Integrated Monitoring in Bird Conservation Regions (IMBCR):

2016 Field Season Report

June 2017

Bird Conservancy of the Rockies
Connecting People, Birds and Land

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Bird Conservancy of the Rockies

Connecting people, birds and land

Mission: Conserving birds and their habitats through science, education and land stewardship

Vision: Native bird populations are sustained in healthy ecosystems

Bird Conservancy of the Rockies conserves birds and their habitats through an integrated approach of science, education, and land stewardship. Our work radiates from the Rockies to the Great Plains, Mexico and beyond. Our mission is advanced through sound science, achieved through empowering people, realized through stewardship, and sustained through partnerships. Together, we are improving native bird populations, the land, and the lives of people.

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.

Goals:

1. Guide conservation action where it is needed most by conducting scientifically rigorous monitoring and research on birds and their habitats within the context of their full annual cycle.
2. Inspire conservation action in people by developing relationships through community outreach and science-based, experiential education programs.
3. Contribute to bird population viability and help sustain working lands by partnering with landowners and managers to enhance wildlife habitat.
4. Promote conservation and inform land management decisions by disseminating scientific knowledge and developing tools and recommendations.

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Executive Summary

Bird Conservancy of the Rockies (Bird Conservancy), in conjunction with its partners, conducted landbird monitoring for the ninth year in a row for the Integrated Monitoring in Bird Conservation Regions (IMBCR) program. IMBCR uses a spatially balanced sampling design which allows inferences to avian species occurrence and population sizes at various scales, from local management units to entire BCRs or states, facilitating conservation at local and national levels. The sampling design allows analysts to estimate species densities, population sizes, and occupancy rates for individual strata or biologically meaningful combinations of strata. The IMBCR design provides a spatially consistent and flexible framework for understanding the status and annual changes of bird populations. Collaboration across organizations and spatial scales increase sample sizes and improve the accuracy and precision of population estimates. Analyzing the data collectively allows us to estimate detection probabilities for species that would have otherwise had insufficient numbers of detections at local scales.

In 2016, the IMBCR program's area of inference encompassed two entire states (Colorado and Wyoming) and portions of 11 additional states (Arizona, Idaho, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas and Utah). We surveyed across US Forest Service (USFS) Regions 1 and 2 and portions of Regions 3 and 4; all of the Badlands and Prairies Bird Conservation Region (BCR), almost all of the Shortgrass Prairie Bird Conservation Region (BCR18), and portions of seven other BCRs (Great Basin, Northern Rockies, Prairie Potholes, Southern Rockies/Colorado Plateau, Central Mixed Grass Prairie, Sonoran and Mohave Deserts, and Sierra Madre Occidental). Field technicians completed 1,551 of 1,590 (97.5%) planned surveys. Technicians conducted 17,697 point counts within the 1,551 surveyed sampling units between 26 April and 19 July 2016. They detected 235,784 individual birds representing 335 species.

To view interactive maps illustrating survey and detection locations, species counts and density, population and occupancy results, please visit Bird Conservancy's Rocky Mountain Avian Data Center at http://rmbo/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 this report's 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 combination of strata are summarized in this report. All individual strata and all biologically meaningful combinations of strata, or "superstrata", can be found on the Avian Data Center.

To demonstrate the use of IMBCR monitoring data for bird conservation, we focus on population trends 2009-2016 of five priority grassland bird species in the Badlands and Prairies BCR of the Northern Great Plains. Trends in density and occupancy estimates differed among the species, suggesting that factors impacting the trends were not the same for all species. For example, Chestnut-collared Longspur numbers decreased dramatically, highlighting the need for immediate actions. In contrast, Lark Bunting populations remained stable in the BCR over the eight-year period.

The IMBCR program is well positioned to address conservation and management needs for 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 2016 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: Audubon Rockies; Colorado Parks and Wildlife; Department of Defense; Montana Fish, Wildlife and Parks; National Fish and ,Wildlife Foundation; Natural Resources Conservation Service; Northern Great Plains Joint Venture; US Bureau of Land Management; US Forest Service; US National Park Service; and Wyoming Game and Fish Department. We thank Playa Lakes Joint Venture for building a collaborative partnership and acquiring funding across the states within their boundary to allow for the addition of IMBCR for PLJV this year. We thank Arizona Game and Fish, the Department of Defense, Intermountain Bird Observatory, Utah Division of Wildlife Resources and Wyoming Natural Diversity Database for planning and implementing field work in their study areas. Bird Conservancy of the Rockies' 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 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. We thank Kelli Turner and Bob Paulson of The Nature Conservancy for providing excellent training facilities at the Whitney Preserve 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 Bird Conservancy staff and IMBCR partners.

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Acronyms

BCR	Bird Conservation Region
BCR 9	Great Basin Bird Conservation Region
BCR 10	Northern Rockies Bird Conservation Region
BCR 11	Prairie Potholes Bird Conservation Region
BCR 16	Southern Rockies and Colorado Plateau Bird Conservation Region
BCR 17	Badlands and Prairies Bird Conservation Region
BCR 18	Shortgrass Prairie Bird Conservation Region
BCR 19	Central Mixed-grass Prairie Bird Conservation Region
BCR 33	Sonoran and Mohave Deserts Bird Conservation Region
BCR 34	Sierra Madre Occidental Bird Conservation Region
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CPW	Colorado Parks and Wildlife
DoD	Department of Defense
GRTS	Generalized Random-Tessellation Stratification
IBO	Intermountain Bird Observatory
IMBCR	Integrated Monitoring in Bird Conservation Regions
MNRR	Missouri National Recreational River
NABCI	North American Bird Conservation Initiative
NCPN	Northern Colorado Plateau Network
NF	National Forest
NG	National Grassland
NGPN	Northern Great Plains Network
NPS	National Park Service
PLJV	Playa Lakes Joint Venture
RMNW	Rocky Mountain Network
TNC	The Nature Conservancy
UDWR	Utah Division of Wildlife Resources
USFS	US Forest Service
USFWS	US Fish and Wildlife Service
USNG	US National Grid
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). In addition to providing basic information on species distributions, 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); and 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). 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 et al. 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). Accounting 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 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).

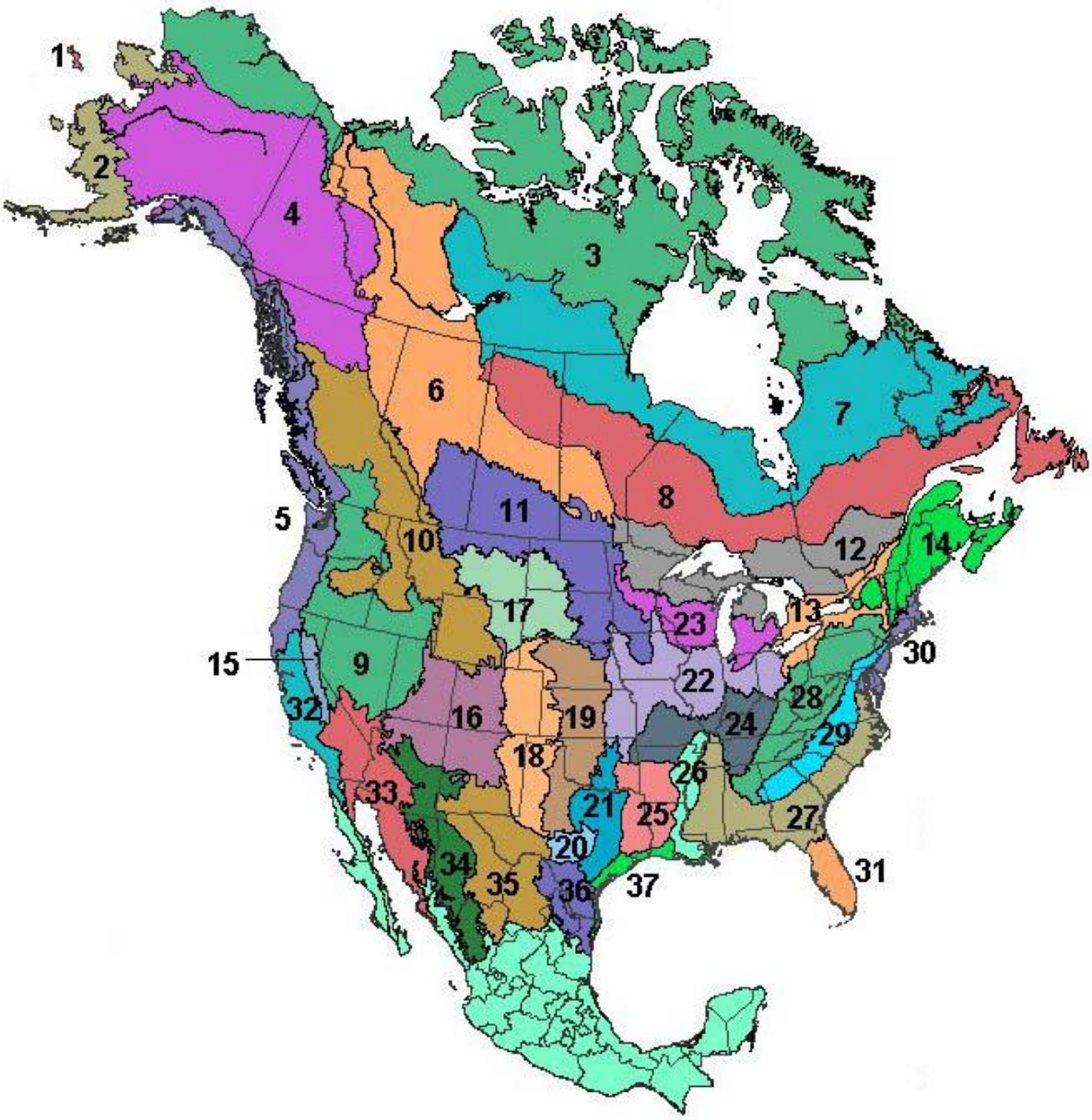


Figure 1. Bird Conservation Regions throughout North America, excluding Hawaii and Mexico (Source: http://www.nabci-us.org/map.html).

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, the IMBCR 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; and
- 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, Bird Conservancy of the Rockies (Bird Conservancy; formerly Rocky Mountain Bird Observatory), in partnership with 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. After a successful pilot year in 1998, Bird Conservancy implemented the protocol in 13 habitats in Colorado in 1999. Bird Conservancy and its partners used this methodology for 10 years and expanded the effort to include parts of Arizona, New Mexico, North Dakota, South Dakota, Utah, and Wyoming.

In 2007, the NABCI Monitoring Subcommittee published "Opportunities for Improving Avian Monitoring" (US North American Bird Conservation Initiative 2007) which offered recommendations for improving the efficiency and effectiveness of avian monitoring in North America. After taking NABCI's recommendations into consideration, IMBCR partners developed a new study design and protocol for statewide bird monitoring in Colorado. The new study design used BCRs as the sampling frame and further stratified by land ownership within each BCR.

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. Furthermore, in Colorado BCR 16, we used cell weighting to target high order rivers and streams (based on Strahler stream order) and higher elevation habitats (e.g. alpine tundra), which occur in a small proportion of the landscape (Blakesley and Hanni 2009). Field crews completed over 209 surveys within BCR 16 and BCR 18, resulting in density estimates for 69 landbird species.

2009

After the 2008 season, IMBCR partners determined the 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. Additionally, the All Other Lands stratum in Wyoming BCR 16 was split into two strata: All Other Lands and BLM Lands.

Based on the overall success of the pilot implementation, IMBCR expanded to include the Colorado and Wyoming portions of the Northern Rockies (BCR 10); the Great Basin (BCR 9) and BCR 18 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).

