

B. Montana

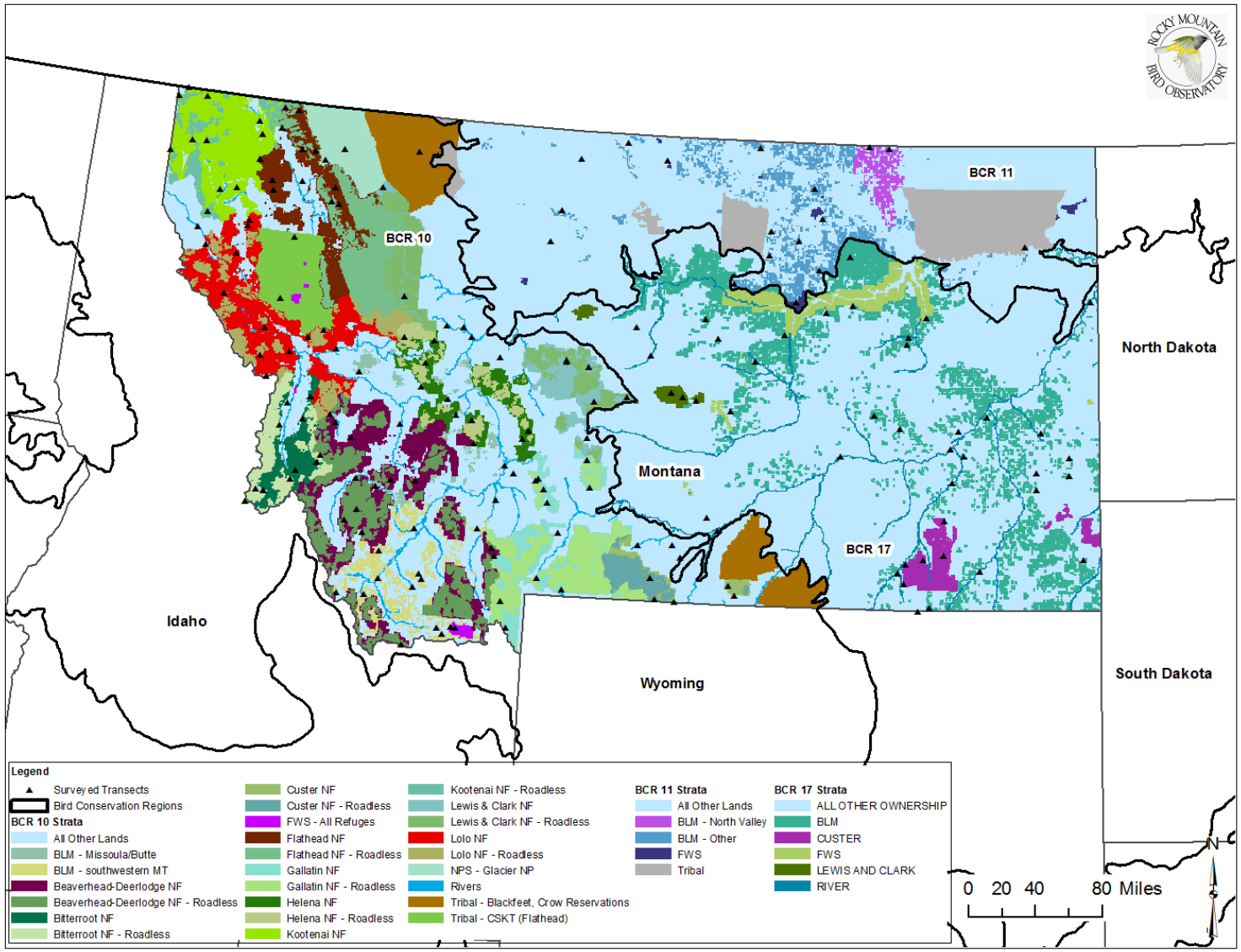

Figure 6. Survey locations in Montana, 2012.

1. Montana Statewide

IMBCR surveys were first conducted in Montana in 2009 within the BCR 17 portion of the state. This was part of the larger sampling effort throughout all of BCR 17. In 2010, the program expanded to include the BCR 10 and the Prairie Potholes BCR (BCR 11) portions of Montana, making it a statewide effort.

In 2012, several strata were restratified and combined within the Montana portion of BCR 17. The three All Other Lands strata were combined with the Tribal Lands stratum into one All Other Lands stratum. The four BLM strata within Montana BCR 17 were combined into one BLM stratum. These strata were collapsed into larger strata to maximize the number of samples conducted within two strata rather than spread them out amongst eight strata.

a) Montana Statewide: Total

Results for Montana were obtained by compiling and jointly analyzing data from 35 of 37 strata in Montana (Figure 6). The BLM North Valley stratum and the Rocky Boys, Fort Peck, Fort Belknap and Blackfeet Reservations stratum in Montana BCR 11 did not have the minimum number of two samples surveyed in order to be included in analyses. The Montana statewide inferences are therefore restricted to the 35 strata in Montana that were sampled.

Field technicians completed 185 of 191 planned surveys (97%) in 2012. Technicians conducted 2,150 point counts within the 185 surveyed sampling units between 22 May and 18 July. They detected 207 bird species, including 36 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within Montana across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘MT’}

b) All Other Lands in Montana

Results for All Other Lands in Montana were obtained by compiling and jointly analyzing data from three strata (Figure 6).

Field technicians completed 32 of 34 planned surveys (92%) in 2012. One additional survey was completed in the Montana BCR 17 All Other Lands stratum, resulting in 33 transects completed. Technicians conducted 391 point counts within the 33 surveyed sampling units between 24 May and 9 July. They detected 149 bird species, including 21 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in Montana across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘MT-All Other’}

2. Montana BCR 10

a) Montana BCR 10: Total

Results for Montana BCR 10 were obtained by compiling and jointly analyzing data from 26 strata (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 all 125 planned surveys (100%) in 2012. Technicians conducted 1,427 point counts within the 125 surveyed sampling units between 22 May and 18 July. They detected 171 bird species, including 26 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within Montana BCR 10 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘MT-BCR10’}

b) Montana BCR 10 Rivers

Results for Rivers in Montana BCR 10 were obtained by analyzing data from one stratum (Figure 6).

Field technicians completed all 14 planned surveys (100%) in 2012. Technicians conducted 153 point counts within the 14 surveyed sampling units between 22 May and 14 July. They detected 112 bird species, including 11 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts Rivers in Montana across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘MT-BCR10-RI: Rivers’}

c) Montana BCR 10 US Fish and Wildlife Service

Results for U.S. Fish and Wildlife Service Lands in Montana BCR 10 were obtained from one stratum (Figure 6).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 21 point counts within the 2 surveyed sampling units between 15 June and 18 June. They detected 13 bird species, including 1 priority species (Appendix C).

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.

To view a map of survey locations and get species counts within U.S. Fish and Wildlife Service Lands in Montana BCR 10 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'MT-BCR10-FW: Fish and Wildlife Service - All Refuges'}

d) All Other Lands in Montana BCR 10
Results for All Other Lands in Montana BCR 10 were obtained by analyzing data from one stratum (Figure 6).

Field technicians completed all 14 planned surveys (100%) in 2012. Technicians conducted 152 point counts within the 14 surveyed sampling units between 24 May and 8 July. They detected 110 bird species, including 10 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in Montana BCR 10 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'MT-BCR10-AO: All Other Lands'}

3. Montana BCR 11

a) Montana BCR 11: Total
Results for Montana BCR 11 were obtained by compiling and jointly analyzing data from three of five strata (Figure 6). The BLM North Valley stratum and the Rocky Boys, Fort Peck, Fort Belknap and Blackfeet Reservations stratum in Montana BCR 11 did not have the minimum number of two samples surveyed in order to be included in analyses. The Montana BCR 11 inferences are therefore restricted to the three strata that were sampled. For results on All Other lands, BLM and Tribal lands within Montana BCR 11 refer to section III: Land Ownership.

Field technicians completed 18 of 24 planned surveys (75%) in 2012. Technicians conducted 232 point counts within the 18 surveyed sampling units between 25 May and 9 July. They detected 74 bird species, including 18 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within MT-BCR11 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'MT-BCR11'}

b) Montana BCR 11 US Fish and Wildlife Service
Results for U.S. Fish and Wildlife Service Lands in Montana BCR 11 were obtained from one stratum (Figure 6).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 24 point counts within the 2 surveyed sampling units between 25 June and 6 July. They detected 24 bird species, including 5 priority species (Appendix C).

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.

To view a map of survey locations and get species counts within U.S. Fish and Wildlife Service Lands in Montana BCR 11 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘MT-BCR11-FW: Fish and Wildlife Service - All Refuges and WPA Lands’}

c) All Other Lands in Montana BCR 11
Results for All Other Lands in Montana BCR 11 were obtained by analyzing data from one stratum (Figure 6).

Field technicians completed 8 of 10 planned surveys (80%) in 2012. Technicians conducted 108 point counts within the 8 surveyed sampling units between 25 May and 9 July. They detected 64 bird species, including 13 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in Montana BCR 11 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘MT-BCR11-AO: All Other Lands’}

4. Montana BCR 17

a) Montana BCR 17: Total
Results for Montana BCR 17 were obtained by compiling and jointly analyzing data from six strata (Figure 6). For results on All Other lands, BLM, Tribal lands and USFS lands within Montana BCR 17, refer to section III: Land Ownership.

Field technicians completed 41 of 42 planned surveys (98%) in 2012. One extra survey was completed in the All Other Lands stratum in Montana BCR 17, for 42 surveys completed. Technicians conducted 491 point counts within the 42 surveyed sampling units between 23 May and 7 July. They detected 138 bird species, including 21 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within Montana BCR 17 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘MT-BCR17’}

b) Montana BCR 17 Rivers
Results for Rivers in Montana BCR 17 were obtained by analyzing data from one stratum (Figure 6).

Field technicians completed 9 of 10 planned surveys (90%) in 2012. Technicians conducted 91 point counts within the 9 surveyed sampling units between 23 May and 3 July. They detected 91 bird species, including 10 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts for Rivers in Montana BCR 17 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘MT-BCR17-RI: Rivers - Yellowstone, Tongue, Musselshell, and Missouri’}

c) Montana BCR 17 US Fish and Wildlife Service
Results for U.S. Fish and Wildlife Service Lands in Montana BCR 17 were obtained from one stratum (Figure 6).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 28 point counts within the 2 surveyed sampling units between 25 May and 1 June. They detected 33 bird species, including 3 priority species (Appendix C).

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.

To view a map of survey locations and get species counts within U.S. Fish and Wildlife Service Lands in Montana BCR 17 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘MT-BCR17-FW: Fish and Wildlife Service - All Refuges’}

d) All Other Lands in Montana BCR 17
Results for All Other Lands in Montana BCR 17 were obtained by analyzing data from one stratum (Figure 6).

Field technicians completed all 10 planned surveys (110%) in 2012. One additional survey was completed in this stratum, resulting in 11 surveys completed. Technicians conducted 131 point counts within the 11 surveyed sampling units between 31 May and 7 July. They detected 84 bird species, including 8 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in Montana BCR 17 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘MT-BCR17-AO: All Other Lands’}

C. Wyoming

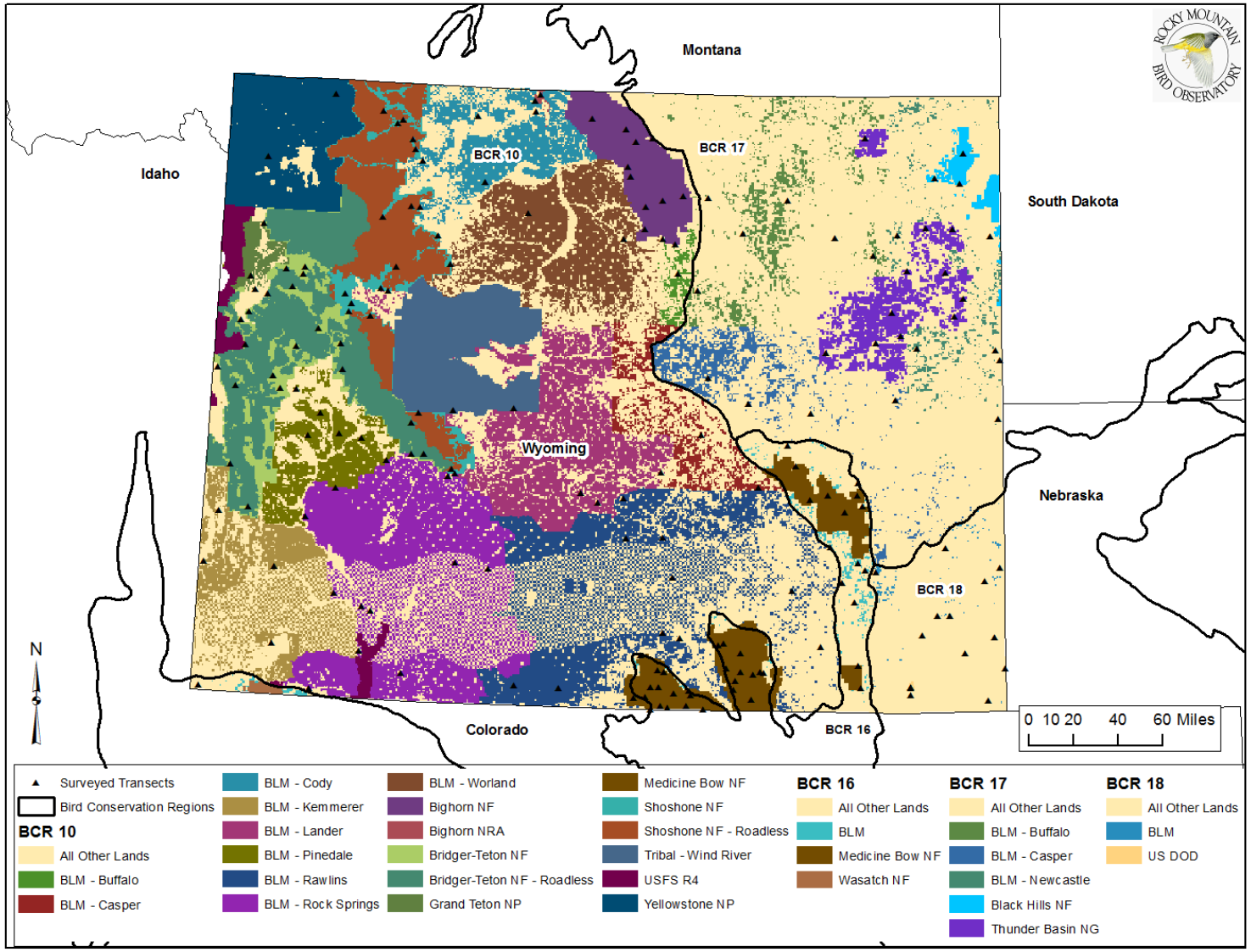

Figure 7. Survey locations in Wyoming, 2012.