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 BCR 10 stratum was restratified to include the small easternmost portion of BCR 10 that dips into Colorado so all Colorado BCR 10 lands are represented. The "NPS Rocky Mountain Inventory and Monitoring Network (RMNW)" and "Northern Colorado Plateau Inventory and Monitoring Network (NCPN)" were restratified because some NCPN park units were initially misclassified 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 specifically for the Bridger-Teton National Forest.

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. The Colorado BCR 10 stratum was split into two strata: BLM Lands and All Other Lands. This was done to facilitate improved 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 allowed sampling intensity changes 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 had mixed administration between the Routt National Forest and the Arapahoe and Roosevelt National Forests. 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 km² 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. Stratification by watershed allows for adjusting sampling intensity to target Management Indicator Species on the Forest.

2012

In 2012, we added four strata in Idaho to account for all of BCR10 within the state. We took into account the boundary between USFS Regions 1 and 4, which runs through Idaho, when stratifying so estimates could be generated at the USFS Region level. The new strata include “All Other Lands in the Region 1 portion of Idaho BCR 10” (all lands outside of national forest boundaries), “All Other Lands in the Region 4 portion of Idaho BCR 10” (all lands outside of national forest boundaries), “other USFS lands in the Region 1 portion of Idaho BCR 10” and “USFS designated roadless/wilderness areas within the Region 4 portion of Idaho BCR 10”. In Arizona, Tonto National Forest became a part of the IMBCR survey effort. The forest was stratified into two strata based on elevation to allow sampling intensity changes 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, 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.

2013

2013 brought significant changes to the program’s overall stratification methods. The original IMBCR sampling grids were created at the state scale and as the program expanded, additional sampling grids were created at the BCR scale. In response to a rapidly growing monitoring program, the partnership acknowledged the need for a standard national grid system to promote the coordination and application of monitoring data in conservation. The group proposed the use of the United States National Grid (USNG), a national grid system created by the Federal

Geographic Data Committee, as its standard. There are three advantages to using the USNG. First, the use of standard grids allows for the integration of datasets and subsequent identification of areas where sampling should or has not occurred. Second, it provides a means to identify sampled areas in a consistent manner so results of monitoring projects can be evaluated in a spatially comparable way. Lastly, it facilitates regional and national-level avian distribution modeling and the development of broad-scale avian distribution maps. This standard was approved by the NABCI committee. Bird Conservancy started using the USNG for new stratification and restratification schemes in 2013.

We added several USFS strata to the sampling frame for the 2013 field season – Coronado National Forest in southern Arizona, Carson National Forest in north-central New Mexico, and Caribou-Targhee National Forest in southeastern Idaho. Coronado and Carson National Forests were stratified into two strata based on elevation to allow for adjusting sampling intensity to target Management Indicator Species on the Forests. Because Caribou-Targhee National Forest spans three states and three BCRs, it was necessary to divide the forest into four strata. The state and BCR-level stratification distinctions allowed the summation of the data for individual states or BCRs. The four new strata in Idaho and Utah join a preexisting Caribou-Targhee stratum in west-central Wyoming as a part of Wyoming's statewide effort. In addition, Pawnee National Grassland was split into two strata – public lands and private lands – since Pawnee National Grassland contains a large amount of private land within its administrative boundary. This allowed the USFS to concentrate more survey effort specifically on public lands. In Wyoming, the preexisting stratum in BCR 10 containing all USFS Region 4 lands (other than Bridger-Teton National Forest) was restratified into three separate strata, one for each Forest (Caribou-Targhee, Ashley, and Wasatch). This allows for forest-wide estimates within Caribou-Targhee National Forest. If, in the future, Ashley and Wasatch National Forests are completely sampled, this will also allow for forest-wide estimates in each of those forests.

The North Dakota, South Dakota, and Nebraska portions of BCR 17 underwent a complete restratification to incorporate several NPS Northern Great Plains Inventory and Monitoring Network (NGPN) strata. All of the non-NPS strata in these states were retained, but renamed to avoid confusion. The NPS strata were stratified by NPS unit to allow the NGPN to monitor birds on each of its units separately. New strata included Knife River Indian Villages National Historic Site, Theodore Roosevelt National Park, Badlands National Park, Jewel Cave National Monument, Mount Rushmore National Monument, and Wind Cave National Park.

Nebraska BCR 18 also underwent a complete restratification to allow for the individual stratification of Agate Fossil Beds and Scotts Bluff National Monuments. We also added an additional stratum for Cherry Ranch, a property owned by The Nature Conservancy (TNC).

2014

In Colorado, the Arapaho and Roosevelt and the Pike and San Isabel National Forests were restratified to allow these forests to monitor treatments intended to mitigate fire hazard and improve forest health. We divided each forest into two strata: a control stratum and the remainder of the forest. The control portion of the Arapaho and Roosevelt National Forests consists of lands ranging in elevation from 6,000 ft. (1,829 m) to 9,000 ft. (2,743 m) and excludes treatment areas and areas burned between 1998 and 2013. The Pike and San Isabel control stratum ranges from 6,000 ft. (1,829 m) to 9,500 ft. (2,896 m) and excludes treatment areas and areas burned between 1998 and 2013. We created a single experiment overlay stratum for all of Arapaho and Roosevelt and Pike and San Isabel National Forests consisting of actual treatment areas (areas with >30% treatment). Since this stratum spans multiple forests, it

is not considered to be a part of the IMBCR design; however, detections from this stratum do contribute to the number of detections used in analyses.

Significant stratification changes were made to the BCR 10 portion of Idaho. The four strata defined in the 2012 field season were further subdivided into nine strata. The boundary between USFS Regions 1 and 4 runs through Idaho and was taken into account when restratifying so that estimates could be generated at the USFS Region level. The new strata created in Idaho BCR 10 include the “Idaho portion of Bitterroot National Forest”, “BLM Lands within Idaho BCR10”, “Boise National Forest”, “the Idaho portion of Kootenai National Forest”, “Payette National Forest”, “Salmon-Challis National Forest”, “Sawtooth National Forest”, “All other Lands within Idaho BCR 10 and USFS Region 1” (all lands outside of national forest and BLM boundaries) and “All Other Lands within Idaho BCR 10 and USFS Region 4” (all lands outside of national forest and BLM boundaries). Since Bitterroot and Kootenai National Forests span Idaho and Montana, 2014 density and occupancy estimates for those forests included strata from both states. In the past, “forest-wide” estimates have only represented the Montana portion of these forests.

We subdivided the US Fish and Wildlife Service (USFWS) strata in Montana BCRs 11 and 17 to allow density and occupancy estimation specifically within the Charles M. Russell National Wildlife Refuge. Previously, we grouped all USFWS lands together in these BCRs, limiting estimates for individual refuges. In each BCR, we created two new strata – a Charles M. Russel NWR stratum and an “All Other USFWS Lands” stratum.

In addition to restratification, we added a few new strata to the IMBCR program in 2014. In Nebraska, NGPN began monitoring on the Niobrara National Scenic River spanning BCRs 17 and 19. In Utah, we created a new stratum for Manti-La Sal National Forest. Previously, only the Colorado portion of Manti-La Sal was stratified and surveyed. The additional Utah portion allows for the generation of forest-wide estimates for Manti-La Sal.

2015

In 2015, the Department of Defense (DoD) stratum in Colorado BCR 18 was completely restratified as part of a DoD Legacy Resource Management Program Grant to represent six individual military installations: US Air Force Academy, Fort Carson, Pueblo Chemical Depot, Piñon Canyon, and All Other DoD Lands. This DoD installation-level stratification allows for the generation of density and occupancy estimates for each installation. Fort Carson and Piñon Canyon were further stratified by areas within range fans (training zones) and areas outside of range fans to allow the DoD to assess the effects of military training on bird species.

The Rocky Mountain Arsenal National Wildlife Refuge stratum also came out of the 2015 restratification. During WWII, the Rocky Mountain Arsenal, as it was originally known, was a chemical weapons manufacturing facility. At the time of the 2008 IMBCR stratification in the state Colorado, it was still partially owned by the US Army and was included in the DoD stratum. The refuge is now in its own individual stratum.

The IMBCR program expanded to include the Missouri National Recreational River (MNRR), part of the NPS NGPN in Nebraska and South Dakota. There are two strata for MNRR representing the 39 Mile District and the 59 Mile District. In Utah, an additional stratum was added for Sanpitch Recreation Area. This area is part of Uinta National Forest but administered by Manti-La Sal National Forest and will be incorporated into forest-wide estimates for Manti-La Sal National.

2016

In 2016, the Playa Lakes Joint Venture (PLJV) coordinated a partnership between several state wildlife agencies and Bird Conservancy to expand sampling in five of the joint venture's six states: Nebraska, Kansas, New Mexico, Oklahoma, and Texas. PLJV's sixth state, Colorado, was already included in the IMBCR program starting in 2008. This expansion now provides the program with nearly complete coverage of two BCRs that were only sparsely covered in past years: Shortgrass Prairie (BCR 18) and Central Mixed Grass Prairie (BCR 19). The BCR 18 and 19 portions of these 5 states were divided into several strata, including, playas, rivers, biologically unique landscapes in Nebraska, and all other lands.

The IMBCR program also underwent a major expansion into the state of Utah in 2016. The entire state was stratified into BLM, USFS, DoD, and All Other Lands strata. This year was somewhat of a pilot year, with select BLM, USFS, DoD, and all other lands strata sampled across the state. In future years, sampling will be increased to a statewide level.

In addition to new strata, some existing strata were restratified for a variety of reasons. In North and South Dakota, we restratified the Tribal and All Other Lands strata to ensure all tribal lands were only included in the tribal lands strata. In the past, some tribal lands could still be found within the All Other Lands strata. We also restratified Cimarron, Kiowa, and Rita Blanca National Grasslands in Kansas, Oklahoma, New Mexico, and Texas. With the expansion of IMBCR throughout the PLJV region, these strata needed to be fit to the US National Grid to make them consistent with the rest of the IMBCR program in the region. In addition, we determined that the portion of Rita Blanca National Grassland that fell in New Mexico was actually managed by Kiowa National Grassland, so that portion was moved to the Kiowa National Grasslands stratum. All DoD lands in Colorado BCR18 were combined into one stratum. This was the same stratification used prior to 2015.

Methods

Study Area

In 2016, IMBCR encompassed 2 entire states (Colorado and Wyoming) and portions of 11 additional states (Arizona, Idaho, Kansas, Montana, North Dakota, Nebraska, New Mexico, Oklahoma, South Dakota, Texas and Utah); 2 entire USFS Regions (Regions 1 and 2) and portions of Regions 3 and 4; all of the Badlands and Prairies BCR and almost all of the Shortgrass Prairie BCR and portions of 7 additional BCRs (Great Basin, Northern Rockies, Prairie Potholes, Southern Rockies/Colorado Plateau, Central Mixed-grass Prairie, Sonoran and Mohave Deserts, and Sierra Madre Occidental; Figure 2).