1. Wyoming Statewide

In 2008, the Wyoming portion of BCR 16 was sampled under the IMBCR design as a part of the pilot effort in Colorado. That year we used cell weighting based on Strahler stream order to target higher order rivers and streams, and cell weighting based on elevation target to higher elevation habitats such as Alpine Tundra which occur in a small proportion of the landscape (Blakesley and Hanni 2009). However, IMBCR partners decided after the initial field season that cell weighting had caused middle-elevations to be under-sampled. To correct this, all strata in the Colorado and Wyoming portions of BCR 16 were restratified without cell weighting in 2009. Additionally, the All Other lands stratum in Wyoming BCR 16 was split into two strata: All Other lands and BLM lands.

The IMBCR program was expanded in 2009 to include the entire state of Wyoming. Most of the strata in Wyoming have remained unchanged since then. In 2010, the USFS Region 4 stratum in Wyoming BCR 10 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 for the Bridger-Teton National Forest.

a) Wyoming Statewide: Total

Statewide results for Wyoming were obtained by compiling and jointly analyzing data from 32 of 35 strata (Figure 7). The BCR 9 portion of Wyoming, the USFS Region 4 stratum in BCR10, and the Wasatch NF stratum in BCR 16 were not sampled in 2012 because funding for these surveys was unavailable. The Wyoming statewide inferences are therefore restricted to the 32 strata in Wyoming that were sampled.

Field technicians completed all 191 planned surveys (100%) in 2012. Technicians conducted 2,413 point counts within the 191 surveyed sampling units between 20 May and 23 July. They detected 173 bird species, including 27 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within Wyoming across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘WY’}

b) All Other Lands in Wyoming

Results for All Other Lands in Wyoming were obtained by compiling and jointly analyzing data from four strata (Figure 7).

Field technicians completed all 42 planned surveys (100%) in 2012. Technicians conducted 444 point counts within the 42 surveyed sampling units between 21 May and 7 July. They detected 121 bird species, including 19 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in Wyoming across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'WY-All Other'}

2. Wyoming BCR 10

a) Wyoming BCR 10: Total

Results for Wyoming 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 all 107 planned surveys (100%) in 2012. Technicians conducted 1,394 point counts within the 107 surveyed sampling units between 25 May and 23 July. They detected 153 bird species, including 23 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within Wyoming BCR 10 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'WY-BCR10'}

b) All Other Lands in Wyoming BCR 10

Results for All Other Lands in Wyoming BCR 10 were obtained by analyzing data from one stratum (Figure 7).

Field technicians completed all 10 planned surveys (100%) in 2012. Technicians conducted 81 point counts within the 10 surveyed sampling units between 27 May and 19 June. They detected 83 bird species, including 13 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in Wyoming BCR 10 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR10-AO: All Other Lands'}

3 Wyoming BCR 16

a) Wyoming BCR 16: Total

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 all 39 planned surveys (100%) in 2012. Technicians conducted 479 point counts within the 39 surveyed sampling units between 31 May and 18 July. They detected 111 bird species, including 11 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within Wyoming BCR 16 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘WY-BCR16’}

b) All Other Lands in Wyoming BCR 16
Results for All Other Lands in Wyoming BCR 16 were obtained by analyzing data from one stratum (Figure 7).

Field technicians completed all 10 planned surveys (100%) in 2012. Technicians conducted 112 point counts within the 10 surveyed sampling units between 31 May and 7 July. They detected 60 bird species, including 7 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in Wyoming BCR 16 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘WY-BCR16-AO: All Other Lands’}

4. Wyoming BCR 17

a) Wyoming BCR 17: Total
Results for Wyoming BCR 17 were obtained by compiling and jointly analyzing data from six strata (Figure 7). For results on All Other lands, BLM and USFS lands within Wyoming BCR 17, refer to section III: Land Ownership.

Field technicians completed all 31 planned surveys (100%) in 2012. Technicians conducted 375 point counts within the 31 surveyed sampling units between 20 May and 4 July. They detected 107 bird species, including 14 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within Wyoming BCR 17 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘WY-BCR17’}

b) All Other Lands in Wyoming BCR 17
Results for All Other Lands in Wyoming BCR 17 were obtained by analyzing data from one stratum (Figure 7).

Field technicians completed all 12 planned surveys (100%) in 2012. Technicians conducted 131 point counts within the 12 surveyed sampling units between 21 May and 11 June. They detected 77 bird species, including 8 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in Wyoming BCR 17 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘WY-BCR17-AO: All Other Lands’}

5. Wyoming BCR 18

a) Wyoming BCR 18: Total
Results for Wyoming BCR 18 were obtained by compiling and jointly analyzing data from three strata (Figure 7). For results on All Other, BLM, and DOD lands within Wyoming BCR 18 refer to section III: Land Ownership.

Field technicians completed 14 planned surveys (100%) in 2012. Technicians conducted 165 point counts within the 14 surveyed sampling units between 27 May and 29 June. They detected 62 bird species, including 11 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within Wyoming BCR 18 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘WY-BCR18’}

b) All Other Lands in Wyoming BCR 18
Results for All Other Lands in Wyoming BCR 18 were obtained by analyzing data from one stratum (Figure 7).

Field technicians completed all 10 planned surveys (100%) in 2012. Technicians conducted 120 point counts within the 10 surveyed sampling units between 28 May and 5 June. They detected 56 bird species, including 10 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in Wyoming BCR 18 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘WY-BCR18-AO: All Other Lands’}

III. Land Ownership

A. All Other Lands

This section contains results for All Other Lands sampled in states that do not have full IMBCR coverage across the entire state. For results for All Other Lands strata within Colorado, Montana, and Wyoming are reported in Section II: States.

1. All Other Lands in Idaho BCR 10
Results for All Other Lands in Idaho BCR 10 were obtained by compiling and jointly analyzing data from two strata.

Field technicians completed all 20 planned surveys (100%) in 2012. Technicians conducted 188 point counts within the 20 surveyed sampling units between 2 June and 12 July. They detected 124 bird species, including 13 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in Idaho BCR 10 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'ID-BCR10-All Other'}

2. All Other Lands in North Dakota BCR 17
Results for All Other Lands in North Dakota BCR 17 were obtained by analyzing data from one stratum (Figure 4).

Field technicians completed all 10 planned surveys (100%) in 2012. Technicians conducted 71 point counts within the 10 surveyed sampling units between 30 May and 3 July. They detected 83 bird species, including 13 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in North Dakota BCR 17 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'ND-BCR17-AO: All Other Lands'}

3. All Other Lands in South Dakota BCR 17
Results for All Other Lands in South Dakota BCR 17 were obtained by analyzing data from one stratum (Figure 4).

Field technicians completed all 10 planned surveys (100%) in 2012. Technicians conducted 102 point counts within the 10 surveyed sampling units between 22 May and 22 June. They detected 70 bird species, including 4 priority species (Appendix C).

To view a map of survey locations, density and occupancy results, and species counts within All Other Lands in South Dakota BCR 17 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'SD-BCR17-AO: All Other Lands'}

B. Bureau of Land Management

1. BLM in Colorado

a) BLM in Colorado: Total

Results for BLM Lands in Colorado were obtained by compiling and jointly analyzing data from two strata (Figure 5).

Field technicians completed all 53 planned surveys (100%) in 2012. Technicians conducted 708 point counts within the 53 surveyed sampling units between 7 May and 4 July. They detected 113 bird species, including 1 priority species (Appendix D).

To view a map of survey locations, density and occupancy results, and species counts within BLM Lands in Colorado across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘CO-BLM’}

b) BLM in Colorado BCR 10

Results for BLM Lands in Colorado BCR 10 were obtained by analyzing data from one stratum (Figure 5).

Field technicians completed all 28 planned surveys (100%) in 2012. Technicians conducted 385 point counts within the 28 surveyed sampling units between 8 May and 16 June. They detected 76 bird species (Appendix D).

To view a map of survey locations, density and occupancy results, and species counts within BLM Lands in Colorado BCR 10 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘CO-BCR10-BL: Bureau of Land Management’}

c) BLM in Colorado BCR 16

Results for BLM Lands in Colorado BCR 16 were obtained by analyzing data from one stratum (Figure 5).

Field technicians completed all 25 planned surveys (100%) in 2012. Technicians conducted 323 point counts within the 25 surveyed sampling units between 7 May and 4 July. They detected 91 bird species, including 1 priority species (Appendix D).

To view a map of survey locations, density and occupancy results, and species counts within BLM Lands in Colorado BCR 16 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘CO-BCR16-BL: Bureau of Land Management’}

2. BLM in Montana

a) BLM in Montana: Total

Results for BLM Lands in Montana were obtained by compiling and jointly analyzing data from five strata (Figure 6).

Field technicians completed 27 of 30 planned surveys (90%) in 2012. Technicians conducted 360 point counts within the 27 surveyed sampling units between 24 May and 4 July. They detected 110 bird species, including 16 priority species (Appendix D).

To view a map of survey locations, density and occupancy results, and species counts within BLM Lands in Montana across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘MT-BLM’}

b) BLM in Montana BCR 10

Results for BLM Lands in Montana BCR 10 were obtained by compiling and jointly analyzing data from two strata (Figure 6).

Field technicians completed all eight planned surveys (100%) in 2012. Technicians conducted 106 point counts within the 8 surveyed sampling units between 24 May and 17 June. They detected 51 bird species, including 4 priority species (Appendix D).

To view a map of survey locations, density and occupancy results, and species counts within BLM Lands in Montana BCR 10 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘MT-BCR10-BLM’}

c) BLM in Montana BCR 11

Results for BLM Lands in Montana BCR 11 were obtained by analyzing data from one stratum: BLM – Other (Figure 6). There are two BLM strata in Montana BCR 11; however the BLM North Valley stratum did not have the minimum number of two samples surveyed in order to be included in analyses.

Field technicians completed 7 of 10 planned surveys (70%) in 2012. Technicians conducted 94 point counts within the 7 surveyed sampling units between 12 June and 28 June. They detected 45 bird species, including 12 priority species (Appendix D).

To view a map of survey locations, density and occupancy results, and species counts within the BLM – Other stratum in Montana BCR 11 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘MT-BCR11-BLM’}

d) BLM in Montana BCR 17
Results for BLM Lands in Montana BCR 17 were obtained by analyzing data from one stratum (Figure 6).

Field technicians completed all 12 planned surveys (100%) in 2012. Technicians conducted 160 point counts within the 12 surveyed sampling units between 24 May and 4 July. They detected 71 bird species, including 10 priority species (Appendix D).

To view a map of survey locations, density and occupancy results, and species counts within BLM Lands in Montana BCR 17 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'MT-BCR17-BL: Bureau of Land Management'}

3. BLM in North Dakota BCR 17
Results for BLM Lands in North Dakota BCR 17 were obtained by analyzing data from one stratum (Figure 4).

Field technicians completed all five planned surveys (100%) in 2012. Technicians conducted 60 point counts within the 5 surveyed sampling units between 9 June and 30 June. They detected 50 bird species, including 4 priority species (Appendix D).

To view a map of survey locations, density and occupancy results, and species counts within BLM Lands in North Dakota BCR 17 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'ND-BCR17-BL: Bureau of Land Management'}

4. BLM in South Dakota BCR 17
Results for BLM Lands in South Dakota BCR 17 were obtained by analyzing data from one stratum (Figure 4).

Field technicians completed all eight planned surveys (100%) in 2012. Technicians conducted 77 point counts within the 8 surveyed sampling units between 28 May and 1 July. They detected 44 bird species, including 7 priority species (Appendix D).

To view a map of survey locations, density and occupancy results, and species counts within South Dakota BCR 17 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'SD-BCR17-BL: Bureau of Land Management'}

5. BLM in Wyoming

a) BLM in Wyoming: Total

Results for BLM Lands in Wyoming were obtained by compiling and jointly analyzing data from 14 strata (Figure 7).

Field technicians completed all 46 planned surveys (100%) in 2012. Technicians conducted 633 point counts within the 46 surveyed sampling units between 20 May and 18 July. They detected 108 bird species, including 6 priority species (Appendix D).

To view a map of survey locations, density and occupancy results, and species counts within BLM Lands in Wyoming across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘WY-BLM’}

b) Buffalo Field Office

Results for the Buffalo Field Office were obtained by compiling and jointly analyzing data from two strata; one in BCR 10 and one in BCR 17 (Figure 7). 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 2012. Technicians conducted 54 point counts within the 4 surveyed sampling units between 20 May and 12 July. They detected 45 bird species, including 3 priority species (Appendix D).

To view a map of survey locations, density and occupancy results, and species counts within the Buffalo Field Office across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘WY-BLM-Buffalo’}

c) Casper Field Office

Results for the Casper Field Office were obtained by compiling and jointly analyzing data from two strata; one in BCR 10 and one in BCR 17 (Figure 7). 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 2012. Technicians conducted 51 point counts within the 4 surveyed sampling units between 25 May and 27 June. They detected 41 bird species, including 4 priority species (Appendix D).

To view a map of survey locations, density and occupancy results, and species counts within the Casper Field Office across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘WY-BLM-Casper’}

d) Cody Field Office
Results for Cody Field Office were obtained from one stratum (Figure 7).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 30 point counts within the 2 surveyed sampling units between 29 May and 30 May. They detected 22 bird species, including 1 priority species (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.

To view a map of survey locations and get species counts within the Cody Field Office across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR10-CO: Bureau of Land Management - Cody Field Office'}

e) Kemmerer Field Office
Results for Kemmerer Field Office were obtained from one stratum (Figure 7).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 28 point counts within the 2 surveyed sampling units between 2 June and 3 June. They detected 11 bird species, including 3 priority species (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.

To view a map of survey locations and get species counts within the Kemmerer Field Office across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR10-KE: Bureau of Land Management - Kemmerer Field Office'}

f) Lander Field Office
Results for Lander Field Office were obtained from one stratum (Figure 7).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 32 point counts within the 2 surveyed sampling units between 6 July and 7 July. They detected 34 bird species, including 2 priority species (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.

To view a map of survey locations and get species counts within the Lander Field Office across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR10-LA: Bureau of Land Management - Lander Field Office'}

g) Newcastle Field Office
Results for Newcastle Field Office were obtained from one stratum (Figure 7).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 23 point counts within the 2 surveyed sampling units between 22 May and 10 June. They detected 27 bird species, including 3 priority species (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.

To view a map of survey locations and get species counts within the Newcastle Field Office across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR17-NE: Bureau of Land Management - Newcastle Field Office'}

h) Pinedale Field Office
Results for Pinedale Field Office were obtained by analyzing data from one stratum (Figure 7).

Field technicians completed all eight planned surveys (100%) in 2012. Technicians conducted 115 point counts within the 8 surveyed sampling units between 5 June and 27 June. They detected 55 bird species, including 4 priority species (Appendix D).

To view a map of survey locations, density and occupancy results, and species counts within the Pinedale Field Office across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR10-PI: Bureau of Land Management - Pinedale Field Office'}

i) Rawlins Field Office
Results for Rawlins Field Office were obtained by analyzing data from one stratum (Figure 7).

Field technicians completed all 8 planned surveys (100%) in 2012. Technicians conducted 123 point counts within the 8 surveyed sampling units between 7 June and 27 June. They detected 21 bird species, including 3 priority species (Appendix D).

To view a map of survey locations, density and occupancy results, and species counts within the Rawlins Field Office across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR10-RA: Bureau of Land Management - Rawlins Field Office'}

j) Rock Springs Field Office
Results for Rock Springs Field Office were obtained by analyzing data from one stratum (Figure 7).

Field technicians completed all eight planned surveys (100%) in 2012. Technicians conducted 112 point counts within the 8 surveyed sampling units between 30 May and 10 July. They detected 34 bird species, including 4 priority species (Appendix D).

To view a map of survey locations, density and occupancy results, and species counts within the Rock Springs Field Office across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR10-RO: Bureau of Land Management - Rock Springs Field Office'}

k) Worland Field Office
Results for Worland Field Office were obtained from one stratum (Figure 7).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 26 point counts within the 2 surveyed sampling units between 25 May and 27 June. They detected 17 bird species, including 2 priority species (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.

To view a map of survey locations and get species counts within the Worland Field Office across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR10-WO: Bureau of Land Management - Worland Field Office'}

l) BLM Lands in Wyoming BCR 16
Results for BLM Lands in Wyoming BCR 16 were obtained from one stratum (Figure 7).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 19 point counts within the 2 surveyed sampling units between 14 June and 18 July. They detected 38 bird species (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.

To view a map of survey locations and get species counts within BLM Lands in Wyoming BCR 16 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR16-BL: Bureau of Land Management'}

m) BLM Lands in Wyoming BCR 18
Results for BLM Lands in Wyoming BCR 18 were obtained from one stratum (Figure 7).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 20 point counts within the 2 surveyed sampling units between 27 May and 31 May. They detected 18 bird species, including 1 priority species (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.

To view a map of survey locations and get species counts within BLM Lands in Wyoming BCR 18 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR18-BL: Bureau of Land Management'}

C. Department of Defense (DOD)

1. DOD in Colorado BCR 18
Results for DOD Lands in Colorado BCR 18 were obtained from one stratum (Figure 5).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 24 point counts within the 2 surveyed sampling units between 16 May and 30 May. They detected 31 bird species, including 3 priority species (Appendix C).

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.

To view a map of survey locations and get species counts within DOD Lands in Colorado BCR 18 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'CO-BCR18-DO: Department of Defense'}

2. DOD in Wyoming BCR 18
Results for DOD Lands in Wyoming BCR 18 were obtained from one stratum (Figure 7).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 25 point counts within the 2 surveyed sampling units between 11 June and 29 June. They detected 33 bird species, including 4 priority species (Appendix C).

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.

To view a map of survey locations and get species counts within DOD Lands in Wyoming BCR 18 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR18-DO: Department of Defense'}

D. National Park Service

1. Greater Yellowstone Network

a) Greater Yellowstone Network: Total

Results for the Greater Yellowstone Network were obtained by compiling and jointly analyzing data from three strata (Figure 7).

Field technicians completed all six planned surveys (100%) in 2012. Technicians conducted 67 point counts within the 6 surveyed sampling units between 26 May and 16 July. They detected 69 bird species.

To view a map of survey locations, density and occupancy results, and species counts within the Greater Yellowstone Network across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'NPS-Greater Yellowstone Network'}

b) Bighorn Canyon National Recreation Area

Results for Bighorn Canyon National Recreation Area were obtained by analyzing data from one stratum (Figure 7).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 20 point counts within the 2 surveyed sampling units between 26 May and 28 June. They detected 25 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, these data were incorporated into larger scale estimates.

To view a map of survey locations and get species counts within Bighorn Canyon National Recreation Area across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR10-BH: Bighorn Canyon National Recreation Area'}

c) Grand Teton National Park

Results for Grand Teton National Park were obtained from one stratum (Figure 7).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 18 point counts within the 2 surveyed sampling units between 23 June and 24 June. They detected 34 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, these data were incorporated into larger scale estimates.

To view a map of survey locations and get species counts within Grand Teton National Park across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR10-GR: Grand Teton National Park'}

d) Yellowstone National Park
Results for Yellowstone NP were obtained from one stratum (Figure 7).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 29 point counts within the 2 surveyed sampling units between 29 June and 16 July. 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, these data were incorporated into larger scale estimates.

To view a map of survey locations and get species counts within Yellowstone National Park across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR10-YE: Yellowstone National Park'}

2. Northern Colorado Plateau Network in Colorado
Results for the Northern Colorado Plateau Network in Colorado were obtained from one stratum (Figure 5).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 21 point counts within the 2 surveyed sampling units between 10 May and 16 May. They detected 30 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, these data were incorporated into larger scale estimates.

To view a map of survey locations and get species counts within the Northern Colorado Plateau Network in Colorado across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'CO-BCR16-NC: National Park Service - Northern Colorado Plateau Network'}

3. Northern Great Plains Network

a) Northern Great Plains Network in North Dakota BCR 17

Results for Northern Great Plains Network in North Dakota BCR 17 were obtained from one stratum (Figure 4).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 29 point counts within the 2 surveyed sampling units between 7 June and 9 June. They detected 34 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, these data were incorporated into larger scale estimates.

To view a map of survey locations and get species counts within the Northern Great Plains Network in North Dakota BCR 17 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘ND-BCR17-NP: National Park Service - Northern Great Plains Network’}

b) Northern Great Plains Network in South Dakota BCR 17

Results for Northern Great Plains Network in South Dakota BCR 17 were obtained from one stratum (Figure 4).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 18 point counts within the 2 surveyed sampling units between 22 May and 13 June. They detected 28 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, these data were incorporated into larger scale estimates.

To view a map of survey locations and get species counts within the Northern Great Plains Network in South Dakota BCR 17 across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘SD-BCR17-NP: National Park Service - Northern Great Plains Network’}

4. Rocky Mountain Network

a). Rocky Mountain Network in Colorado

Results for Rocky Mountain Network in Colorado were obtained from one stratum (Figure 5).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 22 point counts within the 2 surveyed sampling units between 13 June and 14 June. They detected 42 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, these data were incorporated into larger scale estimates.

To view a map of survey locations and get species counts within the Rocky Mountain Network in Colorado across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'CO-BCR16-RM: National Park Service - Rocky Mountain Network'}

b) Glacier National Park
Results for Glacier National Park were obtained from one stratum (Figure 6).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 25 point counts within the 2 surveyed sampling units between 11 July and 12 July. They detected 35 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, these data were incorporated into larger scale estimates.

To view a map of survey locations and get species counts within Glacier National Park across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'MT-BCR10-NG: National Park Service - Glacier National Park'}

5. Southern Colorado Plateau Network in Colorado
Results for Southern Colorado Plateau Network in Colorado were obtained from one stratum (Figure 5).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 26 point counts within the 2 surveyed sampling units between 4 June and 5 June. They detected 30 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, these data were incorporated into larger scale estimates.

To view a map of survey locations and get species counts within the Southern Colorado Plateau Network in Colorado across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'CO-BCR16-SC: National Park Service - Southern Colorado Plateau Network'}

E. Tribal Lands

1. Blackfeet and Crow Tribal Lands in Montana BCR 10
Results for the Blackfeet and Crow Tribal Lands in Montana BCR 10 were obtained from one stratum (Figure 6).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 24 point counts within the 2 surveyed sampling units between 7 June and 8 June. They detected 20 bird species, including 4 priority species (Appendix C).

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.

To view a map of survey locations and get species counts within the Blackfeet and Crow Tribal Lands in Montana BCR 10 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'MT-BCR10-TB: Blackfeet and Crow Reservations'}

2. Flathead Tribal Lands in Montana BCR 10
Results for the Flathead Tribal Lands in Montana BCR 10 were obtained from one stratum (Figure 6).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 26 point counts within the 2 surveyed sampling units between 16 June and 21 June. They detected 60 bird species, including 4 priority species (Appendix C).

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.

To view a map of survey locations and get species counts within the Flathead Tribal Lands in Montana BCR 10 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'MT-BCR10-TF: Flathead Reservation'}

3. Blackfeet, Fort Belknap, Fort Peck and Rocky Boys Tribal Lands in Montana BCR 11
Results for the Rocky Boys; Fort Peck; Fort Belknap and Blackfeet Tribal Lands in Montana BCR 11 were obtained from one stratum (Figure 6).

Field technicians completed one of two planned surveys (50%) in 2012. A technician conducted six point counts within the surveyed sampling unit on 27 May. The technician detected 14 bird species, including 5 priority species (Appendix C).

RMBO did not generate density or occupancy results for this stratum, because results from strata with only one sample are not informative. This stratum did not have the minimum number of two samples surveyed in order to be included in analyses.

To view a map of survey locations and get species counts within the Rocky Boys; Fort Peck; Fort Belknap and Blackfeet Tribal Lands in Montana BCR 11 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'MT-BCR11-TR: Rocky Boys; Fort Peck; Fort Belknap and Blackfeet Reservations'}

4. Wind River Tribal Lands in Wyoming BCR 10
Results for Wind River Tribal Lands in Wyoming BCR 10 were obtained from one stratum (Figure 7).

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 23 point counts within the 2 surveyed sampling units between 18 June and 19 June. They detected 35 bird species, including 3 priority species (Appendix C).

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.

To view a map of survey locations and get species counts within the Wind River Tribal Lands in Wyoming BCR 10 across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR10-WR: Wind River Reservation'}

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 Region 1 National Forests were obtained by compiling and jointly analyzing data from 28 strata across 3 states.

Field technicians completed all 161 planned surveys (100%) in 2012. Technicians conducted 1,735 point counts within the 161 surveyed sampling units between 29 May and 18 July. They detected 156 bird species, including 22 priority species (Appendix E).

To view a map of survey locations, density and occupancy results, and species counts within Region 1 National Forests across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'USFS-Region 1 National Forests'}

(2) Beaverhead-Deerlodge National Forest
Results for Beaverhead-Deerlodge National Forest were obtained by compiling and jointly analyzing data from two strata

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 2012. Technicians conducted 104 point counts within the 10 surveyed sampling units between 29 May and 21 June. They detected 50 bird species (Appendix E).

To view a map of survey locations, density and occupancy results, and species counts within Beaverhead-Deerlodge National Forest across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘Beaverhead-Deerlodge National Forest’}

(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 2012. Technicians conducted 102 point counts within the 10 surveyed sampling units between 29 May and 29 June. They detected 72 bird species, including 1 priority species (Appendix E).

To view a map of survey locations, density and occupancy results, and species counts within Bitterroot National Forest across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘Bitterroot National Forest’}

(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 17 planned surveys (100%) in 2012. Technicians conducted 156 point counts within the 17 surveyed sampling units between 12 June and 10 July. They detected 63 bird species, including 1 priority species (Appendix E).

To view a map of survey locations, density and occupancy results, and species counts within Clearwater National Forest across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘Clearwater National Forest’}

(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 all 14 planned surveys (100%) in 2012. Technicians conducted 115 point counts within the 14 surveyed sampling units between 4 June and 5 July. They detected 84 bird species, including 6 priority species (Appendix E).

To view a map of survey locations, density and occupancy results, and species counts within Custer National Forest across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘Custer National Forest’}

(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 2012. Technicians conducted 126 point counts within the 10 surveyed sampling units between 1 June and 15 July. They detected 71 bird species, including 2 priority species (Appendix E).

To view a map of survey locations, density and occupancy results, and species counts within Flathead National Forest across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'Flathead National Forest'}

(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 2012. Technicians conducted 111 point counts within the 10 surveyed sampling units between 29 May and 11 July. They detected 65 bird species, including 1 priority species (Appendix E).

To view a map of survey locations, density and occupancy results, and species counts within Gallatin National Forest across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'Gallatin National Forest'}

(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 2012. Technicians conducted 115 point counts within the 10 surveyed sampling units between 15 June and 8 July. They detected 67 bird species, including 1 priority species (Appendix E).

To view a map of survey locations, density and occupancy results, and species counts within Helena National Forest across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'Helena National Forest'}

(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 all 30 planned surveys (100%) in 2012. Technicians conducted 321 point counts within the 30 surveyed sampling units between 3 June and 7 July. They detected 78 bird species, including 7 priority species (Appendix E).

To view a map of survey locations, density and occupancy results, and species counts within Idaho Panhandle National Forest across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘Idaho Panhandle National Forest’}

(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 all 10 planned surveys (100%) in 2012. Technicians conducted 138 point counts within the 10 surveyed sampling units between 30 May and 6 July. They detected 68 bird species, including 6 priority species (Appendix E).