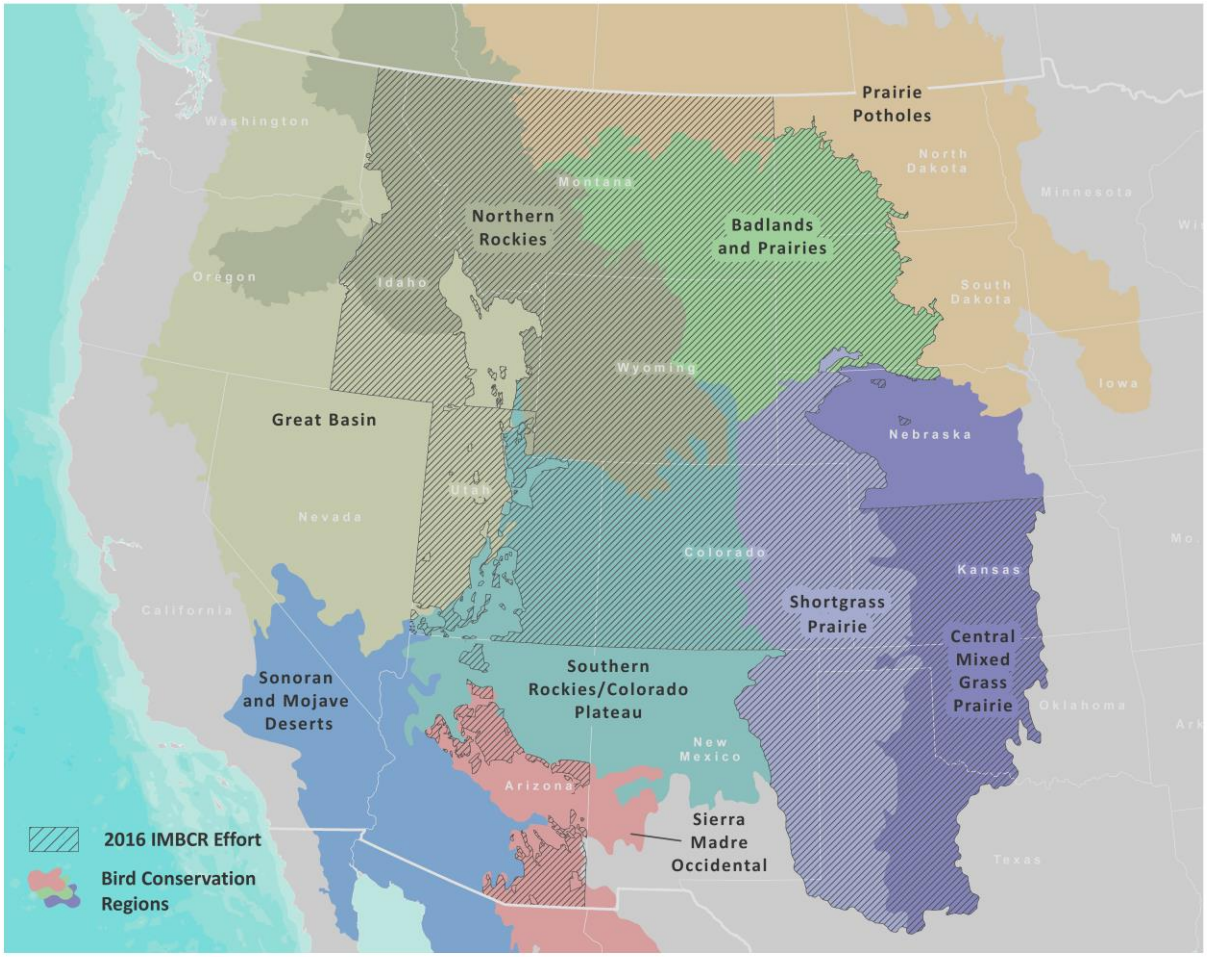


Figure 2. Spatial extent of sampled strata using the IMBCR design, 2016.

BCR 9: Great Basin

The Great Basin Bird Conservation Region is a large area encompassing a wide variety of habitats throughout lowlands and mountains (US North American Bird Conservation Initiative 2000). It is a mostly dry region of grassland and semi-desert shrubland spread across the lowlands and flat country, interspersed with a few marshes and lakes that are very important to shorebirds and waterbirds. At higher elevations Pinyon-Juniper woodlands and Ponderosa Pine forests transition into Lodgepole Pine and sub-alpine fir forests. BCR 9 covers portions of British Columbia, Washington, Oregon, California, Nevada, Idaho, Utah, and Wyoming.

This was the sixth year we implemented IMBCR within BCR 9. Bird Conservancy, DoD, Intermountain Bird Observatory (IBO), and Utah Division of Wildlife Resources (UDWR) conducted surveys within the Idaho, Utah, and Wyoming portions of BCR 9 comprising 19 strata covering 115,114 km².

BCR 10: Northern Rockies

The Northern Rockies Bird Conservation Region 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 eighth year we implemented IMBCR within BCR 10. Bird Conservancy and Wyoming Natural Diversity Database (WYNDD) conducted surveys throughout the Colorado and Wyoming portions of BCR 10 and IBO conducted surveys within BLM and USFS lands in Idaho and Montana. The effort in BCR 10 comprised 66 strata covering 338,349 km².

BCR 11: Prairie Potholes

The Prairie Potholes Bird Conservation Region consists of 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 seventh year we implemented IMBCR within BCR 11. IBO conducted surveys within the Montana portion of BCR 11 and Bird Conservancy conducted surveys in NPS lands in Nebraska and South Dakota. The effort in BCR 11 comprised eight strata covering 83,906 km².

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 shrub steppe; 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 ninth year we implemented IMBCR within BCR 16. Bird Conservancy and WYNDD conducted surveys across the Colorado and Wyoming portions of BCR 16, as well as the BCR16 portion of Kaibab and Coconino National Forests in Arizona; Bird Conservancy and IBO conducted surveys in the Caribou-Targhee National Forest in Idaho and Utah, Ashley National Forest in Utah, and Manti-La Sal National Forest in Utah; and UDWR conducted surveys in private lands in Utah. This area comprises 31 strata covering 225,801 km².

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 Black Hills and western portions of BCR 17 contain 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 eighth year we implemented IMBCR within BCR 17. IBO, Bird Conservancy, and WYNDD conducted surveys throughout the entire BCR comprising 37 strata covering 364,010 km².

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, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming.

This was the ninth year we implemented IMBCR within BCR 18. In BCR 18, Bird Conservancy conducted surveys throughout Colorado, Kansas, Nebraska, New Mexico, Oklahoma, Texas, and Wyoming. The only portion of BCR 18 not surveyed in 2016 was the small area within South Dakota. The effort in BCR 18 comprised 37 strata covering 381,286 km².

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 the southern border of South Dakota through Nebraska, Kansas, Oklahoma, and north-central Texas.

This was the sixth year we implemented IMBCR within BCR 19. In BCR 19, Bird Conservancy conducted surveys throughout Kansas, Oklahoma, and Texas; and within USFS lands in BCR 19 in Nebraska. The effort in BCR 19 comprised 11 strata covering 274,583 km².

BCR 33: Sonoran and Mohave Deserts

The Sonoran and Mohave Deserts Bird Conservation Region is an arid region known for creosote, cacti, and other desert shrubs (US North American Bird Conservation Initiative 2000). This BCR covers southeastern California, southern Nevada, southwestern Utah, southwestern Arizona, and extends south into Mexico.

This was the third year IMBCR was implemented within BCR 33. Previously Bird Conservancy conducted surveys in two strata in Tonto National Forest in 2012 and 2013. In 2016, we surveyed in one All Other Lands stratum in Utah covering an area of 65 km^2.

BCR 34: Sierra Madre Occidental

The Sierra Madre Occidental Bird Conservation Region contains 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 eighth year we implemented IMBCR within BCR 34. Bird Conservancy conducted surveys in Coconino and Kaibab National Forests within BCR 34, comprising three strata covering 13,927 km².

Sampling Design

Sampling Frame and Stratification

A key component of the IMBCR design is the ability to infer 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 statewide estimates; data from each individual stratum in BCR 17 are combined to produce BCR-wide estimates.

We defined strata based on areas to which IMBCR partners wanted to make inferences. We defined the largest scale strata by the intersection of state and BCR boundaries (e.g., Wyoming BCR 10). We based the smaller-order strata within BCRs 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 km² cells, each containing 16 evenly-spaced sample points, 250 meters apart (Figure 3). We define potential sampling units by superimposing a uniform grid of cells over each state in the study area, then we assign each cell to a stratum using ArcGIS version 10.X and higher (Environmental Systems Research Institute 2006).

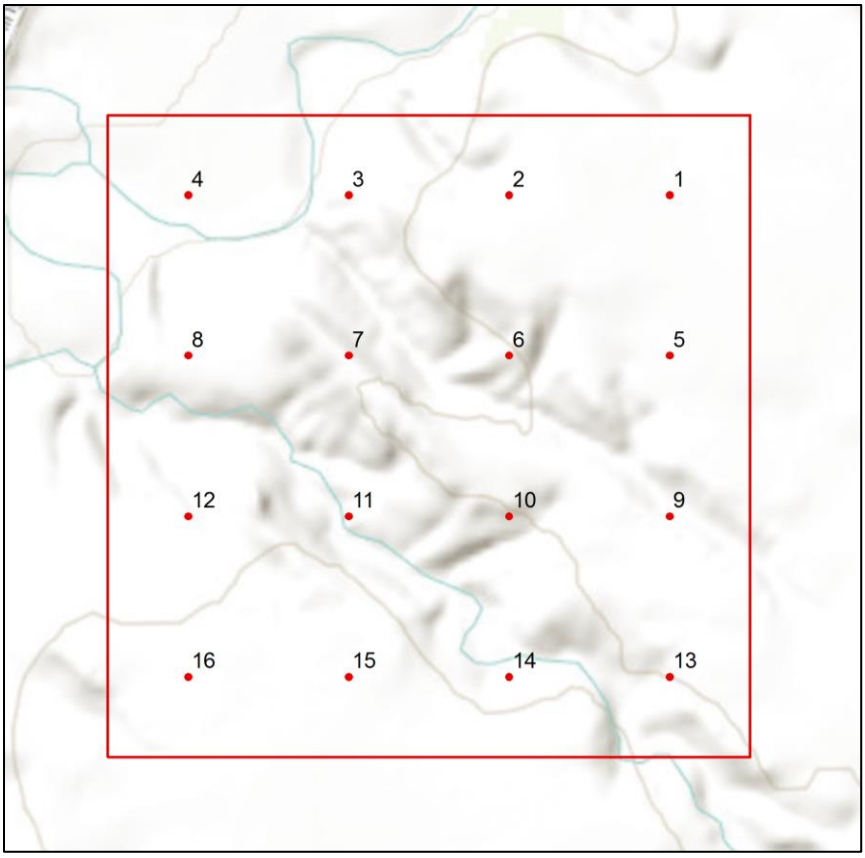


Figure 3. Example 1 km² sampling unit using the IMBCR design.

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.

Sampling Methods

IMBCR surveyors (also referred to as field technician, technician or observer in this report), with excellent aural and visual bird-identification skills, conducted field work in 2016. Prior to

conducting surveys, technicians completed an intensive training program to ensure full understanding of the field protocol; review bird and plant identification; and 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. 2014, Hanni et al. 2015). Observers conducted surveys in the morning, beginning one-half hour before sunrise and concluding no later than five 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 possible. When it was not possible to measure the distance to a bird, observers estimated the distance by measuring to some object near the bird using a laser rangefinder. In addition to recording all bird species detected in the area during point counts, observers recorded birds flying over but not using the immediate surrounding landscape. Observers also recorded Abert's squirrel (*Sciurus aberti*), American red squirrels (*Tamiasciurus hudsonicus*), and American pika (*Ochotona princeps*). While observers traveled between points within a sampling unit, they recorded the presence of any species not recorded during a point count. 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 via ocular estimation. 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 Bird Conservancy's Field Protocol for Spatially Balanced Sampling of Landbird Populations on our Avian Data Center website at http://rmbo/v3/avian/DataCollection.aspx. There you will find links to past and current protocols and data sheets.