To view a map of survey locations, density and occupancy results, and species counts within Kootenai National Forest across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘Kootenai National Forest’}

(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 2012. Technicians conducted 116 point counts within the 10 surveyed sampling units between 1 June and 18 July. They detected 56 bird species, including 2 priority species (Appendix E).

To view a map of survey locations, density and occupancy results, and species counts within Lewis and Clark National Forest across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'Lewis and Clark National Forest'}

(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 2012. Technicians conducted 104 point counts within the 10 surveyed sampling units between 7 June and 7 July. They detected 78 bird species, including 1 priority species (Appendix E).

To view a map of survey locations, density and occupancy results, and species counts within Lolo National Forest across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'Lolo National Forest'}

(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 18 planned surveys (100%) in 2012. Technicians conducted 200 point counts within the 18 surveyed sampling units between 4 June and 6 July. They detected 69 bird species, including 1 priority species (Appendix E).

To view a map of survey locations, density and occupancy results, and species counts within Nez Perce National Forest across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'Nez Perce National Forest'}

b) Dakota Prairie National Grasslands (not including Sheyenne National Grassland)
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 2013).

Field technicians completed all 20 planned surveys (100%) in 2012. Technicians conducted 210 point counts within the 20 surveyed sampling units between 26 May and 4 July. They detected 91 bird species, including 15 priority species (Appendix E).

To view a map of survey locations, density and occupancy results, and species counts within Dakota Prairie Grasslands across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'Dakota Prairie Grasslands'}

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 220 of 222 planned surveys (99%) in 2012. Technicians conducted 2,636 point counts within the 220 surveyed sampling units between 23 May and 21 July. They detected 166 bird species, including 12 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within Region 2 National Forests across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'USFS-Region 2 National Forests'}

(2) Arapaho and Roosevelt National Forests

Results for this section were obtained by analyzing data from the Arapaho and Roosevelt National Forests stratum in Colorado BCR 16. In 2011, the Routt and Arapaho and Roosevelt National Forests strata were reorganized and a third stratum, the Williams Fork Area, was created from the two, because it is a portion of the Arapaho and Roosevelt National Forests that is included in the Routt National Forest land management plan, but administered by the Arapaho and Roosevelt National Forests. This stratum allows data to be rolled-up to meet

multiple needs of these two units. For information on the Williams Fork Management Unit, please refer to the Routt National Forest section.

Field technicians completed all 10 planned surveys (100%) in 2012. Technicians conducted 115 point counts within the 10 surveyed sampling units between 29 May and 6 July. They detected 68 bird species, including 5 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within Arapaho and Roosevelt National Forests across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'CO-BCR16-AR: Arapaho-Roosevelt National Forest'}

(3) Bighorn National Forest
Results for Bighorn National Forest were obtained by analyzing data from one stratum.

Field technicians completed all 10 planned surveys (100%) in 2012. Technicians conducted 136 point counts within the 10 surveyed sampling units between 18 June and 27 June. They detected 49 bird species, including 2 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within Bighorn National Forest across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR10-BI: Bighorn National Forest'}

(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 16 of 17 planned surveys (94%) in 2012. Technicians conducted 162 point counts within the 16 surveyed sampling units between 12 June and 7 July. They detected 60 bird species, including 6 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within Black Hills National Forest across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'Black Hills National Forest'}

(5) Grand Mesa, Uncompaghre and Gunnison National Forests
Results for Grand Mesa, Uncompahgre and Gunnison National Forests were obtained by analyzing data from one stratum.

Field technicians completed all 10 planned surveys (100%) in 2012. Technicians conducted 113 point counts within the 10 surveyed sampling units between 8 June and 14 July. They detected 52 bird species, including 3 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within the Grand Mesa, Uncompahgre and Gunnison National Forests across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'CO-BCR16-GM: Grand Mesa; Uncompahgre and Gunnison National Forests'}

(6) Medicine Bow National Forest
Results for Medicine Bow National Forest were obtained by compiling and jointly analyzing data from two strata. This forest-level stratification distinction is made to allow for the summation of the data for individual BCRs.

Field technicians completed all 30 planned surveys (100%) in 2012. Technicians conducted 390 point counts within the 30 surveyed sampling units between 2 June and 18 July. They detected 99 bird species, including 6 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within Medicine Bow National Forest across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'Medicine Bow National Forest'}

(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.

Field technicians completed all 11 planned surveys (100%) in 2012. Technicians conducted 116 point counts within the 11 surveyed sampling units between 23 May and 26 June. They detected 69 bird species, including 1 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within Nebraska National Forests across all years of the project follow the

web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'Nebraska National Forests'}

(8) Pike and San Isabel National Forests
Results for Pike and San Isabel National Forests were obtained by analyzing data from one stratum.

Field technicians completed all 10 planned surveys (100%) in 2012. Technicians conducted 110 point counts within the 10 surveyed sampling units between 11 June and 8 July. They detected 64 bird species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within Pike and San Isabel National Forests across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'CO-BCR16-PS: Pike-San Isabel National Forest'}

(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. There was a land acquisition within Great Sand Dunes National Monument so during the restratification some samples were removed from Rio Grande National Forest and added to the RMNW stratum; 16 km^2 were added to the area of the RMNW strata.

Field technicians completed 23 of 24 planned surveys (96%) in 2012. Technicians conducted 274 point counts within the 23 surveyed sampling units between 2 June and 21 July. They detected 81 bird species, including 5 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within Rio Grande National Forest across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'Rio Grande National Forest'}

(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 National Forest and Arapaho and Roosevelt National Forests strata were reorganized and a third stratum, the Williams Fork Area, was created from the two, because it is a portion of the

Arapaho and Roosevelt National Forests that is included in the Routt National Forest land management plan, but administered by the Arapaho and Roosevelt National Forests. This stratum allows data to be rolled-up to meet multiple needs of these two units.

Field technicians completed all 40 planned surveys (100%) in 2012. Technicians conducted 474 point counts within the 40 surveyed sampling units between 1 June and 17 July. They detected 83 bird species, including 3 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within Routt National Forest across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'Routt National Forest'}

(11) San Juan National Forest
Results for San Juan National Forest were obtained by analyzing data from one stratum.

Field technicians completed all 10 planned surveys (100%) in 2012. Technicians conducted 112 point counts within the 10 surveyed sampling units between 29 May and 11 July. They detected 72 bird species, including 5 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within San Juan National Forest across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'CO-BCR16-SA: San Juan National Forest'}

(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 all 20 planned surveys (100%) in 2012. Technicians conducted 269 point counts within the 20 surveyed sampling units between 27 May and 18 July. They detected 83 bird species, including 3 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within Shoshone National Forest across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'Shoshone National Forest'}

(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 all 30 planned surveys (100%) in 2012. Technicians conducted 365 point counts within the 30 surveyed sampling units between 31 May and 19 July. They detected 90 bird species, including 5 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within White River National Forest across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'White River National Forest'}

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 all 47 planned surveys (102%) in 2012. One additional survey was completed in Thunder Basin National Grassland, resulting in 48 surveys completed. Technicians conducted 583 point counts within the 48 surveyed sampling units between 14 May and 20 June. They detected 110 bird species, including 16 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within USFS-Region 2 National Grasslands across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'USFS-Region 2 National Grasslands'}

(2) Cimarron National Grassland
Results for Cimarron National Grassland were obtained by analyzing data from one stratum.

Field technicians completed all three planned surveys (100%) in 2012. Technicians conducted 36 point counts within the 3 surveyed sampling units between 28 May and 30 May. They detected 29 bird species, including 2 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within Cimarron National Grassland across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘KS-BCR18-CI: Cimarron National Grassland’}

(3) Nebraska National Grasslands (Buffalo Gap, Fort Pierre, and Oglala)
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. The BCR-level stratification distinction is made to allow for the summation of the data for individual BCRs.

Field technicians completed all 14 planned surveys (100%) in 2012. Technicians conducted 151 point counts within the 14 surveyed sampling units between 21 May and 20 June. They detected 65 bird species, including 8 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within Nebraska National Grasslands across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘Nebraska National Grasslands’}

(4) Comanche National Grassland
Results for Comanche National Grassland were obtained by analyzing data from one stratum.

Field technicians completed all 10 planned surveys (100%) in 2012. Technicians conducted 120 point counts within the 10 surveyed sampling units between 14 May and 1 June. They detected 34 bird species, including 1 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within Comanche National Grassland across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'CO-BCR18-CO: Comanche National Grassland'}

(5) Pawnee National Grassland
Results for Pawnee National Grassland were obtained by analyzing data from one stratum.

Field technicians completed all 10 planned surveys (100%) in 2012. Technicians conducted 121 point counts within the 10 surveyed sampling units between 16 May and 13 June. They detected 28 bird species, including 3 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within Pawnee National Grassland across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'CO-BCR18-PA: Pawnee National Grassland'}

(6) Thunder Basin National Grassland
Results for Thunder Basin National Grassland were obtained by analyzing data from one stratum.

Field technicians completed all 10 planned surveys (110%) in 2012. One additional survey was completed in this stratum, resulting in 11 surveys completed. Technicians conducted 155 point counts within the 11 surveyed sampling units between 20 May and 1 June. They detected 68 bird species, including 1 priority species (Appendix F).

To view a map of survey locations, density and occupancy results, and species counts within Thunder Basin National Grassland across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'WY-BCR17-TB: Thunder Basin National Grassland'}

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

a) Coconino National Forest
Results for Coconino National Forest were obtained by analyzing data from one stratum.

Field technicians completed all 50 planned surveys (100%) in 2012. Technicians conducted 652 point counts within the 50 surveyed sampling units between 9 May and 25 June. They detected 127 bird species, including 5 priority species (Appendix G).

To view a map of survey locations, density and occupancy results, and species counts within Coconino National Forest across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘stratum’: ‘AZ-BCR34-CF: Coconino National Forest’}

b) Kaibab National Forest
Results for Kaibab National Forest were obtained by compiling and jointly analyzing data from two strata. The stratum was split into two strata based on elevation prior to the 2012 field season. The new stratification by elevation allows for adjusting sampling intensity to target Management Indicator Species on the Forest.

Field technicians completed all 20 planned surveys (100%) in 2012. Technicians conducted 241 point counts within the 20 surveyed sampling units between 28 May and 24 June. They detected 82 bird species, including 4 priority species (Appendix G).

To view a map of survey locations, density and occupancy results, and species counts within Kaibab National Forest across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘Kaibab National Forest’}

c) Tonto National Forest
Results for Tonto National Forest were obtained by compiling and jointly analyzing data from two strata. Two strata were created within this Forest based on elevation prior to the 2012 field season. The stratification by elevation allows for adjusting sampling intensity to target Management Indicator Species on the Forest. 2012 was the first year surveys were conducted in Tonto National Forest.

Field technicians completed 37 of 39 planned surveys (95%) in 2012. Technicians conducted 382 point counts within the 37 surveyed sampling units between 28 April and 22 June. They detected 119 bird species, including 20 priority species (Appendix G).

To view a map of survey locations, density and occupancy results, and species counts within Tonto National Forest across all years of the project follow the web link below and hit the “Run Query” button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{‘superstratum’: ‘Tonto National Forest’}

d) Kiowa National Grassland
Results for Kiowa National Grassland were obtained from one stratum.

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 26 point counts within the 2 surveyed sampling units between 31 May and 1 June. They detected 42 bird species, including 1 priority species (Appendix G).

To view a map of survey locations, density and occupancy results, and species counts within Kiowa National Grassland across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'NM-BCR18-KI: Kiowa National Grassland'}

e) 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 all six planned surveys (100%) in 2012. Technicians conducted 47 point counts within the 6 surveyed sampling units between 22 May and 27 May. They detected 30 bird species, including 3 priority species (Appendix G).

To view a map of survey locations, density and occupancy results, and species counts within Rita Blanca National Grassland across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'Rita Blanca National Grassland'}

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. In 2012 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

In 2010 the USFS Region 4 stratum in Wyoming 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. Separating this forest from the rest of the Region 4 USFS lands was done to allow for density and occupancy estimation at the National Forest level for the Bridger-Teton National Forest. Results for Bridger-Teton National Forest were obtained by analyzing data from the front-country/managed stratum and the designated roadless/wilderness stratum. 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 20 planned surveys (100%) in 2012. Technicians conducted 259 point counts within the 20 surveyed sampling units between 4 June and 23 July. They detected 96 bird species, including 2 priority species (Appendix H).

To view a map of survey locations, density and occupancy results, and species counts within Bridger-Teton National Forest across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'superstratum': 'Bridger-Teton National Forest'}

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.

Results for Manti-La Sal National Forest were obtained from one stratum.

Field technicians completed both planned surveys (100%) in 2012. Technicians conducted 18 point counts within the 2 surveyed sampling units between 17 June and 16 July. They detected 42 bird species (Appendix H).

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.

To view a map of survey locations and get species counts within Manti-La Sal National Forest across all years of the project follow the web link below and hit the "Run Query" button highlighted in red located near the top of the page.

http://www.rmbo.org/new_site/adc/QueryWindow.aspx#{'stratum': 'CO-BCR16-MA: Manti-La Sal National Forest'}

ADDITIONAL APPLICATIONS OF IMBCR DATA

The successful conservation and management of bird species in part relies upon our understanding of their habitat use and requirements. Because birds often select habitat in a hierarchy from large to small scales (Cody 1985), it is important to investigate habitat relationships at different scales. The project summary below highlights the usefulness of the IMBCR design and vegetation data for investigating multi-scale habitat relationship to support avian conservation.