Limitations

The primary limitation in estimating avian population parameters using the IMBCR approach is sample size within strata. A minimum number of two samples per stratum is necessary to estimate regional density and occupancy. 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, adding more samples to a particular stratum does not bias the overall estimate it simply increases the precision.

Protocol Changes Over Time

The original protocol implemented in 2008 has changed and evolved 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. We added categorical habitat options to facilitate data proofing, to incorporate habitat in analysis and to link the IMBCR data and results with the older habitat-based monitoring program. Technicians also began recording the presence of water and snow within 50 m of each point as a type of ground cover.

Beginning in 2010, the point count duration was increased from five minutes to six minutes to facilitate occupancy estimation, which 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. We added a "visual" checkbox 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 for birds in addition to listening for them and helps crew leaders make decisions regarding unusual or rare bird detections while proofing data. We provided technicians with an additional datasheet to record the reasons points were not surveyed (e.g., weather issues, unsafe terrain, denied permission by landowner, etc.). This sheet also provided space to record additional landowner information as needed. Lastly, technicians began recording horizontal distance to each flyover detection. In the past, we did not record distances because we do not use flyover detections in analysis. However, technicians sometimes incorrectly distinguish flyovers from birds using the surrounding habitat while foraging on the wing (e.g., swallows, swifts, and raptors). Therefore, if we find an incorrectly recorded flyover, we can still use the detection data in analysis.

In 2012, technicians began recording the start time for every point count conducted so we could use temporal information as a variable in analyses. Start times for the entire transect and for individual points were all recorded in Mountain Daylight Time for consistency across the region. Prior to 2012, technicians were allowed to conduct point counts until 11:00 AM local time each day. In order to account for variability across study areas from Arizona to Montana, crew leaders instructed technicians to survey no later than five hours after sunrise in 2012. Technicians also began noting migrant detections on surveys. After the field season, we thoroughly review the migrant records; if those records are verified, they are not included in analysis. Previously, crew leaders instructed technicians to record a bird as a male if 1) it was a singing warbler or sparrow, or 2) it was singing repeatedly and emphatically. In 2012, we instructed technicians to only identify the sex of a visually observed bird of a sexually dimorphic species. We instructed technicians to record subspecies only if they visually identified a bird as such. In the past, we used geographic range to assume a bird was of a particular subspecies. Up until the 2012 field season, we provided technicians with 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, we eliminated the list and technicians recorded any species they came across while traveling between points they had not documented during a point count.

That way all species encountered within the sampling unit would be documented for distribution mapping purposes.

Also in 2012, several changes were made to the vegetation datasheet. First, we removed distance to the nearest road, forest structural stage and human structures from the data sheet. We no longer collect these types of data in the field because they can be obtained through remote sensing. Second, we modified the datasheet to simply record whether a mid-story was present. In the past, if mid-story vegetation was present, technicians would record the species found in that layer. Data analysis found mid-story vegetation data to be extremely variable from year to year. Third, we added a ground cover category for residual grass. Finally, we limited acceptable overstory, understory, and ground cover relative abundance values to 1%, 5%, or increments of 10%. In the past, technicians estimated cover to the nearest percent for all categories where percent cover or relative abundance was recorded. We made the change to improve the consistency of cover and relative abundance estimates and to decrease the amount of time technicians spend estimating these values.

In 2012, crew leaders provided technicians with 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 data sheet contained the name, contact information and any pertinent notes about the landowner. 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.

In 2015, we began recording American pika, similarly to the way we record Abert's and American red squirrels. Other than this addition, there have been no protocol changes since 2012.

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 five critical assumptions be met: 1) all birds at and near the sampling location (distance = 0) are detected; 2) distances to birds are measured accurately; 3) birds do not move in response to the observer's presence (Buckland et al. 2001, Thomas et al. 2010); 4) cluster sizes are recorded without error; and 5) the sampling units are representative of the entire survey region (Buckland et al. 2008).

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 these data separately for each species. The development of robust density estimates typically requires 80 or more independent detections ($n \geq 80$) within the entire sampling area. We excluded birds flying over, but not using the immediate surrounding landscape, birds detected while migrating (not breeding), juvenile birds and birds detected between points from analyses.

We estimated density for each species using a sequential framework where 1) year specific detection functions were applied to species with greater than or equal to 80 detections per year ($n \geq 80$), 2) global detection functions were applied to species with less than 80 detections per year ($n < 80$) and greater than or equal to 80 detections over the life of the project ($n \geq 80$) and 3) remedial measures were used for species with moderate departures from the assumptions of distance sampling (Buckland et al. 2001).

Beginning in 2015, we streamlined the analysis by fitting models with no series expansions to all species using the recommended 10% truncation for point transects. For the year specific detection functions, we fit Conventional Distance Sampling models using the half-normal and hazard-rate key functions with no series expansions (Thomas et al. 2010). For the global detection functions, in addition to the above models, we fit Multiple-Covariate Distance Sampling models using half-normal and hazard-rate key function models with a categorical year covariate and no series expansions (Thomas et al. 2010). We selected the most parsimonious detection function for each species using Akaike's Information Criterion adjusted for sample size (AIC_c) (Burnham and Anderson 2002, Thomas et al. 2010) and considered the most parsimonious model as the estimation model. We estimated population size ($\widehat{N}$) for each stratum as $\widehat{N} = \widehat{D}^*A$, where $\widehat{D}$ was the estimated population density and A was the number of 1 km² sampling units in each stratum. We calculated Satterthwaite 90% Confidence Intervals (CI) for the estimates of density and population size for each stratum (Buckland et al. 2001). In addition, we combined the stratum-level density estimates at various spatial scales, such as management entity, State and BCR, using an area-weighted mean. For the combined density estimates, we estimated the variance for detection and cluster size using the delta method (Powell 2007, Thomas et al. 2010) and the variance for the encounter rate using the design-based estimator of Fewster et al. (2009).

We reviewed the highest ranking detection function for each species to check the shape criteria, evaluate the fit of the model and identify species with moderate departure from the assumptions of distance sampling (Buckland et al. 2001). First, we checked the shape criteria of the histogram to make sure the detection data exhibited a "shoulder" that fell away at increasing distances from the point. Second, we evaluated the fit of the model using the Kolmogorov-Smirnov goodness-of-fit test. Finally, we visually inspected the detection histograms to identify species that demonstrated evasive movement and/ or measurement errors. We looked for a type of measurement error involving the heaping of detections at certain distances that occurs when observers round detection distances. We also looked for histograms with detections that were highly skewed to the right, which may indicate a pattern of evasive movement (Buckland et al. 2001).

For species with moderate departures from the assumptions and shape criteria, we used two sequential remedial measures. First, we truncated the data to the point where detection probability was approximately 0.1 [$g(w) \sim 0.1$] and included key functions with second order cosine series-expansion terms in the candidate set of models (Buckland et al. 2001). We did not include detection function models with a single cosine expansion term because the half-normal and hazard-rate models require the order of the terms are > 1 (Buckland et al. 2001). Second, when the goodness-of-fit test and/ or inspection of the detection histogram continued to suggest evasive movement and/or measurement errors, we grouped the distance data into four to eight bins and applied custom truncation and second order expansion terms. These remedial measures can ameliorate problems associated with moderate levels of evasive movement and/ or distance measurement errors (Buckland et al. 2001).

Occupancy Analysis

Occupancy estimation is most commonly used to quantify the proportion of sample units (i.e., 1 km² 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). We used a removal design (MacKenzie et al. 2006), to estimate a detection probability for each species, in which 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. 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 (θ, Theta) and 3) the proportion of sampling units occupied by a species (ψ, Psi).

We truncated the data, using only detections less than 125 m from the sample points. Truncating the data at less than 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)

We expected 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, *p* and Theta were held constant across the BCRs and/or allowed to vary by BCR. Models are defined as follows:

Model 1: Held *p* and Theta 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; and
Model 4: Allowed both *p* and Theta to vary across BCRs.

We ran model 1 for species with less than 10 point detections in each BCR or less than 10 point detections in all but one BCR. We ran models 1 through 4 for species with greater than 10 point detections in more than one BCR. For the purpose of estimating regional variation in detection (*p*) and availability (Theta), we pooled data for BCRs with fewer than 10 point detections into adjacent BCRs with sufficient numbers of detections. We used model selection and AIC corrected for small sample size (AIC_c) to weight models from which estimates of 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% CIs (Burnham and Anderson 2002). We combined stratum-level estimates of Psi using an area-weighted mean. The variances and standard errors for the combined estimates of Psi were estimated using the delta method (Powell 2007).

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).

Automated Analysis

We estimated population density using point transect distance sampling and site occupancy using the multi-scale occupancy model within a modified version of the RIMBCR package (R Core Team 2014; Paul Lukacs, University of Montana, Missoula). The RIMBCR package streamlined the analyses by calling the raw data from the IMBCR Structured Query Language (SQL) server database and incorporated the R code created in previous years. We allowed the input of all data collected in a manner consistent with the IMBCR design to increase the number of detections available for estimating global detection rates for population density and site occupancy. The RIMBCR package used package mrds (Thomas et al. 2010, R Core Team 2014) to fit the point transect distance sampling model, and program MARK (White and Burnham 1999) and package RMark (Laake 2013, R Core Team 2014) to fit the multi-scale occupancy model. The RIMBCR package provided an automated framework for combining strata-level estimates of population density and site occupancy at multiple spatial scales, as well as approximating the standard errors and CIs for the combined estimates.

In October 2014, we revised the RIMBCR distance sampling code to accommodate updates to package mrds 2.18. However, because we were unable to troubleshoot the complex structure of the RIMBCR code, we completely rewrote the distance sampling code between October 2014 and April 2015. The updated distance sampling code retained the “roll-up” code for combining the strata-level estimates from the previous version of RIMBCR. In March 2015, we discovered a delta method (Powell 2007) error in the RIMBCR “roll-up” code (Powell 2007). We estimated the proportion of sampling units occupied (Psi) for all species that estimates the standard errors and CIs for the combined occupancy estimates. In April 2015, we revised RIMBCR to fix the error, but we were unable to troubleshoot the complex structure of the RIMBCR code. We plan to rewrite the RIMBCR occupancy code in way that allows testing, but in the meantime, we developed an R “roll-up” patch that correctly estimates the standard errors and CIs for the combined occupancy estimates. We reran the “roll-up” patch for 2012-2014 to retroactively correct the standard errors and CIs for the previous combined (superstrata) occupancy estimates. We currently maintain version control of the automated analysis code in the Bird Conservancy repository (Atlassian Stash, version 3.6.1).

Results

In 2016, field technicians completed 1,551 of 1,590 (97.5%) planned surveys throughout all or portions of BCRs 9, 10, 11, 16, 17, 18, 19, 33 and 34 using the IMBCR design (Table 1, Figure 2). Reasons surveys were not completed are summarized in Table 2. Technicians conducted 17,697 point counts within the 1,551 surveyed sampling units between 26 April and 19 July 2016. They detected 235,784 individual birds representing 335 species.

Please note that not every stratum or superstratum is summarized in this report. We include details of specific strata or superstrata for which our partners are most interested. Results from all strata and all biologically meaningful superstrata can be found on the Rocky Mountain Avian Data Center (http://rmbo.org/v3/avian/ExploretheData.aspx).This online database contains interactive maps showing survey and detection locations, as well as species counts and density, population and occupancy results using the IMBCR study design. 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 superstratum presented in the Results section contains a web link that leads directly to the Avian Data Center with the appropriate queries already populated.

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, seventh edition (2007).

Table 1. Planned and completed surveys, by stratum, 2016. BCR = Bird Conservancy of the Rockies; DoD = Department of Defense; IBO = Intermountain Bird Observatory; UDWR = Utah Division of Wildlife Resources; WYNDD = Wyoming Natural Diversity Database.