Species Distributions and Habitat Relationships to Inform the Conservation of Sagebrush Birds

Apparent long-term population declines of sagebrush-dependent birds have elevated the recovery of the sagebrush avifauna to among the highest conservation priorities in North America (US North American Bird Conservation Initiative Committee 2011). The effectiveness of surrogate species conservation for Greater Sage-Grouse (*Centrocercus urophasianus*) may well be measured by conservation success for other species in the community (Favreau et al. 2006, Rowland et al. 2006), such as the Brewer's Sparrow (*Spizella breweri*), Sage Sparrow (*Amphispiza belli*) and Sage Thrasher (*Oreoscoptes montanus*). Reliable knowledge about bird populations at the scale of Bird Conservation Regions and their response to habitat manipulations at the scale of local management units may be necessary for the effective management of the sagebrush avifauna. We used data from the Integrated Monitoring in Bird Conservation Regions Program, which includes ~1,000 transects and ~12,000 point counts annually in 13 states, to 1) predict species distributions at the landscape scale, 2) compare avian species richness and Greater Sage-Grouse occurrence, and 3) quantify habitat relationships at the local scale.

The species distributions and habitat relationships proved useful for answering the "where" and "what to do" questions in conservation planning. By predicting species distributions, we discovered a biodiversity hotspot for sagebrush-dependent songbirds in southwestern Wyoming and northwestern Colorado (Fig. 8). Bird species richness in lands occupied by Greater Sage-Grouse (Doherty et al. 2010) was 4 times greater ($\bar{x}$ = 1.1, SD = 0.7) than bird species richness outside these areas ($\bar{x}$ = 0.3, SD = 0.4). This suggested Greater Sage-Grouse may serve as an umbrella species for the community, but multi-species conservation objectives may be best achieved in southwestern Wyoming where Greater Sage-Grouse and high species richness coincide (Fig. 8). After prioritizing landscapes for conservation, the local habitat relationships were used to predict species responses to habitat manipulations. In an example for one of the species, we predicted Sage Sparrow occurrence will increase with brush management practices that remove juniper woodland cover below 10%, reduce

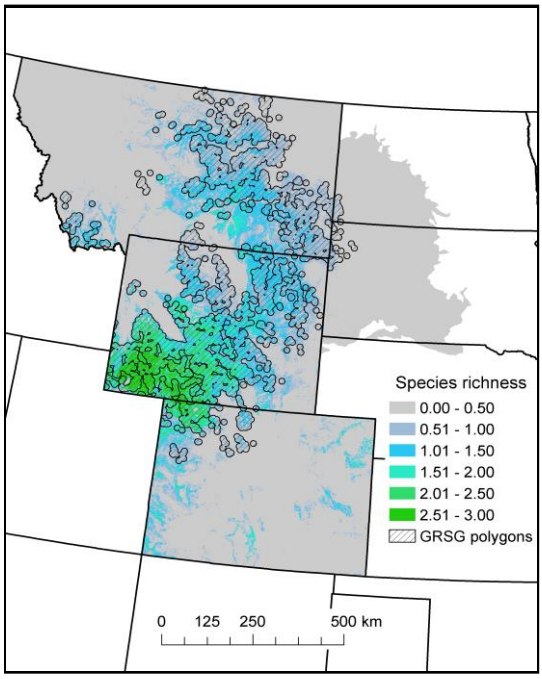

Figure 8. Predicted bird species richness of the Brewer's Sparrow, Sage Sparrow and Sage Thrasher for 1 km^2 sampling units, IMBCR Program, USA, 2011. The hatched areas are Greater Sage-Grouse (GRSG) 100% breeding polygons.

shrub height and maintain sagebrush cover above 15% (Fig 9). Grazing practices that maintain grass height above 15 cm will likely increase Sage Sparrow occurrence (Fig. 9).
Sage Sparrow habitat was similar to breeding, brood-rearing and wintering habitat of the Greater Sage-Grouse: sagebrush height (0.3 – 0.8 m); sagebrush cover (10 – 30%); grass height (>15 cm) (Connelly et al. 2000), suggesting the habitat management strategy would be effective for both species.

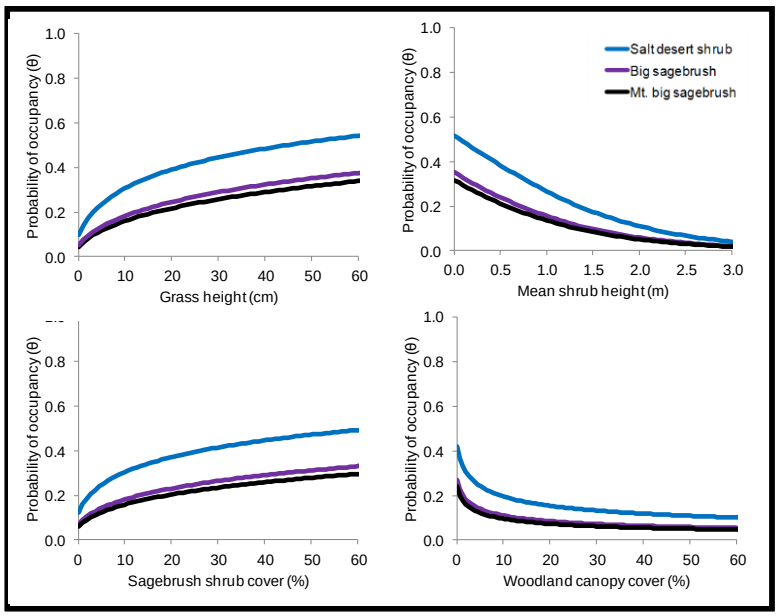

Figure 9. Predicted Sage Sparrow occupancy of 5 ha point count plots by vegetation type and by grass height, shrub height, sagebrush shrub cover and juniper woodland tree cover, IMBCR Program, USA, 2011. The habitat relationships are shown at the mean values for the other variables in the model.

The IMBCR Program provided a framework for gaining reliable knowledge about bird populations at multiple scales to support the conservation of the sagebrush avifauna. The spatially balanced study design provided a legitimate way to extend the occupancy estimates to un-sampled areas within the region. Because we accounted for the incomplete detection of singing birds, the occupancy rates represented population attributes of the species without observation bias (Pavlacky et al. 2012). Species distribution models are gaining wide use in wildlife ecology and conservation, highlighting the need for accurate predictions. We propose a conservation vision where quantitative measures of population attributes support management and conservation, and species distribution indices (Pollock et al. 2002, Rota et al. 2011) serve as hypotheses for species occurrence.

This project was funded in part by a Conservation Innovation Grant from the Natural Resource Conservation Service. With additional funding and collaboration, the IMBCR Program is well positioned to address important conservation issues, including climate and landscape change, as well as other bird species and ecosystems; from grasslands and forests to alpine tundra. The multi-scale approach can be applied to other datasets such as point counts along transects and surveys within specific project areas (Pavlacky et al. 2012). The population estimates can be used to inform strategic landscape conservation at the scale of Bird Conservation Regions and predict species responses to habitat manipulations at the scale of local management units. Currently, we are working toward cost effective habitat management for multi-species conservation in working sagebrush landscapes. We welcome collaboration toward full life cycle bird conservation and adaptive monitoring to evaluate the effectiveness of management actions.

DISCUSSION

In 2012, the Integrated Bird Monitoring in Bird Conservation Regions Program achieved several benchmarks toward understanding the status and annual changes of bird populations within eight BCRs and 13 western states of the monitoring region. Successes included a productive field season, advances in automated population estimation and increase in the number of auxiliary projects. The IMBCR program provides population estimates in an efficient, adaptive framework to inform the conservation the adaptive management of bird populations at multiple scales. Currently, IMBCR data are being used to model bird-habitat relationship and map species distributions with application to habitat management, conservation planning and the development of decision support tools.

To the credit of our implementation partners, the Avian Science Center, Idaho Bird Observatory, Montana Natural Heritage Program and Wyoming Natural Diversity Database, we achieved a 99% completion rate of planned field work. A streamlined landowner contact system and an improved web-based data entry system, both accomplished by RMBO, also contributed to success in the field. In 2012, we expanded the extent of the monitoring region to 1,200,732 km^2 (463,605 mi^2). Within this region, the stratified design provided population estimates at the level of management units to suit partner needs. The collaboration across organizations and spatial scales contributed to the sampling efficiency of the monitoring program. Increasing the spatial extent and combining data across management units increased sample sizes, and improved the accuracy and precision of the population estimates. The IMBCR collaboration allowed the estimation of common detection probabilities for species that would have otherwise had an insufficient number of detections within individual management units. Combining detection data across additional years allowed us to estimate of population density for several infrequently detected species.

The automation of the density and occupancy analyses by Paul Lukacs of the University of Montana has further increased the efficiency of the monitoring program. The automated analysis package, RIMBCR, was developed using the free software environment R (R Core Team 2012). The RIMBCR package calls raw data from the database, estimates population parameters using previously established methods, combines population estimates at biologically relevant scales, and will eventually import the estimates directly into the database. The time previously spent on generating population estimation for hundreds of bird species and strata can now be turned toward applying IMBCR data to important conservation issues facing the avifauna of the region.

Auxiliary, or "overlay", projects are an emerging innovation of the IMBCR program that are useful for increasing the efficiency of the monitoring program and for addressing specific management questions. Auxiliary projects follow the IMBCR sampling design and field methods but are not integrated into the nested stratification of the IMBCR program. These projects benefit from the IMBCR program in that the data can be analyzed in such a way to borrow detection data from the surrounding BCR and the resulting population estimates can be placed in context with those in the larger region. In this way, the collaborative efficiency of the IMBCR program was extended to the auxiliary projects to improve the accuracy and precision of the population estimates, and allow population estimates for infrequently detected species. In a similar fashion, data collected in the auxiliary projects contribute to the efficiency of the IMBCR program. An example Auxiliary project was a joint endeavor of the BLM and Rocky Mountain Bird Observatory: we monitored bird populations on the Atlantic Rim Natural Gas Development Project Area to investigate the influence of oil and gas development on the bird community (Van Lanen et al. 2012). This project found few differences between bird communities in the high and low development areas, but bird species richness was much greater for the Atlantic Rim than

other BLM lands in the Northern Rockies BCR, highlighting the conservation value of the Atlantic Rim Project Area (Van Lanen et al. 2012).

The availability of consistent monitoring data at multiple scales is an important challenge for avian conservation (Ruth et al. 2003). The IMBCR program is well positioned to address conservation and management needs of a wide range of stakeholders, landowners and government entities at various spatial scales. The Program was designed to provide reliable knowledge about bird populations from the scale of local management units to the scale of BCRs. The hierarchical framework of nested strata is useful for partitioning bird populations according to management units, and aggregating bird populations at various scales to support large-scale conservation efforts. At the scale of management units, IMBCR population estimates can be used to support local management efforts. Monitoring at regional and BCR scales provides land managers with dependable knowledge about the status and change of bird populations at ecologically relevant scales (US North American Bird Conservation Initiative 2009). In addition, the population estimates at the scale of management units can be compared to those at the BCR scale to place the population estimates in a regional context. The large-scale context provides biological information for conservation planning and allows an assessment of conservation responsibility.

By focusing on multiple scales relevant to management and conservation, IMBCR can easily be integrated within an interdisciplinary approach to bird conservation that combines monitoring, research and management (Ruth et al. 2003). The IMBCR program easily accommodates the principles of adaptive monitoring (Lindenmayer and Likens 2009): 1) address well-defined and tractable questions; 2) underpinned by rigorous science ; 3) based on a conceptual model of how bird populations function; and 4) relevant to the management of natural resources. Under the adaptive monitoring framework, the objectives, sampling design, data collection, analysis and interpretation are iterative. This allows the program to evolve and develop in response to new information or new management questions. For example, The IMBCR program allows different stratification schemes and the re-stratification of local management units to better address partner management objectives. The flexible hierarchical design easily accommodates annual re-stratification and fluctuation of sampling intensity without compromising the regional population estimates. Because IMBCR strata are based on fixed attributes rather than existing vegetation types, the Program is in a strong position directly tie changes in bird populations to changes in vegetation at multiple scales. The hierarchical stratification scheme is well suited for linking bird population responses to climate and landscape change at biogeographical scales (Opdam and Wascher 2004). Finally, the IMBCR program uses the best available science to support the management of natural resources by providing bird population estimates that appropriately account for spatial variation and incomplete detection (Pollock et al. 2002, Rosenstock et al. 2002, Thompson 2002). The population density estimates are useful for evaluating temporal and spatial trends in population size. The occupancy estimates are able to track temporal and spatial trends in the area occupied, including range contraction and expansion.

Monitoring is integral to the management and conservation of wildlife populations (Marsh and Trenham 2008, Sauer and Knutson 2008). In particular, monitoring is necessary for the adaptive management of wildlife populations (Nichols and Williams 2006, Lyons et al. 2008). Monitoring in adaptive management is used to 1) make state-dependent management decisions, 2) evaluate the effectiveness of management, and 3) improve understanding of the system (Lyons et al. 2008). For example, management decisions may depend on the state of a bird population and a threshold can be set to trigger a management action when the population reaches a predetermined level. Bird population monitoring is also necessary to determine if management actions implemented in previous management cycle(s) are achieving conservation objectives. The population estimates within management units can be compared over time and space, and

to average conditions in the region to evaluate effectiveness of management actions. Monitoring data are also useful for evaluating competing hypotheses about how bird populations respond to system dynamics. A better understanding of regional bird population dynamics will help land managers predict species responses to landscape change and large-scale conservation efforts (Jones 2011, Noon et al. 2012).

The population estimates for a particular species or group of species can be used to make informed management decisions about where to focus conservation efforts. For example, management units with large populations can be targeted for protection and management units with low populations can be prioritized for conservation action. Although IMBCR does not employ stratification by existing vegetation, the monitoring data can easily be post stratified to estimate vegetation-specific population density and occupancy rates. The IMBCR program is a rich data source for modeling habitat relationships, as well as developing spatially explicit abundance and occupancy maps. Currently, RMBO is working on a project to determine multi-scale habitat relationships for sagebrush birds. This project uses vegetation data collected at sampling points to model habitat relationships, and digital land cover data within sampling units to map bird occupancy rates at large-scales. In addition, RMBO is developing a hierarchical removal model (Chandler et al. 2011) to predict and map bird population densities at large-scales. The IMBCR design provides a legitimate way to extend the population estimates to un-sampled regions, and the models provide population estimates that are adjusted for incomplete detection. The population estimation approach to species distribution modeling represents an improvement over opportunistic, index-based approaches (Rota et al. 2011), especially when the fate of declining species depend on conservation action. The large-scale species distribution maps and local habitat relationships are useful for answering the “where” and “what to do” questions in conservation planning (Wilson et al. 2007). The bird distributions can be summarized for un-sampled management units and regions, extending the ability of IMBCR to inform management and assess conservation responsibility.

The IMBCR data provide a data source for the development of decision support tools to help land managers and resource professionals address important conservation issues. For example, RMBO is currently developing a decision support tool that will assist resource professionals, land managers, and private landowners in managing the sagebrush bird community. The foundation of the tool will be species distribution maps to prioritize landscapes for conservation and bird-habitat relationships to evaluate the effectiveness of conservation practices. Decision support tools that integrate biological, social and economic objectives are important for cost effective conservation outcomes in working landscapes.

Land managers and conservation organizations can use IMBCR population estimates to better understand annual 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. Currently, we are investigating Bayesian trend estimation, which should have greater power to detect a trend, and also will provide estimates of the probability that a species is declining. The IMBCR data can also be used to investigate population, metapopulation and community dynamics over time. Annually surveyed sampling units provide

the information on dynamic processes that give rise to the patterns of abundance, occupancy and species richness over time.

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 density and occupancy using an area weighted mean, estimates from large, under-sampled strata often receive more weight than estimates from small, well sampled strata.

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.

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APPENDIX A: 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.

- The IMBCR filter will select data and results collected under the IMBCR protocol that contribute to state and BCR-wide estimates.
- The Habitat-based filter will select data and results from habitat-based monitoring efforts conducted from 1998 to 2008.
- Selecting the GRTS filter will produce data and results for monitoring efforts which used the IMBCR design but do NOT contribute to state-wide and regional estimates (these have been called "overlays" at some of the IMBCR meetings).
- The NPS study designs are a mixture of study designs specifically designed for individual national parks. Please note that we are still working on adding some of the historic data to the Avian Data Center so not all study designs are currently available.

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

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

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

BCR: This filter will allow users to select IMBCR data and results for a particular Bird Conservation Region. Selecting this filter will provide you with results for all strata and super strata within a particular BCR.

State: This filter will allow users to select data and results for all study designs for a particular state. Selecting this filter will supply the user with IMBCR data and results for all strata and super strata within a particular state.

County: This filter will allow users to select data for a particular county. Please note that only raw count data and survey locations are available at the county level.

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

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

Priority Species List: This filter will allow users to select data and results for multiple 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, US Forest Service (USFS), Bureau of Land Management (BLM), National Park Service (NPS), Bureau of Indian Affairs (BIA), Department of Defense (DOD), or US Fish and Wildlife Service (USFWS). 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 management regions (e.g., USFS Region 1), management units (e.g., Dakota Prairie Grasslands), management forests (e.g., Shoshone National Forest), or management districts (e.g., North Kaibab district within Kaibab National Forest). Below is the filter hierarchy for the different management entities.

USFS:
Tier One – Management Entity – US Forest Service
Tier Two – Management Region – USFS Regions
Tier Three – Management Unit – National Forest (NF) or National Grassland (NG) management units (used to represent situations where multiple forests are managed jointly)
Tier Four – National Forest or Grassland – NF or NG
Tier Five – Management District – NF or NG Ranger Districts

NPS:
Tier One – Management Entity – National Park Service
Tier Two – Management Region – Inventory and Monitoring Network
Tier Three – Management Unit – Individual NPS Parks, Monuments, Memorials, Recreation Areas, and Historic Sites
Tier Four – Management Forest – Not applicable
Tier Five – Management District – Not applicable

BLM:
Tier One – Management Entity – Bureau of Land Management
Tier Two – Management Region – BLM Field Office
Tier Three – Management Unit – Not applicable
Tier Four – National Forest or Grassland – Not applicable
Tier Five – Management District – Not applicable

DOD:
Tier One – Management Entity – US Department of Defense
Tier Two – Management Region – US DOD Installation
Tier Three – Management Unit – Not applicable
Tier Four – National Forest or Grassland – Not applicable
Tier Five – Management District – Not applicable

Tribal Lands:
Tier One – Management Entity – US Bureau of Indian Affairs
Tier Two – Management Region – Reservation Region (used for several reservations that were jointly stratified)
Tier Three – Management Unit – Reservation
Tier Four – National Forest or Grassland – Not applicable
Tier Five – Management District – Not applicable

All Other Lands:
Tier One – Management Entity – All Other Lands
Tier Two – Management Region – Not applicable
Tier Three – Management Unit – Not applicable
Tier Four – National Forest or Grassland – Not applicable
Tier Five – Management District – Not applicable

USFWS:
Tier One – Management Entity – US Fish and Wildlife Service
Tier Two – Management Region – USFWS Region
Tier Three – Management Unit – USFWS Management Unit, Refuge, etc.
Tier Four – National Forest or Grassland – Not applicable
Tier Five – Management District – Not applicable

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 multiple queries 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 separate query can be run. The two windows can then be viewed side by side.

Share a Created Query with a Colleague
It is possible to create a link to the Avian Data Center/ Explore the Data screen with a pre-loaded set of filters for a query. To do this, add the custom set of filters for your query per the instructions above and then click the "Generate URL" button near the top right corner of the screen. A pop-up box will appear with a highlighted URL address. Once you copy the highlighted text you may paste the URL address into an email or document using conventional means. Please note that whoever receives the URL address will need to run the query after clicking on the link to see the survey locations, results, and raw count statistics for the set of filters of interest.

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

sampling units are represented by blue semi-transparent circles) in Google Earth. If you have filtered by species, survey locations where that species was not detected will be represented by the blue circle. Locations where a survey was conducted and the target species was detected will have a pink dot in the center of the blue circle. To see the specific name of a survey location, hover the mouse arrow over the blue circle. After a moment the name of the surveyed sampling unit should appear. You may view the bird detection information for a sampling unit 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. Funding and/or implementation partners wishing for more precise location information to be displayed should request a password from RMBO IT via email (). Once a user has a password, click on the "View Options" button at the top of the screen, enter the password in the "Password for RMBO staff and partners" field, and click "Save". If you have run a query prior to entering the password, you will need to click the "Run Query" button again in order to utilize the enhanced zooming features now available to you.

Adding map layers

You may add the following layers to the map: Bird Conservation Region 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 sampling units expected to be occupied), the number of sampling units the species was detected on, the standard error (SE) of the estimate, and the percent coefficient of variance (% 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 variance (% CV), and the number of individuals detected (*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 by clicking on the peach colored row in the table.

How to interpret the estimates

The Integrated Monitoring in Bird Conservation Regions Program annually collects breeding bird information in all or portions of 13 states. Each year, occupancy and density estimates are calculated at a variety of spatial scales. This information can be used in the following ways to inform avian conservation:

1. **Bird Population estimates can be compared in space and time.** For example, stratum-level estimates can be compared to state and regional estimates to determine whether local populations are above or below estimates for the region;
2. **Population estimates can be used to make informed management decisions about where to focus conservation efforts.** For example, strata with large populations can be targeted for protection and strata with low populations can be prioritized for conservation action; a threshold could be set to trigger a management action when populations reach a predetermined level;
3. **Population estimates of treatment areas can be compared to regional estimates to evaluate effectiveness of management actions.** For example, if sagebrush areas are being treated to improve habitat for Greater Sage-grouse (GRSG) and estimates for sagebrush-obligate birds increase in these areas in relation to regional estimates where treatment is not occurring, the results would suggest that the GRSG management actions are also beneficial to other sagebrush-obligate bird species;
4. **Annual estimates of density and occupancy can be compared over time to determine if population changes are a result of population growth or decline and/or range expansion or contraction.** For example, if population densities of a species declined over time, but the occupancy rates remained constant, then the population change was due to declines in local abundance. In contrast, if both density and occupancy rates of a species declined, then population change was due to range contraction;
5. **Occupancy rates can be multiplied by the land area in a region of interest to estimate the area occupied by a species.** For example, if a stratum comprises 120,000 km^2 and the occupancy estimate for Western Meadowlark is 0.57, managers can estimate that 68,400 km^2 (120,000 km^2 * 0.57) of habitat within that stratum is occupied by Western Meadowlarks.

Knowing which species have estimates

To restrict the species filter to display only those species for which occupancy and/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.

What is available?
Currently, the 2010 and 2011 occupancy results and density results for 2008 thru 2011 are available via the ADC.

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 point count stations 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 sampling units surveyed, click on the "View Options" button located at the top of the screen and check the box labeled "Show effort by number of sampling units instead of by point".

APPENDIX B

Priority species detected in all Bird Conservation Regions (BCRs) surveyed in 2012, as designated by Partners In Flight (PIF). BCRs include BCR 10 (Northern Rockies), BCR 11 (Prairie Potholes), BCR 16 (Southern Rockies and Colorado Plateau), BCR 17 (Badlands and Prairies), BCR 18 (Shortgrass Prairie), BCR 19 (Central Mixed-grass Prairie), BCR 33 (Sonoran and Mohave Deserts), and BCR 34 (Sierra Madre Occidental).

	Partners In Flight*			
Species	**BCR 10**	**BCR 11**	**BCR 16**	**BCR 17**
Abert's Towhee				
American Dipper	UCS,RS			
American Kestrel	RC			
Ash-throated Flycatcher				
Baird's Sparrow		TNC,UCC,RC,UCS,RS		TNC,UCC,RC
Bank Swallow	CBSD		CBSD	CBSD
Bell's Vireo				
Belted Kingfisher	CBSD		CBSD	CBSD
Black-billed Cuckoo				UCC,RC,CBSD
Black-billed Magpie			UCS	RC
Black-chinned Sparrow			UCC,CBSD	
Black-tailed Gnatcatcher				
Black-throated Gray Warbler			RC	
Black Rosy-Finch	TNC,UCC,RC,UCS,RS			
Black-throated Sparrow				
Bobolink	UCC,CBSD	UCC,RC,UCS,RS,CBSD		UCC,CBSD
Boreal Chickadee	CBSD			
Brewer's Sparrow	RC,CBSD	CBSD	RC,CBSD	RC,CBSD
Bridled Titmouse				
Broad-tailed Hummingbird			UCS,RS	
Brown-capped Rosy-Finch			TNC,UCC,RC,UCS,RS	
Brown Thrasher				
Bullock's Oriole				
Burrowing Owl				RC
Bushtit				

Species	Partners In Flight*			
	BCR 10	BCR 11	BCR 16	BCR 17
Cactus Wren				
Calliope Hummingbird	UCS,RS			
Canyon Towhee				
Canyon Wren				
Cassin's Finch	UCC,RC,UCS,RS,CBSD		UCC,RC,CBSD	
Cassin's Kingbird				
Cassin's Sparrow				
Cassin's Vireo	UCS,RS			
Chestnut-collared Longspur		TNC,UCC,RC,UCS,RS		TNC,UCC,RC,UCS,RS
Chihuahuan Raven				
Chimney Swift				
Chipping Sparrow	RC,UCS,RS			
Clark's Nutcracker	UCS,RS		RC,UCS,RS	
Clay-colored Sparrow		UCS,RS		
Common Black-Hawk				
Common Nighthawk	CBSD	CBSD	RC,CBSD	RC,CBSD
Common Poorwill				
Cooper's Hawk			UCS,RS	
Cordilleran Flycatcher			UCS,RS	
Costa's Hummingbird				
Crissal Thrasher				
Curve-billed Thrasher				
Dickcissel				RC
Dusky Flycatcher	UCS			
Dusky Grouse	UCS,RS		UCS,RS	
Eastern Kingbird		UCS		UCS
Eastern Meadowlark				
Evening Grosbeak	RC			
Ferruginous Hawk	RC	RC,UCS,RS		RC,UCS,RS
Field Sparrow		CBSD		CBSD

	Partners In Flight*			
Species	**BCR 10**	**BCR 11**	**BCR 16**	**BCR 17**
Flammulated Owl	UCC			
Gambel's Quail				
Gila Woodpecker				
Gilded Flicker				
Golden Eagle		RC	RC	RC
Golden-crowned Kinglet	UCS			
Grace's Warbler			UCS,RS	
Grasshopper Sparrow	CBSD	RC,CBSD		RC,UCS,RS,CBSD
Gray Vireo			UCC,RC,UCS,RS	
Greater Prairie-Chicken				TNC,UCC,RC
Greater Sage-Grouse	TNC,UCC,RC,UCS,RS	TNC,UCC,RC	TNC,UCC,RC	TNC,UCC,RC,UCS,RS
Green-tailed Towhee			UCS,RS	
Hammond's Flycatcher	UCS			
Hepatic Tanager				
Hooded Oriole				
Horned Lark	CBSD	RC,CBSD	CBSD	CBSD
Juniper Titmouse			UCS,RS	
Ladder-backed Woodpecker				
Lark Bunting	CBSD	RC,CBSD		RC,UCS,RS,CBSD
Lark Sparrow				RC
Lazuli Bunting	UCS		RC,UCS,RS	UCS,RS
Lesser Prairie-Chicken				
Lewis's Woodpecker	RC		RC,UCS,RS	
Loggerhead Shrike	CBSD		RC,CBSD	CBSD
Lucy's Warbler				
MacGillivray's Warbler	UCS			
McCown's Longspur	RC	RC,UCS,RS		RC,UCS,RS
Mexican Jay				
Mountain Bluebird	UCS		RC,UCS,RS	
Mountain Chickadee	UCS			

Species	Partners In Flight*			
	BCR 10	BCR 11	BCR 16	BCR 17
Northern Bobwhite				
Northern Flicker	UCS,CBSD		UCS,RS,CBSD	CBSD
Northern Goshawk	UCS,RS			
Northern Harrier		RC,UCS,RS		RC,UCS,RS
Olive Warbler				
Olive-sided Flycatcher	TNC,UCC,RC		TNC,UCC,RC	
Painted Redstart				
Phainopepla				
Pine Siskin	UCS,RS,CBSD		UCS,RS,CBSD	CBSD
Pinyon Jay	TNC,UCC,RC		TNC,UCC,RC,UCS,RS	TNC,UCC,RC
Plumbeous Vireo			UCS,RS	
Prairie Falcon				
Pygmy Nuthatch			UCS,RS	
Red Crossbill				UCS
Red-breasted Nuthatch	UCS			
Red-faced Warbler				
Red-headed Woodpecker				UCC,RC,CBSD
Red-naped Sapsucker	UCS,RS			
Ring-necked Pheasant				UCS
Rock Wren	CBSD		UCS,RS,CBSD	CBSD
Ruby-crowned Kinglet	UCS			
Rufous-crowned Sparrow				
Ruffed Grouse	UCS,RS,CBSD			
Rufous Hummingbird	UCC,CBSD			
Sage Sparrow	RC		RC	RC
Sage Thrasher				RC
Savannah Sparrow		UCS		
Say's Phoebe			UCS	
Scaled Quail				
Scott's Oriole				