State	BCR	Stratum	Stratum Definitions	Collected By	Area (km^2)	Planned	Completed	% Completed
AZ	16/34	AZ-BCR34-CF	Coconino National Forest	BCR	7,426	40	40	100.0%
AZ	16/34	AZ-KAIBAB-KH	Kaibab National Forest - High Elevation	BCR	4,319	30	30	100.0%
AZ	16/34	AZ-KAIBAB-KL	Kaibab National Forest - Low Elevation	BCR	2,182	15	15	100.0%
				Subtotal	**13,927**	**85**	**85**	**100.0%**
CO	10	CO-BCR10-AO	All Other Lands	BCR	5,060	5	5	100.0%
CO	10	CO-BCR10-BL	Bureau of Land Management	BCR	4,288	8	8	100.0%
				Subtotal	**9,348**	**13**	**13**	**100.0%**
CO	16	CO-BCR16-AO	All Other Lands	BCR	51,214	20	20	100.0%
CO	16	CO-BCR16-BL	Bureau of Land Management	BCR	27,825	25	25	100.0%
CO	16	CO-BCR16-GM	Grand Mesa; Uncompahgre and Gunnison National Forests	BCR	13,630	7	7	100.0%
CO	16	CO-BCR16-MA	Manti-La Sal National Forest	BCR	131	2	2	100.0%
CO	16	CO-BCR16-NC	National Park Service - Northern Colorado Plateau Network	BCR	807	2	2	100.0%
CO	16	CO-BCR16-PC	Pike-San Isabel National Forest Control	BCR	1,300	30	30	100.0%
CO	16	CO-BCR16-PO	Pike-San Isabel National Forest All Other	BCR	9,650	5	5	100.0%
CO	16	CO-BCR16-RA	Rio Grande National Forest - High Elevation	BCR	866	8	8	100.0%
CO	16	CO-BCR16-RC	Arapaho-Roosevelt National Forest Control	BCR	780	30	30	100.0%
CO	16	CO-BCR16-RM	National Park Service - Rocky Mountain Network	BCR	1,644	2	2	100.0%
CO	16	CO-BCR16-RO	Routt National Forest	BCR	5,734	15	15	100.0%
CO	16	CO-BCR16-RP	Rio Grande National Forest - Middle Elevation	BCR	5,410	8	8	100.0%
CO	16	CO-BCR16-RS	Rio Grande National Forest - Low Elevation	BCR	1,896	8	8	100.0%
CO	16	CO-BCR16-SA	San Juan National Forest	BCR	8,794	7	7	100.0%
CO	16	CO-BCR16-SC	National Park Service - Southern Colorado Plateau Network	BCR	214	2	2	100.0%
CO	16	CO-BCR16-VO	Arapaho-Roosevelt National Forest All Other	BCR	6,152	5	5	100.0%
CO	16	CO-BCR16-WA	White River National Forest - High Elevation	BCR	2,138	6	6	100.0%
CO	16	CO-BCR16-WF	USFS - Williams Fork Management Unit	BCR	551	7	7	100.0%
CO	16	CO-BCR16-WP	White River National Forest - Middle Elevation	BCR	5,443	6	6	100.0%
CO	16	CO-BCR16-WS	White River National Forest - Low Elevation	BCR	2,786	6	6	100.0%
				Subtotal	**146,965**	**201**	**201**	**100.0%**
CO	18	CO-BCR18-AR	Arkansas River and Tributaries	BCR	1,127	8	8	100.0%

State	BCR	Stratum	Stratum Definitions	Collected By	Area (km^2)	Planned	Completed	% Completed
CO	18	CO-BCR18-CO	Comanche National Grassland	BCR	4,836	8	8	100.0%
CO	18	CO-BCR18-DO	Department of Defense - All Other Lands	BCR	1,647	2	2	100.0%
CO	18	CO-BCR18-IA	Area between I-70 and the Arkansas River	BCR	34,755	8	8	100.0%
CO	18	CO-BCR18-NP	Area North of the Platte River	BCR	11,457	8	8	100.0%
CO	18	CO-BCR18-PC	Pawnee National Grassland - Private Lands	BCR	2,458	2	2	100.0%
CO	18	CO-BCR18-PG	Pawnee National Grassland - Public Lands	BCR	810	5	5	100.0%
CO	18	CO-BCR18-PI	Area between the Platte River and I-70	BCR	30,365	8	8	100.0%
CO	18	CO-BCR18-PT	Platte River and Tributaries	BCR	970	8	8	100.0%
CO	18	CO-BCR18-SA	Area South of the Arkansas River	BCR	24,985	8	8	100.0%
				Subtotal	**113,410**	**65**	**65**	**100.0%**
ID	9	ID-BCR9-BR	BLM Bruneau Field Office	IBO	5,975	7	7	100.0%
ID	9	ID-BCR9-BU	BLM Burley Field Office	IBO	3,269	7	7	100.0%
ID	9	ID-BCR9-CT	Caribou-Targhee National Forest	BCR	1,940	3	3	100.0%
ID	9	ID-BCR9-FR	BLM Four Rivers Field Office	IBO	3,616	6	6	100.0%
ID	9	ID-BCR9-JA	BLM Jarbidge Field Office	IBO	5,497	7	7	100.0%
ID	9	ID-BCR9-OW	BLM Owyhee Field Office	IBO	5,010	7	7	100.0%
ID	9	ID-BCR9-SH	BLM Shoshone Field Office	IBO	5,301	19	19	100.0%
				Subtotal	**30,608**	**56**	**56**	**100.0%**
ID	10	ID-BCR10-BI	Bitterroot National Forest	IBO	1,916	2	2	100.0%
ID	10	ID-BCR10-BO	Boise National Forest	IBO	8,778	4	4	100.0%
ID	10	ID-BCR10-CL	Clearwater National Forest - Roaded/Managed	IBO	1,946	16	16	100.0%
ID	10	ID-BCR10-CR	Clearwater National Forest - Roadless/Wilderness	IBO	5,036	6	6	100.0%
ID	10	ID-BCR10-CT	Caribou-Targhee National Forest	BCR	7,752	8	8	100.0%
ID	10	ID-BCR10-FR	BLM Four Rivers Field Office	IBO	1,269	2	2	100.0%
ID	10	ID-BCR10-IP	Idaho Panhandle National Forest - Roaded/Managed	IBO	8,660	26	26	100.0%
ID	10	ID-BCR10-IR	Idaho Panhandle National Forest - Roadless/Wilderness	IBO	3,155	7	7	100.0%
ID	10	ID-BCR10-KO	Kootenai National Forest	IBO	169	2	2	100.0%
ID	10	ID-BCR10-NP	Nez Perce National Forest - Roaded/Managed	IBO	2,864	16	16	100.0%
ID	10	ID-BCR10-NR	Nez Perce National Forest - Roadless/Wilderness	IBO	6,370	6	6	100.0%
ID	10	ID-BCR10-PA	Payette National Forest	IBO	9,857	4	4	100.0%
ID	10	ID-BCR10-SA	Salmon-Challis National Forest	IBO	13,563	4	4	100.0%

State	BCR	Stratum	Stratum Definitions	Collected By	Area (km^2)	Planned	Completed	% Completed
ID	10	ID-BCR10-SH	BLM Shoshone Field Office	IBO	507	2	2	100.0%
ID	10	ID-BCR10-SW	Sawtooth National Forest	IBO	6,302	4	4	100.0%
				Subtotal	**78,144**	**109**	**109**	**100.0%**
ID	16	ID-BCR16-CT	Caribou-Targhee National Forest	BCR	909	2	2	100.0%
KS	18	KS-BCR18-AO	Kansas BCR 18 All Other Lands	BCR	34,794	8	8	100.0%
KS	18	KS-BCR18-CM	Cimarron National Grassland	BCR	430	3	3	100.0%
KS	18	KS-BCR18-PL	Kansas BCR 18 Playas	BCR	370	2	2	100.0%
KS	18	KS-BCR18-RV	Kansas BCR 18 Rivers	BCR	1,409	2	2	100.0%
				Subtotal	**37,003**	**15**	**15**	**100.0%**
KS	19	KS-BCR19-AO	Kansas BCR 19 All Other Lands	BCR	98,649	8	8	100.0%
KS	19	KS-BCR19-PL	Kansas BCR 19 Playas	BCR	176	2	2	100.0%
KS	19	KS-BCR19-RV	Kansas BCR 19 Rivers	BCR	10,523	2	2	100.0%
				Subtotal	**109,348**	**12**	**12**	**100.0%**
MT	10	MT-BCR10-BE	Beaverhead-Deerlodge National Forest - Roaded/Managed	IBO	7,697	10	10	100.0%
MT	10	MT-BCR10-BI	Bitterroot National Forest - Roaded/Managed	IBO	2,324	10	10	100.0%
MT	10	MT-BCR10-BM	Bureau of Land Management - Missoula/Butte	IBO	1,356	2	2	100.0%
MT	10	MT-BCR10-BR	Beaverhead-Deerlodge National Forest - Roadless/Wilderness	IBO	8,236	3	3	100.0%
MT	10	MT-BCR10-BS	Bureau of Land Management - southwestern Montana	IBO	3,447	2	2	100.0%
MT	10	MT-BCR10-BW	Bitterroot National Forest - Roadless/Wilderness	IBO	2,763	3	3	100.0%
MT	10	MT-BCR10-CR	Custer National Forest - Roadless/Wilderness	IBO	1,783	3	3	100.0%
MT	10	MT-BCR10-CU	Custer National Forest - Roaded/Managed	IBO	779	3	3	100.0%
MT	10	MT-BCR10-FL	Flathead National Forest - Roaded/Managed	IBO	4,945	10	10	100.0%
MT	10	MT-BCR10-FR	Flathead National Forest - Roadless/Wilderness	IBO	6,410	3	3	100.0%
MT	10	MT-BCR10-GA	Gallatin National Forest - Roaded/Managed	IBO	3,479	10	10	100.0%
MT	10	MT-BCR10-GR	Gallatin National Forest - Roadless/Wilderness	IBO	5,787	3	3	100.0%
MT	10	MT-BCR10-HE	Helena National Forest - Roaded/Managed	IBO	3,024	10	10	100.0%
MT	10	MT-BCR10-HR	Helena National Forest - Roadless/Wilderness	IBO	2,248	3	3	100.0%
MT	10	MT-BCR10-KO	Kootenai National Forest - Roaded/Managed	IBO	7,239	26	26	100.0%
MT	10	MT-BCR10-KR	Kootenai National Forest - Roadless/Wilderness	IBO	1,887	7	7	100.0%
MT	10	MT-BCR10-LC	Lewis and Clark National Forest - Roaded/Managed	IBO	2,778	5	5	100.0%