	Partners In Flight*			
Species	**BCR 10**	**BCR 11**	**BCR 16**	**BCR 17**
Sharp-shinned Hawk				
Sharp-tailed Grouse				UCS,RS
Short-eared Owl	RC,CBSD			RC,CBSD
Sprague's Pipit	TNC,UCC,RC	TNC,UCC,RC,UCS,RS		TNC,UCC,RC
Swainson's Hawk		RC,UCS,RS		
Swainson's Thrush	UCS			
Townsend's Solitaire	UCS,RS			
Townsend's Warbler	UCS,RS			
Tree Swallow	UCS			
Varied Thrush	RC			
Verdin				
Vesper Sparrow	RC	UCS		RC,UCS,RS
Violet-green Swallow			UCS	
Virginia's Warbler			UCC,UCS,RS	
Warbling Vireo	UCS		UCS	
Western Bluebird				
Western Kingbird				
Western Meadowlark		UCS		UCS
White-breasted Nuthatch				
White-tailed Ptarmigan			RC	
White-winged Dove				
Wild Turkey				
Williamson's Sapsucker	UCS,RS		UCS,RS	
Willow Flycatcher	UCS,RS			
Wilson's Warbler	CBSD		CBSD	
Yellow-headed Blackbird		UCS		
Zone-tailed Hawk				

*CBSD = Common Bird in Steep Decline; RC = Regional Concern Species; RS = Regional Stewardship Species; TNC = Tri-National Concern Species; UCC = U.S and Canada Concern Species; UCS = U.S. and Canada Stewardship Species (PIF Science Committee 2012).

Appendix B continued. Priority species detected in all Bird Conservation Regions (BCRs) surveyed in 2012, as designated by Partners In Flight (PIF). BCRs include BCR 10 (Northern Rockies), BCR 11 (Prairie Potholes), BCR 16 (Southern Rockies and Colorado Plateau), BCR 17 (Badlands and Prairies), BCR 18 (Shortgrass Prairie), BCR 19 (Central Mixed-grass Prairie), BCR 33 (Sonoran and Mohave Deserts), and BCR 34 (Sierra Madre Occidental).

	Partners In Flight*			
Species	**BCR18**	**BCR19**	**BCR33**	**BCR34**
Abert's Towhee			UCS,RS	
American Dipper				
American Kestrel				RC
Ash-throated Flycatcher			UCS	UCS
Baird's Sparrow				
Bank Swallow	CBSD			
Bell's Vireo		TNC,UCC,RC		TNC,UCC,RC
Belted Kingfisher	CBSD	CBSD		
Black-billed Cuckoo				
Black-billed Magpie				
Black-chinned Sparrow				UCC,RC,UCS,RS,CBSD
Black-tailed Gnatcatcher			UCS,RS	
Black-throated Gray Warbler				RC
Black Rosy-Finch				
Black-throated Sparrow			RC,UCS,RS	RC,UCS,RS
Bobolink				
Boreal Chickadee				
Brewer's Sparrow	RC,CBSD			
Bridled Titmouse				UCS,RS
Broad-tailed Hummingbird				RC
Brown-capped Rosy-Finch				
Brown Thrasher		UCS,RS		
Bullock's Oriole	UCS		RC	
Burrowing Owl	RC,UCS,RS			
Bushtit				UCS,RS
Cactus Wren			RC,UCS,RS	RC,UCS,RS
Calliope Hummingbird				

	Partners In Flight*			
Species	**BCR18**	**BCR19**	**BCR33**	**BCR34**
Canyon Towhee				UCS,RS
Canyon Wren				UCS,RS
Cassin's Finch				
Cassin's Kingbird				RC,UCS,RS
Cassin's Sparrow	RC,UCS,RS			
Cassin's Vireo				
Chestnut-collared Longspur				
Chihuahuan Raven	UCS,RS			
Chimney Swift	CBSD			
Chipping Sparrow				
Clark's Nutcracker				
Clay-colored Sparrow				
Common Black-Hawk				RC
Common Nighthawk	RC,CBSD	UCS,CBSD		RC,CBSD
Common Poorwill				UCS,RS
Cooper's Hawk				UCS,RS
Cordilleran Flycatcher				UCS,RS
Costa's Hummingbird			UCS,RS	
Crissal Thrasher				UCS,RS
Curve-billed Thrasher			UCS,RS	
Dickcissel		RC,UCS,RS		
Dusky Flycatcher				
Dusky Grouse				
Eastern Kingbird		UCS		
Eastern Meadowlark				CBSD
Evening Grosbeak				
Ferruginous Hawk	RC,UCS,RS			
Field Sparrow		RC,CBSD		
Flammulated Owl				
Gambel's Quail			UCS,RS	UCS,RS

	Partners In Flight*			
Species	**BCR18**	**BCR19**	**BCR33**	**BCR34**
Gila Woodpecker			RC,UCS,RS	
Gilded Flicker			UCC,RC,UCS,RS	UCC,RC
Golden Eagle				
Golden-crowned Kinglet				
Grace's Warbler				RC,UCS,RS
Grasshopper Sparrow	RC,UCS,RS,CBSD	RC,UCS,RS,CBSD		
Gray Vireo				UCC,RC,UCS,RS
Greater Prairie-Chicken	TNC,UCC,RC			
Greater Sage-Grouse				
Green-tailed Towhee				
Hammond's Flycatcher				
Hepatic Tanager				UCS
Hooded Oriole				UCS,RS
Horned Lark	UCS,RS,CBSD	CBSD		CBSD
Juniper Titmouse				RC,UCS,RS
Ladder-backed Woodpecker			RC	UCS,RS
Lark Bunting	RC,UCS,RS,CBSD			
Lark Sparrow	UCS	RC,UCS,RS		
Lazuli Bunting				
Lesser Prairie-Chicken	TNC,UCC,RC,UCS,RS			
Lewis's Woodpecker	RC			RC
Loggerhead Shrike	CBSD			CBSD
Lucy's Warbler			RC,UCS,RS	RC,UCS,RS
MacGillivray's Warbler				
McCown's Longspur	UCS,RS			
Mexican Jay				UCS,RS
Mountain Bluebird				
Mountain Chickadee				
Northern Bobwhite	CBSD	UCS,CBSD		
Northern Flicker	CBSD			CBSD

	Partners In Flight*			
Species	**BCR18**	**BCR19**	**BCR33**	**BCR34**
Northern Goshawk				
Northern Harrier	RC			
Olive Warbler				UCS,RS
Olive-sided Flycatcher				
Painted Redstart				RC,UCS,RS
Phainopepla			RC,UCS,RS	RC,UCS,RS
Pine Siskin				CBSD
Pinyon Jay	TNC,UCC,RC			TNC,UCC,RC
Plumbeous Vireo				RC,UCS,RS
Prairie Falcon	RC			
Pygmy Nuthatch				UCS,RS
Red Crossbill				
Red-breasted Nuthatch				
Red-faced Warbler				RC,UCS,RS
Red-headed Woodpecker	UCC,CBSD			
Red-naped Sapsucker				
Ring-necked Pheasant	UCS,RS			
Rock Wren	CBSD			CBSD
Ruby-crowned Kinglet				
Rufous-crowned Sparrow				UCS,RS
Ruffed Grouse				
Rufous Hummingbird				
Sage Sparrow				
Sage Thrasher				
Savannah Sparrow				
Say's Phoebe				
Scaled Quail	RC			
Scott's Oriole				UCS,RS
Sharp-shinned Hawk				RC
Sharp-tailed Grouse	RC			

	Partners In Flight*			
Species	**BCR18**	**BCR19**	**BCR33**	**BCR34**
Short-eared Owl				
Sprague's Pipit				
Swainson's Hawk	UCS,RS			
Swainson's Thrush				
Townsend's Solitaire				
Townsend's Warbler				
Tree Swallow				
Varied Thrush				
Verdin			RC,UCS,RS,CBSD	UCS,RS,CBSD
Vesper Sparrow				
Violet-green Swallow				UCS
Virginia's Warbler				UCC,UCS,RS
Warbling Vireo				
Western Bluebird				UCS,RS
Western Kingbird	UCS			
Western Meadowlark	RC,UCS,RS	RC,UCS,RS		
White-breasted Nuthatch				UCS
White-tailed Ptarmigan				
White-winged Dove			UCS	
Wild Turkey		UCS		
Williamson's Sapsucker				UCS,RS
Willow Flycatcher				
Wilson's Warbler				
Yellow-headed Blackbird				
Zone-tailed Hawk				UCS,RS

*CBSD = Common Bird in Steep Decline; RC = Regional Concern Species; RS = Regional Stewardship Species; TNC = Tri-National Concern Species; UCC = U.S and Canada Concern Species; UCS = U.S. and Canada Stewardship Species (PIF Science Committee 2012).

APPENDIX C

Priority species detected in 2012, by state, with management designations by state agencies. Agencies included: Arizona Game and Fish Department (AZGFD), Colorado Parks and Wildlife (CPW), Idaho Fish and Game Department (IDFGD), 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).

	State Agencies							
Species	**AZGFD**	**CPW**	**IDFGD**	**MTFWP**	**NDGFD**	**NGPC**	**SDGFP**	**WGFD**
Abert's Towhee	SGCN							
Acorn Woodpecker	SGCN							
American Dipper		SGCN						
American Three-toed Woodpecker		SGCN	SGCN					SGCN
American White Pelican		SGCN	SGCN	S3		Tier II	SGCN	SGCN
Baird's Sparrow				S3	SoCP L1		SGCN	
Bald Eagle		SGCN,ST	SGCN	S3		Tier I		SGCN
Band-tailed Pigeon	SGCN	SGCN						
Bell's Vireo	SGCN					Tier I		
Black-backed Woodpecker				S3			SGCN	SGCN
Black-billed Cuckoo				S3				
Black-chinned Hummingbird		SGCN						
Black-chinned Sparrow	SGCN							
Black-crowned Night-Heron				S3				
Black Rosy-Finch								SGCN
Black-tailed Gnatcatcher	SGCN							
Black-throated Gray Warbler	SGCN	SGCN						
Bobolink		SGCN		S3	SoCP L2			
Boreal Chickadee				S3				
Brewer's Blackbird						Tier II		
Brewer's Sparrow	SGCN	SGCN	SGCN	S3	SoCP 3			SGCN
Brown Creeper 47				S3				
Bridled Titmouse	SGCN							
Broad-tailed Hummingbird		SGCN						

	State Agencies							
Species	**AZGFD**	**CPW**	**IDFGD**	**MTFWP**	**NDGFD**	**NGPC**	**SDGFP**	**WGFD**
Brown-capped Rosy-Finch		SGCN						
Bullock's Oriole	SGCN							
Burrowing Owl		SGCN,ST				Tier I		SGCN
Caspian Tern			SGCN					
Cassin's Finch		SGCN		S3				
Cassin's Sparrow		SGCN						
Chestnut-collared Longspur				S2	SoCP L1	Tier II	SGCN	SGCN
Clark's Nutcracker				S3				
Common Black-Hawk	SGCN							
Common Loon				S3				
Common Nighthawk	SGCN							
Common Poorwill	SGCN							
Common Tern				S3				
Cooper's Hawk						Tier II		
Cordilleran Flycatcher	SGCN	SGCN						
Costa's Hummingbird	SGCN							
Dickcissel					SoCP L2			
Dusky Flycatcher	SGCN	SGCN						
Dusky Grouse		SGCN						
Dusky-capped Flycatcher	SGCN							
Eastern Meadowlark	SGCN							
Evening Grosbeak		SGCN						
Ferruginous Hawk		SGCN, SC		S3			SGCN	SGCN
Flammulated Owl			SGCN					
Forster's Tern								SGCN
Franklin's Gull				S3				
Gila Woodpecker	SGCN							
Gilded Flicker	SGCN							
Golden Eagle		SGCN		S3	SoCP L2			

	State Agencies							
Species	**AZGFD**	**CPW**	**IDFGD**	**MTFWP**	**NDGFD**	**NGPC**	**SDGFP**	**WGFD**
Golden-crowned Kinglet	SGCN							
Grace's Warbler	SGCN	SGCN						
Grasshopper Sparrow			SGCN	S3	SoCP L1			SGCN
Gray Flycatcher	SGCN	SGCN						
Gray Vireo	SGCN	SGCN						
Great Blue Heron				S3				SGCN
Great Gray Owl				S3				SGCN
Greater Prairie-Chicken		SGCN					SGCN	
Greater Sage-Grouse				S2				SGCN
Harris's Hawk	SGCN							
Hooded Oriole	SGCN							
Horned Grebe								
Juniper Titmouse	SGCN	SGCN						
Lark Bunting		SGCN			SoCP L1		SGCN	SGCN
Lazuli Bunting	SGCN	SGCN						
Lesser Scaup			SGCN					
Lewis's Woodpecker	SGCN	SGCN	SGCN					
Loggerhead Shrike		SGCN		S3	SoCP L2			
Long-billed Curlew		SGCN, SC	SGCN	S3		Tier I	SGCN	SGCN
Lucy's Warbler	SGCN							
MacGillivray's Warbler	SGCN							
Marbled Godwit					SoCP L1		SGCN	
McCown's Longspur		SGCN		S3				SGCN
Mexican Jay	SGCN							
Mountain Bluebird	SGCN					Tier II		
Mountain Plover		SGCN, SC						SGCN
Northern Bobwhite						Tier II		
Northern Goshawk		SGCN		S3				SGCN
Northern Harrier		SGCN			SoCP L2			