State	BCR	Stratum	Stratum Definitions	Collected By	Area (km^2)	Planned	Completed	% Completed
MT	10	MT-BCR10-LO	Lolo National Forest - Roaded/Managed	IBO	7,742	10	10	100.0%
MT	10	MT-BCR10-LR	Lewis and Clark National Forest - Roadless/Wilderness	IBO	5,007	3	3	100.0%
MT	10	MT-BCR10-LW	Lolo National Forest - Roadless/Wilderness	IBO	3,859	3	3	100.0%
				Subtotal	**82,790**	**129**	**129**	**100.0%**
MT	11	MT-BCR11-AO	All Other Lands	BCR	62,631	2	2	100.0%
MT	11	MT-BCR11-BN	Bureau of Land Management - North Valley	IBO	1,588	9	8	88.9%
MT	11	MT-BCR11-BO	Bureau of Land Management - Other	IBO	6,826	9	9	100.0%
MT	11	MT-BCR11-CM	Charles M. Russell National Wildlife Refuge	BCR	93	2	2	100.0%
MT	11	MT-BCR11-FO	All other USFWS lands	BCR	448	2	2	100.0%
MT	11	MT-BCR11-TR	Rocky Boys; Fort Peck; Fort Belknap and Blackfeet Reservations	BCR	11,829	2	2	100.0%
				Subtotal	**83,415**	**26**	**25**	**96.2%**
MT	17	MT-BCR17-AO	All Other Lands	IBO	102,779	16	16	100.0%
MT	17	MT-BCR17-BL	Bureau of Land Management	IBO	25,013	9	9	100.0%
MT	17	MT-BCR17-CM	Charles M. Russell National Wildlife Refuge	IBO	3,709	2	2	100.0%
MT	17	MT-BCR17-CU	Custer National Forest	IBO	2,649	6	6	100.0%
MT	17	MT-BCR17-FO	All other USFWS lands	IBO	326	2	2	100.0%
MT	17	MT-BCR17-LC	Lewis and Clark National Forest	IBO	867	3	3	100.0%
MT	17	MT-BCR17-RI	Rivers - Yellowstone; Tongue; Musselshell; and Missouri	IBO	4,575	2	2	100.0%
				Subtotal	**139,918**	**40**	**40**	**100.0%**
ND	17	ND-BCR17-BM	Bureau of Land Management	BCR	165	5	5	100.0%
ND	17	ND-BCR17-KR	Knife River Indian Villages National Historic Site	BCR	5	5	5	100.0%
ND	17	ND-BCR17-MG	Little Missouri National Grassland	BCR	4,133	5	5	100.0%
ND	17	ND-BCR17-ON	All Other Lands	BCR	45,456	10	10	100.0%
ND	17	ND-BCR17-RG	Cedar River National Grassland	BCR	20	5	5	100.0%
ND	17	ND-BCR17-TI	Tribal Lands	BCR	4,780	2	2	100.0%
ND	17	ND-BCR17-TN	Theodore Roosevelt National Park - North Unit	BCR	100	6	6	100.0%
ND	17	ND-BCR17-TS	Theodore Roosevelt National Park - South Unit	BCR	193	8	8	100.0%
				Subtotal	**54,852**	**46**	**46**	**100.0%**
NE	17	NE-BCR17-LG	Oglala National Grassland	BCR	350	3	3	100.0%
NE	17	NE-BCR17-OW	All Other Lands	BCR	1,898	2	2	100.0%
NE	17	NE-NGPIM-NI	Niobrara National Scenic River	BCR	64	14	14	100.0%

State	BCR	Stratum	Stratum Definitions	Collected By	Area (km^2)	Planned	Completed	% Completed
				Subtotal	**2,312**	**19**	**19**	**100.0%**
NE	18	NE-BCR18-AF	Agate Fossil Beds National Monument	BCR	12	9	9	100.0%
NE	18	NE-BCR18-AO	Nebraska BCR 18 All Other Lands	BCR	28,452	8	7	87.5%
NE	18	NE-BCR18-GG	Oglala National Grassland	BCR	31	3	3	100.0%
NE	18	NE-BCR18-PR	Nebraska BCR 18 Pineridge BUL	BCR	1,885	8	8	100.0%
NE	18	NE-BCR18-RD	Nebraska National Forest - Pine Ridge	BCR	200	3	3	100.0%
NE	18	NE-BCR18-SA	Nebraska BCR 18 Sandsage BUL	BCR	2,894	8	8	100.0%
NE	18	NE-BCR18-SB	Scotts Bluff National Monument	BCR	13	7	7	100.0%
NE	18	NE-BCR18-WH	Nebraska BCR 18 Wildcat Hills BUL	BCR	1,665	8	8	100.0%
				Subtotal	**35,152**	**54**	**53**	**98.1%**
NE	19	NE-BCR19-BE	Nebraska National Forest - Bessey District	BCR	361	3	3	100.0%
NE	19	NE-BCR19-SG	Samuel R. McKelvie National Forest	BCR	468	3	3	100.0%
				Subtotal	**829**	**6**	**6**	**100.0%**
NE/SD	11	MR-NGPIM-FM	Missouri National Recreational River - 59 Mile District	BCR	243	8	8	100.0%
NE/SD	11	MR-NGPIM-TM	Missouri National Recreational River - 39 Mile District	BCR	248	8	8	100.0%
				Subtotal	**491**	**16**	**16**	**100.0%**
NM	18	NM-BCR18-AO	New Mexico BCR 18 All Other Lands	BCR	65,011	18	13	72.2%
NM	18	NM-BCR18-KW	Kiowa National Grassland	BCR	553	2	2	100.0%
NM	18	NM-BCR18-PL	New Mexico BCR 18 Playas	BCR	244	17	17	100.0%
NM	18	NM-BCR18-RV	New Mexico BCR 18 Rivers	BCR	2,206	15	8	53.3%
				Subtotal	**68,014**	**52**	**40**	**76.9%**
OK	18	OK-BCR18-AO	Oklahoma BCR 18 All Other Lands	BCR	10,556	8	8	100.0%
OK	18	OK-BCR18-PL	Oklahoma BCR 18 Playas	BCR	105	5	5	100.0%
OK	18	OK-BCR18-RB	Rita Blanca National Grassland	BCR	57	2	2	100.0%
OK	18	OK-BCR18-RV	Oklahoma BCR 18 Rivers	BCR	533	8	8	100.0%
				Subtotal	**11,251**	**23**	**23**	**100.0%**
OK	19	OK-BCR19-AO	Oklahoma BCR 19 All Other Lands	BCR	68,616	8	8	100.0%
OK	19	OK-BCR19-PL	Oklahoma BCR 19 Playas	BCR	14	2	2	100.0%
OK	19	OK-BCR19-RV	Oklahoma BCR 19 Rivers	BCR	6,531	8	8	100.0%
				Subtotal	**75,161**	**18**	**18**	**100.0%**
SD	17	SD-BCR17-BF	Black Hills National Forest - All other Watersheds	BCR	5,009	23	23	100.0%

State	BCR	Stratum	Stratum Definitions	Collected By	Area (km^2)	Planned	Completed	% Completed
SD	17	SD-BCR17-BM	Bureau of Land Management	BCR	831	5	5	100.0%
SD	17	SD-BCR17-BN	Badlands National Park - North Unit	BCR	434	16	16	100.0%
SD	17	SD-BCR17-BS	Badlands National Park - South Unit	BCR	539	3	3	100.0%
SD	17	SD-BCR17-GG	Buffalo Gap National Grassland	BCR	2,356	3	3	100.0%
SD	17	SD-BCR17-HU	Black Hills National Forest - Hydrologic Code 7 Watersheds	BCR	376	7	7	100.0%
SD	17	SD-BCR17-JC	Jewel Cave National Monument	BCR	5	5	5	100.0%
SD	17	SD-BCR17-MR	Mount Rushmore National Monument	BCR	6	6	6	100.0%
SD	17	SD-BCR17-ON	All Other Lands	BCR	64,642	6	6	100.0%
SD	17	SD-BCR17-PG	Fort Pierre National Grassland	BCR	482	3	3	100.0%
SD	17	SD-BCR17-RG	Grand River National Grassland	BCR	125	5	5	100.0%
SD	17	SD-BCR17-TI	Tribal Lands	BCR	27,561	2	2	100.0%
SD	17	SD-BCR17-UF	Custer National Forest	BCR	326	5	5	100.0%
SD	17	SD-BCR17-WC	Wind Cave National Park	BCR	136	14	14	100.0%
				Subtotal	**102,828**	**103**	**103**	**100.0%**
TX	18	TX-BCR18-AO	Texas BCR 18 All Other Lands	BCR	98,186	16	16	100.0%
TX	18	TX-BCR18-PL	Texas BCR 18 Playas	BCR	4,507	16	16	100.0%
TX	18	TX-BCR18-RB	Rita Blanca National Grassland	BCR	305	2	2	100.0%
TX	18	TX-BCR18-RV	Texas BCR 18 Rivers	BCR	1,200	16	14	87.5%
				Subtotal	**104,198**	**50**	**48**	**96.0%**
TX	19	TX-BCR19-AO	Texas BCR 19 All Other Lands	BCR	84,131	16	9	56.3%
TX	19	TX-BCR19-PL	Texas BCR 19 Playas	BCR	327	9	8	88.9%
TX	19	TX-BCR19-RV	Texas BCR 19 Rivers	BCR	4,787	16	9	56.3%
				Subtotal	**89,245**	**41**	**26**	**63.4%**
UT	9	UT-BCR9-AO	All Other Lands	UDWR	34,636	5	5	100.0%
UT	9	UT-BCR9-CC	BLM-Cedar City	BCR	8,046	14	14	100.0%
UT	9	UT-BCR9-CT	Caribou-Targhee National Forest	BCR	54	2	2	100.0%
UT	9	UT-BCR9-DO	Department of Defense - All Other Lands	DOD	2,704	37	37	100.0%
UT	9	UT-BCR9-FI	BLM FILMORE FO	IBO	18,326	18	18	100.0%
UT	9	UT-BCR9-MF	Department of Defense - Mud Flats	DOD	4,384	2	2	100.0%
UT	9	UT-BCR9-RI	BLM-Richfield	BCR	617	8	8	100.0%
UT	9	UT-BCR9-SG	BLM-Saint George	BCR	232	6	6	100.0%

State	BCR	Stratum	Stratum Definitions	Collected By	Area (km^2)	Planned	Completed	% Completed
UT	9	UT-BCR9-SL	Bureau of Land Management - Salt Lake Field Office	IBO	12,340	16	16	100.0%
				Subtotal	**81,339**	**108**	**108**	**100.0%**
UT	10	UT-BCR10-AS	Ashley National Forest	BCR	96	3	0	0.0%
UT	10	UT-BCR10-SL	BLM SALT LAKE FO	IBO	642	8	8	100.0%
UT	10	UT-BCR10-VE	BLM VERNAL FO	IBO	268	6	6	100.0%
				Subtotal	**1,006**	**17**	**14**	**82.4%**
UT	16	UT-BCR16-AO	All Other Lands	UDWR	48,838	7	7	100.0%
UT	16	UT-BCR16-AS	Ashley National Forest	BCR	5,117	18	15	83.3%
UT	16	UT-BCR16-MA	Manti-La Sal National Forest	IBO	5,280	42	42	100.0%
UT	16	UT-BCR16-SA	Manti-La Sal National Forest - Sanpitch	IBO	307	3	3	100.0%
UT	16	UT-BCR16-SL	BLM SALT LAKE FO	IBO	87	2	2	100.0%
UT	16	UT-BCR16-VE	BLM VERNAL FO	IBO	6,704	12	12	100.0%
				Subtotal	**66,333**	**84**	**81**	**96.4%**
UT	33	UT-BCR33-AO	All Other Lands	UDWR	65	4	4	100.0%
WY	9	WY-BCR9-WY	Caribou-Targhee National Forest	BCR	119	2	2	100.0%
WY	10	WY-BCR10-AO	All Other Lands	BCR	52,161	15	15	100.0%
WY	10	WY-BCR10-AS	Ashley National Forest	BCR	540	2	2	100.0%
WY	10	WY-BCR10-BE	Bridger-Teton National Forest - Roaded/Managed	BCR	3,034	17	17	100.0%
WY	10	WY-BCR10-BH	Bighorn Canyon National Recreation Area	BCR	57	2	2	100.0%
WY	10	WY-BCR10-BI	Bighorn National Forest	WYNDD	4,712	9	9	100.0%
WY	10	WY-BCR10-BR	Bridger-Teton National Forest - Roadless/Wilderness	BCR	11,364	3	3	100.0%
WY	10	WY-BCR10-BU	Bureau of Land Management - Buffalo Field Office	BCR	547	2	2	100.0%
WY	10	WY-BCR10-CA	Bureau of Land Management - Casper Field Office	BCR	2,509	2	2	100.0%
WY	10	WY-BCR10-CO	Bureau of Land Management - Cody Field Office	BCR	4,704	2	2	100.0%
WY	10	WY-BCR10-CT	Caribou-Targhee National Forest	BCR	1,397	3	3	100.0%
WY	10	WY-BCR10-GR	Grand Teton National Park	BCR	856	2	2	100.0%
WY	10	WY-BCR10-KE	Bureau of Land Management - Kemmerer Field Office	BCR	5,733	2	2	100.0%
WY	10	WY-BCR10-LA	Bureau of Land Management - Lander Field Office	BCR	9,829	6	6	100.0%
WY	10	WY-BCR10-MB	Medicine Bow National Forest	WYNDD	773	3	3	100.0%

State	BCR	Stratum	Stratum Definitions	Collected By	Area (km^2)	Planned	Completed	% Completed
WY	10	WY-BCR10-PI	Bureau of Land Management - Pinedale Field Office	BCR	3,687	8	8	100.0%
WY	10	WY-BCR10-RA	Bureau of Land Management - Rawlins Field Office	BCR	13,954	8	8	100.0%
WY	10	WY-BCR10-RO	Bureau of Land Management - Rock Springs Field Office	BCR	15,152	8	8	100.0%
WY	10	WY-BCR10-SE	Shoshone National Forest - Roaded/Managed	BCR	2,101	5	5	100.0%
WY	10	WY-BCR10-SR	Shoshone National Forest - Roadless/Wilderness	BCR	8,311	5	5	100.0%
WY	10	WY-BCR10-WA	Wasatch National Forest	BCR	33	2	2	100.0%
WY	10	WY-BCR10-WO	Bureau of Land Management - Worland Field Office	BCR	8,467	6	6	100.0%
WY	10	WY-BCR10-WR	Wind River Reservation	BCR	7,819	4	4	100.0%
WY	10	WY-BCR10-YE	Yellowstone National Park	BCR	7,592	4	4	100.0%
				Subtotal	**165,332**	**120**	**120**	**100.0%**
WY	16	WY-BCR16-AO	All Other Lands	BCR	5,438	5	5	100.0%
WY	16	WY-BCR16-BL	Bureau of Land Management	BCR	647	2	2	100.0%
WY	16	WY-BCR16-MB	Medicine Bow National Forest	WYNDD	5,329	20	19	95.0%
WY	16	WY-BCR16-WA	Wasatch National Forest	BCR	180	2	2	100.0%
				Subtotal	**11,594**	**29**	**28**	**96.6%**
WY	17	WY-BCR17-AO	All Other Lands	BCR	52,186	12	12	100.0%
WY	17	WY-BCR17-BH	Black Hills National Forest	BCR	1,085	7	7	100.0%
WY	17	WY-BCR17-BU	Bureau of Land Management - Buffalo Field Office	BCR	2,653	2	2	100.0%
WY	17	WY-BCR17-CA	Bureau of Land Management - Casper Field Office	BCR	2,695	2	2	100.0%
WY	17	WY-BCR17-NE	Bureau of Land Management - Newcastle Field Office	BCR	1,025	2	2	100.0%
WY	17	WY-BCR17-TB	Thunder Basin National Grassland	WYNDD	4,520	8	8	100.0%
				Subtotal	**64,164**	**33**	**33**	**100.0%**
WY	18	WY-BCR18-AO	All Other Lands	BCR	12,064	12	11	91.7%
WY	18	WY-BCR18-BL	Bureau of Land Management	BCR	171	2	2	100.0%
WY	18	WY-BCR18-DO	Department of Defense	BCR	23	2	2	100.0%
				Subtotal	**12,258**	**16**	**15**	**93.8%**
				Grand Total	**1,792,167**	**1,590**	**1,551**	**97.5%**

Table 2. Reasons planned surveys were not completed, 2016.

Stratum	# Not Completed	Reason
MT-BCR11-BN	1	Survey completed in wrong stratum
NE-BCR18-AO	1	Crew leader/technician miscommunication
NM-BCR18-AO	5	Unable to secure landowner permission
NM-BCR18-RV	7	Unable to secure landowner permission
TX-BCR18-RV	2	Unable to secure landowner permission
TX-BCR19-AO	7	Unable to secure landowner permission
TX-BCR19-PL	1	Unable to secure landowner permission
TX-BCR19-RV	7	Unable to secure landowner permission
UT-BCR10-AS	3	Crew leader did not assign survey
UT-BCR16-AS	3	Crew leader did not assign survey
WY-BCR16-MB	1	Aggressive bear in the area
WY-BCR18-AO	1	Landowner revoked permission and not enough time to pull a backup

I. Bird Conservation Regions

A. Bird Conservation Region 17

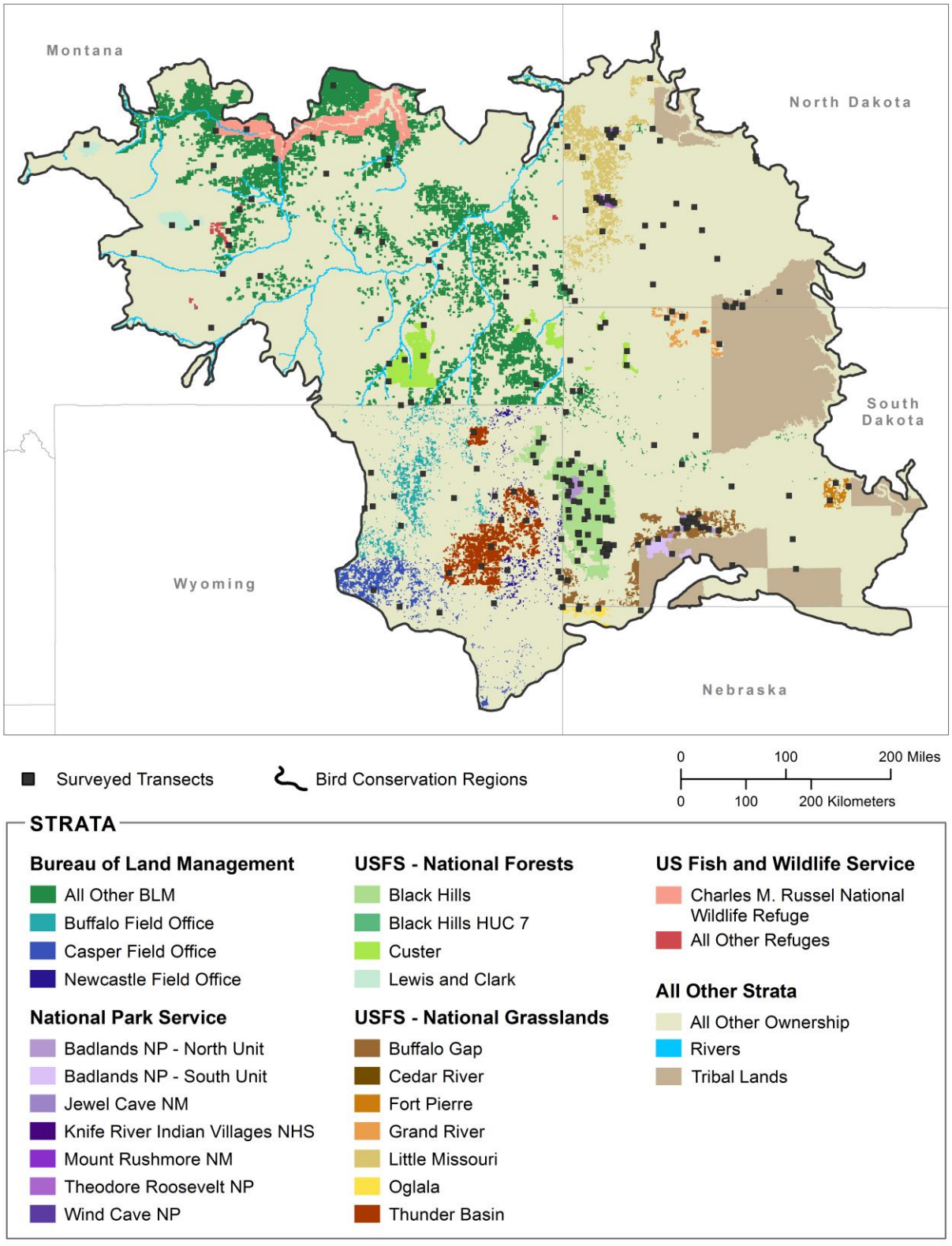


Figure 4. Survey locations in the Badlands and Prairies Bird Conservation Region (BCR 17), 2016.

1. 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. There have been several changes made within this BCR to allow for greater efficiency and to provide land managers with 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.

In 2013, the North Dakota, South Dakota, and Nebraska portions of BCR 17 underwent a complete restratification to integrate several NPS NGPN strata. During restratification, we defined new strata using the US National Grid, a grid system that covers the entire country. There are three advantages to using the USNG. First, the use of standard grids allows for the integration of datasets and subsequent identification of areas where sampling should or has not occurred. Second, it provides a means to identify sampled areas in a consistent manner so results of monitoring projects can be evaluated in a spatially comparable way. Lastly, it facilitates regional and national-level avian distribution modeling and the development of broad-scale avian distribution maps. This standard was approved by the NABCI committee. Bird Conservancy started using the USNG for new stratification and restratification schemes in 2013.

All of the strata in these states were retained and renamed to avoid confusion, except for the original NPS strata. These strata were broken up so that each NPS unit is now its own stratum (including Knife River Indian Villages National Historic Site, Theodore Roosevelt National Park, Badlands National Park, Jewel Cave National Monument, Mount Rushmore National Monument, and Wind Cave National Park). This will allow the NGPN to monitor birds on each of its units separately.

In 2016, we restratified the Tribal and All Other Lands strata in North and South Dakota to ensure all tribal lands were only included in the tribal lands strata. In the past, some tribal lands could still be found within the All Other Lands strata.

We obtained results for BCR 17 by compiling and jointly analyzing data from 37 Strata in five states (Figure 4).

Field technicians completed all 227 planned surveys (100%) in 2016. They also completed one extra survey in BCR 17. Technicians conducted 2,650 point counts within the 228 surveyed grid cells between 16 May and 1 July. They detected 200 bird species, including 43 priority species (Appendix B).

Bird Conservancy estimated densities and population sizes for 159 species, 35 of which are priority species. The data yielded robust density estimates (CV < 50%) for 77 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout BCR 17 for 156 species, 34 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 88 of these species.

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 2016, 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 2016, hit “Add Filter”, then “Run Query”.

BCR 17 Results

2. Montana BCR 17

We obtained results for Montana BCR 17 by compiling and jointly analyzing data from seven Strata (Figure 4). For results on All Other Lands, BLM, NPS, and USFS Lands within Montana refer to section III: Land Ownership.