	State Agencies							
Species	**AZGFD**	**CPW**	**IDFGD**	**MTFWP**	**NDGFD**	**NGPC**	**SDGFP**	**WGFD**
Northern Pintail		SGCN						SGCN
Northern Pygmy-Owl	SGCN							
Olive Warbler	SGCN							
Olive-sided Flycatcher		SGCN						
Orange-crowned Warbler	SGCN							
Osprey		SGCN						
Pacific Wren				S3				
Painted Redstart	SGCN							
Pileated Woodpecker				S3				
Peregrine Falcon	SGCN	SGCN,SC	SGCN					
Phainopepla	SGCN							
Pine Siskin						Tier II		
Pinyon Jay	SGCN	SGCN		S3		Tier II		
Plumbeous Vireo						Tier II		
Prairie Falcon		SGCN			SoCP L2			
Purple Martin	SGCN	SGCN						
Pygmy Nuthatch		SGCN	SGCN					SGCN
Red Crossbill	SGCN	SGCN	SGCN			Tier II		
Red-faced Warbler	SGCN							
Red-headed Woodpecker				S3				
Red-naped Sapsucker		SGCN						
Sage Sparrow	SGCN	SGCN						SGCN
Sage Thrasher				S3				SGCN
Sandhill Crane		SGCN, SC	SGCN					SGCN
Scaled Quail		SGCN						
Scott's Oriole	SGCN							
Sharp-tailed Grouse		SE, SGCN,SC		S1	SoCP L2			
Short-eared Owl					SoCP L2			SGCN
Sprague's Pipit				S3	SoCP L1		SGCN	

	State Agencies							
Species	**AZGFD**	**CPW**	**IDFGD**	**MTFWP**	**NDGFD**	**NGPC**	**SDGFP**	**WGFD**
Summer Tanager	SGCN							
Swainson's Hawk		SGCN	SGCN		SoCP L1	Tier II		SGCN
Trumpeter Swan				S3				
Upland Sandpiper		SGCN			SoCP L1			SGCN
Veery				S3				
Vermilion Flycatcher	SGCN							
Vesper Sparrow		SGCN						
Violet-green Swallow						Tier II		
Virginia's Warbler	SGCN	SGCN						
Western Scrub-Jay	SGCN							
Western Tanager						Tier II		
White-faced Ibis		SGCN						
White-tailed Ptarmigan		SGCN						
White-throated Swift	SGCN	SGCN						
White-winged Crossbill			SGCN					
Wild Turkey	SGCN							
Williamson's Sapsucker	SGCN	SGCN						
Willow Flycatcher		FE,SGCN,SE						SGCN
Wilson's Phalarope		SGCN			SoCP L1		SGCN	
Yellow-breasted Chat	SGCN					Tier II		

*__AZGFD:__ SGCN = Species of Greatest Conservation Need (Arizona Game and Fish Department 2006); __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); IDFGD: SGCN = Species of Greatest Conservation Need (Idaho Fish and Game Department 2006); __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 D

Priority species detected on Bureau of Land Management (BLM) lands in 2012, with management designations by state.

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

*SS = Sensitive Species; Montana, North Dakota, South Dakota (Bureau of Land Management 2009); Wyoming (Bureau of Land Management 2010); Colorado (Bureau of Land Management 2000).

APPENDIX E

Priority species detected on US Forest Service lands in Region 1 in 2012, 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), Idaho Panhandle NF (IPNF).

	USFS Region 1*								
Species	**Region 1**	**BDNF**	**BINF**	**CLNF**	**CUNF**	**FLNF**	**GANF**	**HENF**	**IPNF**
American Dipper	Other								
American Three-toed Woodpecker									
Baird's Sparrow	R1SS								
Bald Eagle	R1SS						MIS		
Black-and-white Warbler	Other								
Black-backed Woodpecker	R1SS					MIS			
Bobolink	Other								
Boreal Chickadee	Other								
Boreal Owl	Other								
Brewer's Sparrow					MIS				
Bullock's Oriole					MIS				
Cassin's Kingbird					MIS				
Chestnut-collared Longspur	Other								
Chipping Sparrow									MIS
Clark's Nutcracker	Other								
Common Loon	R1SS					MIS			
Dickcissel	Other								
Dusky Flycatcher									MIS
Golden Eagle									
Grasshopper Sparrow	Other								
Gray Jay	Other								
Great Gray Owl	Other								
Hairy Woodpecker								MIS	MIS
Hammond's Flycatcher									MIS

	USFS Region 1*								
Species	**Region 1**	**BDNF**	**BINF**	**CLNF**	**CUNF**	**FLNF**	**GANF**	**HENF**	**IPNF**
Lark Bunting	Other								
Lark Sparrow					MIS				
Loggerhead Shrike	R1SS								
Long-billed Curlew	R1SS								
Marbled Godwit	Other								
Northern Harrier	Other								
Northern Goshawk									MIS
Olive-sided Flycatcher	Other								MIS
Osprey	Other								
Ovenbird					MIS				
Pileated Woodpecker			MIS	MIS					MIS
Red-headed Woodpecker	Other								
Red-naped Sapsucker	Other								
Sage Thrasher	Other								
Sandhill Crane	Other								
Sharp-tailed Grouse									
Short-eared Owl	Other								
Spotted Towhee					MIS				
Sprague's Pipit	R1SS								
Swainson's Hawk	Other								
Upland Sandpiper	Other								
Williamson's Sapsucker	Other								
Wilson's Phalarope	Other								
Yellow Warbler					MIS				

*R1SS = Region 1 Sensitive Species; Other = Other Priority Species in Region 1; MIS = Management Indicator Species (Skorkowsky and Hahn 2010).

Appendix E continued. Codes for Region/Units: Kootenai NF (KONF), Lewis and Clark NF (LCNF), Lolo NF (LONF) and Nez Perce NF (NPNF), Cedar River NG (CRNG), Grand River NG (GRNG), Little Missouri NG (LMNG).

	USFS Region 1*							
Species	**Region 1**	**KONF**	**LCNF**	**LONF**	**NPNF**	**CRNG**	**GRNG**	**LMNG**
American Dipper	Other							
American Three-toed Woodpecker			MIS					
Baird's Sparrow	R1SS							
Bald Eagle	R1SS							
Black-and-white Warbler	Other							
Black-backed Woodpecker	R1SS							
Bobolink	Other							
Boreal Chickadee	Other							
Boreal Owl	Other							
Brewer's Sparrow								
Bullock's Oriole								
Cassin's Kingbird								
Chestnut-collared Longspur	Other							
Chipping Sparrow		MIS						
Clark's Nutcracker	Other							
Common Loon	R1SS							
Dickcissel	Other							
Dusky Flycatcher		MIS						
Golden Eagle			MIS					
Grasshopper Sparrow	Other							
Gray Jay	Other							
Great Gray Owl	Other							
Hairy Woodpecker		MIS						
Hammond's Flycatcher		MIS						
Lark Bunting	Other							
Lark Sparrow								
Loggerhead Shrike	R1SS							

	USFS Region 1*							
Species	**Region 1**	**KONF**	**LCNF**	**LONF**	**NPNF**	**CRNG**	**GRNG**	**LMNG**
Long-billed Curlew	R1SS							
Marbled Godwit	Other							
Northern Harrier	Other							
Northern Goshawk								
Olive-sided Flycatcher	Other	MIS						
Osprey	Other							
Ovenbird								
Pileated Woodpecker		MIS		MIS	MIS			
Red-headed Woodpecker	Other							
Red-naped Sapsucker	Other							
Sage Thrasher	Other							
Sandhill Crane	Other							
Sharp-tailed Grouse						MIS	MIS	MIS
Short-eared Owl	Other							
Spotted Towhee								
Sprague's Pipit	R1SS							
Swainson's Hawk	Other							
Upland Sandpiper	Other							
Williamson's Sapsucker	Other							
Wilson's Phalarope	Other							
Yellow Warbler								

*R1SS = Region 1 Sensitive Species; Other = Other Priority Species in Region 1; MIS = Management Indicator Species (Skorkowsky and Hahn 2010).

APPENDIX F

Priority species detected on US Forest Service lands in Region 2 in 2012, with management designations by region and unit. Codes for Region/Units: Arapaho and 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 and San Isabel NF (PSINF), Rio Grande NF (RGNF).

	USFS Region 2*								
Species	**Region 2**	**ARNF**	**BINF**	**BHNF**	**GMUGNF**	**MBNF**	**NENF**	**PSINF**	**RGNF**
American Pipit									
American Three-toed Woodpecker						MIS			
Bald Eagle	R2SS								
Black-backed Woodpecker	R2SS			MIS					
Brewer's Sparrow	R2SS								
Brown Creeper				MIS		SOSC			MIS
Bullock's Oriole									
Burrowing Owl	R2SS								
Cassin's Sparrow	R2SS								
Chestnut-collared Longspur	R2SS								
Cooper's Hawk				SOLC					
Ferruginous Hawk	R2SS								
Golden-crowned Kinglet				MIS		MIS			
Grasshopper Sparrow	R2SS								
Greater Prairie-Chicken	R2SS								
Greater Sage-Grouse	R2SS								
Green-tailed Towhee									
Hairy Woodpecker		MIS			MIS				
Hermit Thrush									MIS
Lark Bunting									
Lesser Prairie-Chicken	R2SS								
Lewis's Woodpecker	R2SS								
Lincoln's Sparrow						MIS			MIS
Loggerhead Shrike	R2SS								

	USFS Region 2*								
Species	**Region 2**	**ARNF**	**BINF**	**BHNF**	**GMUGNF**	**MBNF**	**NENF**	**PSINF**	**RGNF**
Long-billed Curlew	R2SS								
McCown's Longspur	R2SS								
Mountain Bluebird		MIS							
Mountain Plover	R2SS								
Northern Goshawk	R2SS				MIS	MIS			
Northern Harrier	R2SS								
Olive-sided Flycatcher	R2SS								
Peregrine Falcon	R2SS								
Purple Martin	R2SS								
Pygmy Nuthatch		MIS		SOLC					MIS
Red-breasted Nuthatch			MIS						
Red Crossbill					MIS				
Sharp-tailed Grouse	R2SS						MIS		
Song Sparrow				MIS					
Swainson's Hawk			SOLC						
Vesper Sparrow									MIS
Virginia's Warbler									
Warbling Vireo		MIS							
White-tailed Ptarmigan	R2SS								
Wild Turkey									
Wilson's Warbler		MIS				MIS			
Yellow-billed Cuckoo	R2SS								

*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 F continued. Codes for Region/Units: Routt NF (RONF), Samuel McKelvie NF (SMNF), San Juan NF (SJNF), Shoshone NF (SHNF) and White River NF (WRNF), Comanche and Cimarron NG (CO and CING), Pawnee NG (PANG), Nebraska NG (NBNG) and Thunder Basin NG (TBNG).

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

	USFS Region 2*									
Species	**Region 2**	**RONF**	**SMNF**	**SJNF**	**SHNF**	**WRNF**	**CO and CING**	**PANG**	**NBNG**	**TBNG**
Mountain Bluebird				MIS						
Mountain Plover	R2SS									
Northern Goshawk	R2SS			MIS	MIS					
Northern Harrier	R2SS									
Olive-sided Flycatcher	R2SS									
Peregrine Falcon	R2SS					SOC				
Purple Martin	R2SS									
Pygmy Nuthatch						SOVC				
Red-breasted Nuthatch										
Red Crossbill										
Sharp-tailed Grouse	R2SS								MIS	
Song Sparrow										
Swainson's Hawk										
Vesper Sparrow		MIS								
Virginia's Warbler						MIS				
Warbling Vireo										
White-tailed Ptarmigan	R2SS									
Wild Turkey				MIS						
Wilson's Warbler		MIS								
Yellow-billed Cuckoo	R2SS									

*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

Priority species detected on US Forest Service lands in Region 3 in 2012, with management designations by region and unit.

	USFS Region 3*				
Species	**Region 3**	**Coconino NF**	**Kaibab NF**	**Tonto NF**	**Kiowa/Rita Blanca NG**
Abert's Towhee	R3SS				
Ash-throated Flycatcher				MIS	
Bell's Vireo	R3SS			MIS	
Black-chinned Sparrow				MIS	
Black-throated Sparrow				MIS	
Burrowing Owl	R3SS				MIS
Canyon Towhee				MIS	
Cassin's Sparrow					MIS
Common Black-Hawk	R3SS			MIS	
Costa's Hummingbird	R3SS				
Ferruginous Hawk	R3SS				
Gila Woodpecker	R3SS				
Grace's Warbler	R3SS				
Grasshopper Sparrow	R3SS				MIS
Gray Vireo	R3SS			MIS	
Hairy Woodpecker		MIS	MIS	MIS	
Hooded Oriole				MIS	
Juniper Titmouse		MIS	MIS	MIS	
Loggerhead Shrike	R3SS				
Lucy's Warbler		MIS			
Northern Flicker				MIS	
Peregrine Falcon	R3SS				
Pygmy Nuthatch		MIS	MIS	MIS	
Spotted Towhee				MIS	
Summer Tanager				MIS	
Swainson's Hawk	R3SS				

	USFS Region 3*				
Species	**Region 3**	**Coconino NF**	**Kaibab NF**	**Tonto NF**	**Kiowa/Rita Blanca NG**
Townsend's Solitaire				MIS	
Violet-green Swallow				MIS	
Warbling Vireo				MIS	
Western Bluebird				MIS	MIS
Western Wood-Pewee				MIS	
Wild Turkey	R3SS	MIS	MIS	MIS	
Zone-tailed Hawk	R3SS				

*R3SS = USFS Region 3 Sensitive Species (US Forest Service 2010); MIS = Management Indicator Species; SOC = Species of Concern.

APPENDIX H

Priority species detected on US Forest Service lands in Region 4 in 2012, with management designations by region and unit.

	USFS Region 4*		
Species	**Region 4**	**Bridger-Teton NF**	**Manti-La Sal NF**
American Three-toed Woodpecker	R4SS		
Bald Eagle	R4SS	MIS	
Brewer's Sparrow		MIS	
Great Gray Owl	R4SS		
Northern Goshawk	R4SS		
Willow Flycatcher	R4SS		

*R4SS = Region 4 Sensitive Species (US Forest Service 2008a); MIS = Management Indicator Species; SS = Sensitive Species.