Field technicians completed all 40 planned surveys (100%) in 2016. They also completed one extra survey in Montana BCR 17. Technicians conducted 406 point counts within the 41 surveyed grid cells between 18 May and 30 June. They detected 134 bird species, including 20 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 104 species, 13 of which are priority species. The data yielded robust density estimates (CV < 50%) for 37 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Montana BCR 17 for 105 species, 11 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 47 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Montana BCR 17 Results

3. North Dakota BCR 17

We obtained results for North Dakota BCR 17 by compiling and jointly analyzing data from eight 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 46 planned surveys (100%) in 2016. Technicians conducted 524 point counts within the 46 surveyed grid cells between 1 June and 1 July. They detected 113 bird species, including 23 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 99 species, 18 of which are priority species. The data yielded robust density estimates (CV < 50%) for 32 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout North Dakota BCR 17 for 98 species, 18 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 35 of these species. 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

North Dakota BCR 17 Results

4. Nebraska BCR 17

We obtained results for Nebraska BCR 17 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 5 planned surveys (100%) in 2016. Technicians conducted 49 point counts within the 5 surveyed grid cells between 31 May and 26 June. They detected 40 bird species, including 4 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 25 species, 4 of which are priority species. The data yielded robust density estimates (CV < 50%) for 3 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Nebraska BCR 17 for 23 species, 2 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 6 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Nebraska BCR 17 Results

5. South Dakota BCR 17

We obtained results for South Dakota BCR 17 by compiling and jointly analyzing data from 14 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 103 planned surveys (100%) in 2016. Technicians conducted 1267 point counts within the 103 surveyed grid cells between 17 May and 1 July. They detected 157 bird species, including 14 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 135 species, 11 of which is a priority species. The data yielded robust density estimates (CV < 50%) for 47 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout South Dakota BCR 17 for 128 species, 9 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 67 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

South Dakota BCR 17 Results

6. Wyoming BCR 17

We obtained results for Wyoming BCR 17 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 33 planned surveys (100%) in 2016. Technicians conducted 404 point counts within the 33 surveyed grid cells between 16 May and 3 June. They detected 104 bird species, including 16 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 93 species, 15 of which are priority species. The data yielded robust density estimates (CV < 50%) for 24 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Wyoming BCR 17 for 90 species, 13 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 30 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Wyoming BCR 17 Results

B. Bird Conservation Region 18

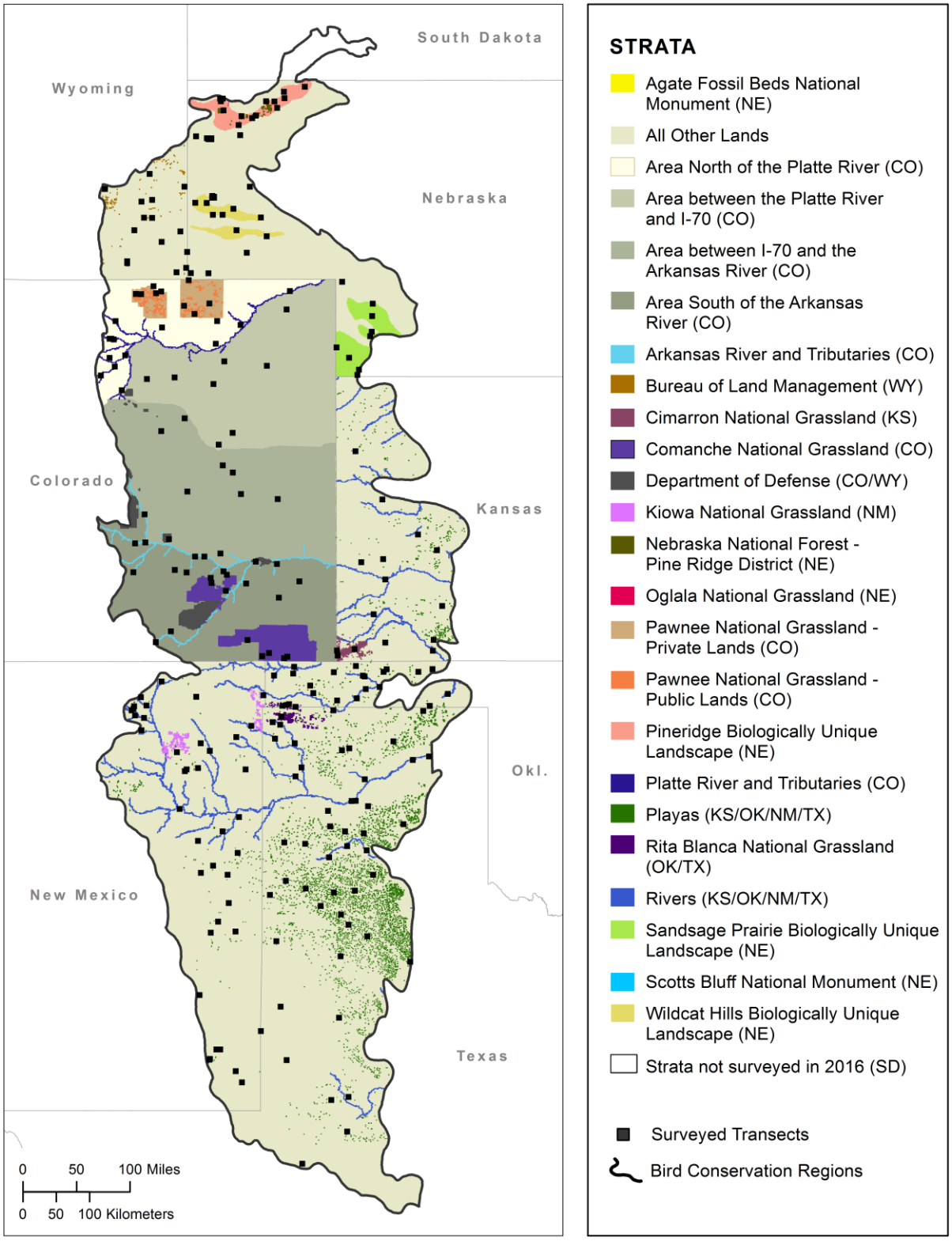


Figure 5. Survey location in the Shortgrass prairie Bird Conservation Region (BCR 18), 2016

1. BCR 18 Total

The IMBCR program expanded in 2016 to include almost all of the Shortgrass Prairie (BCR 18). This is the second BCR that is entirely stratified and sampled through this program. We have surveyed all of the Colorado portion of BCR 18 since 2008 and the entire Wyoming portion of BCR 18 since 2009. We have also completed some surveys in BCR 18 in Kansas, Nebraska, New Mexico, Oklahoma, and Texas since 2009, but have not surveyed all of BCR 18 in those states. There is a small portion of BCR 18 in South Dakota that was not stratified or sampled in 2016. We provide estimates for BCR 18 since we believe that these estimates are relevant even though this small portion of the BCR is not included.

We obtained results for BCR 18 by compiling and jointly analyzing data from 37 Strata in seven states (Figure 5).

Field technicians completed 259 of 275 planned surveys (94.2%) in 2016. Technicians conducted 2,583 point counts within the 259 surveyed grid cells between 26 April and 9 July. They detected 210 bird species, including 35 priority species (Appendix B).

Bird Conservancy estimated densities and population sizes for 155 species, 33 of which are priority species. The data yielded robust density estimates (CV < 50%) for 56 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout BCR18 for 156 species, 31 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 78 of these species.

To view a map of survey locations, density and occupancy results and species counts within 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

BCR 18 Results

2. Colorado BCR 18

We obtained results for Colorado BCR 18 by compiling and jointly analyzing data from 10 Strata (Figure 5).). For additional results within Colorado, refer to section II: States. For results on BLM, DOD, NPS, and USFS lands within Colorado refer to section III: Land Ownership.

Field technicians completed all 65 planned surveys (100%) in 2016. Technicians conducted 777 point counts within the 65 surveyed grid cells between 9 May and 30 May. They detected 141 bird species, including 19 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 110 species, 14 of which are priority species. The data yielded robust density estimates (CV < 50%) for 30 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Colorado BCR 18 for 104 species, 12 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 42 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Colorado BCR 18 Results

3. Kansas BCR 18

We obtained results for Kansas BCR 18 by compiling and jointly analyzing data from four Strata (Figure 5). For results on USFS lands within Kansas, refer to section III: Land Ownership.

Field technicians completed all 15 planned surveys (100%) in 2016. Technicians conducted 131 point counts within the 15 surveyed grid cells between 8 May and 25 May. They detected 53 bird species, including 17 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 41 species, 15 of which are priority species. The data yielded robust density estimates (CV < 50%) for 11 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Kansas BCR 18 for 27 species, 10 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 15 of these species.

To view a map of survey locations, density and occupancy results and species counts within Kansas 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”

Kansas BCR 18 Results

4. Nebraska BCR 18

We obtained results for Nebraska BCR 18 by compiling and jointly analyzing data from eight Strata (Figure 5). For results on NPS and USFS lands within Kansas, refer to section III: Land Ownership.

Field technicians completed 53 of 54 planned surveys (98.1%) in 2016. Technicians conducted 505 point counts within the 53 surveyed grid cells between 25 May and 9 July. They detected 128 bird species, including 20 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 109 species, 16 of which are priority species. The data yielded robust density estimates (CV < 50%) for 26 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Nebraska BCR 18 for 105 species, 15 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 39 of these species.

To view a map of survey locations, density and occupancy results and species counts within Nebraska 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”

Nebraska BCR 18 Results

5. New Mexico BCR 18

We obtained results for New Mexico BCR 18 by compiling and jointly analyzing data from four Strata (Figure 5). For results on USFS lands within New Mexico, refer to section III: Land Ownership.

Field technicians completed 40 of 52 planned surveys (76.9%) in 2016. Technicians conducted 376 point counts within the 40 surveyed grid cells between 27 April and 26 May. They detected 125 bird species, including 12 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 81 species, 10 of which are priority species. The data yielded robust density estimates (CV < 50%) for 15 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout New Mexico BCR 18 for 80 species, 10 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 21 of these species.

To view a map of survey locations, density and occupancy results and species counts within New Mexico 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query.

New Mexico BCR 18 Results

6. Oklahoma BCR 18

We obtained results for Oklahoma BCR 18 by compiling and jointly analyzing data from four Strata (Figure 5). For results on USFS lands within Oklahoma, refer to section III: Land Ownership.

Field technicians completed all 23 planned surveys (100%) in 2016. Technicians conducted 188 point counts within the 23 surveyed grid cells between 4 May and 24 May. They detected 73 bird species, including 12 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 58 species, 10 of which are priority species. The data yielded robust density estimates (CV < 50%) for 10 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Oklahoma BCR 18 for 47 species, 8 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 10 of these species.

To view a map of survey locations, density and occupancy results and species counts within Oklahoma 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query.

Oklahoma BCR 18 Results

7. Texas BCR 18

We obtained results for Texas BCR 18 by compiling and jointly analyzing data from four Strata (Figure 5).). For results on USFS lands within Texas, refer to section III: Land Ownership.

Field technicians completed 48 of 50 planned surveys (96%) in 2016. Technicians conducted 427 point counts within the 48 surveyed grid cells between 26 April and 27 May. They detected 131 bird species, including 26 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 90 species, 23 of which are priority species. The data yielded robust density estimates (CV < 50%) for 25 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Texas BCR 18 for 87 species, 23 of which are priority species

To view a map of survey locations, density and occupancy results and species counts within Texas 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query

Texas BCR 18 Results

8. Wyoming BCR 18

We obtained results for Wyoming BCR 18 by compiling and jointly analyzing data from three Strata (Figure 5).). 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 15 of 16 planned surveys (93.7%) in 2016. Technicians conducted 179 point counts within the 15 surveyed grid cells between 24 May and 6 June. They detected 69 bird species, including 14 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 53 species, 10 of which are priority species. The data yielded robust density estimates (CV < 50%) for 11 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Wyoming BCR 18 for 46 species, 9 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 19 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query.

Wyoming BCR 18 Results

II. States

A. Colorado

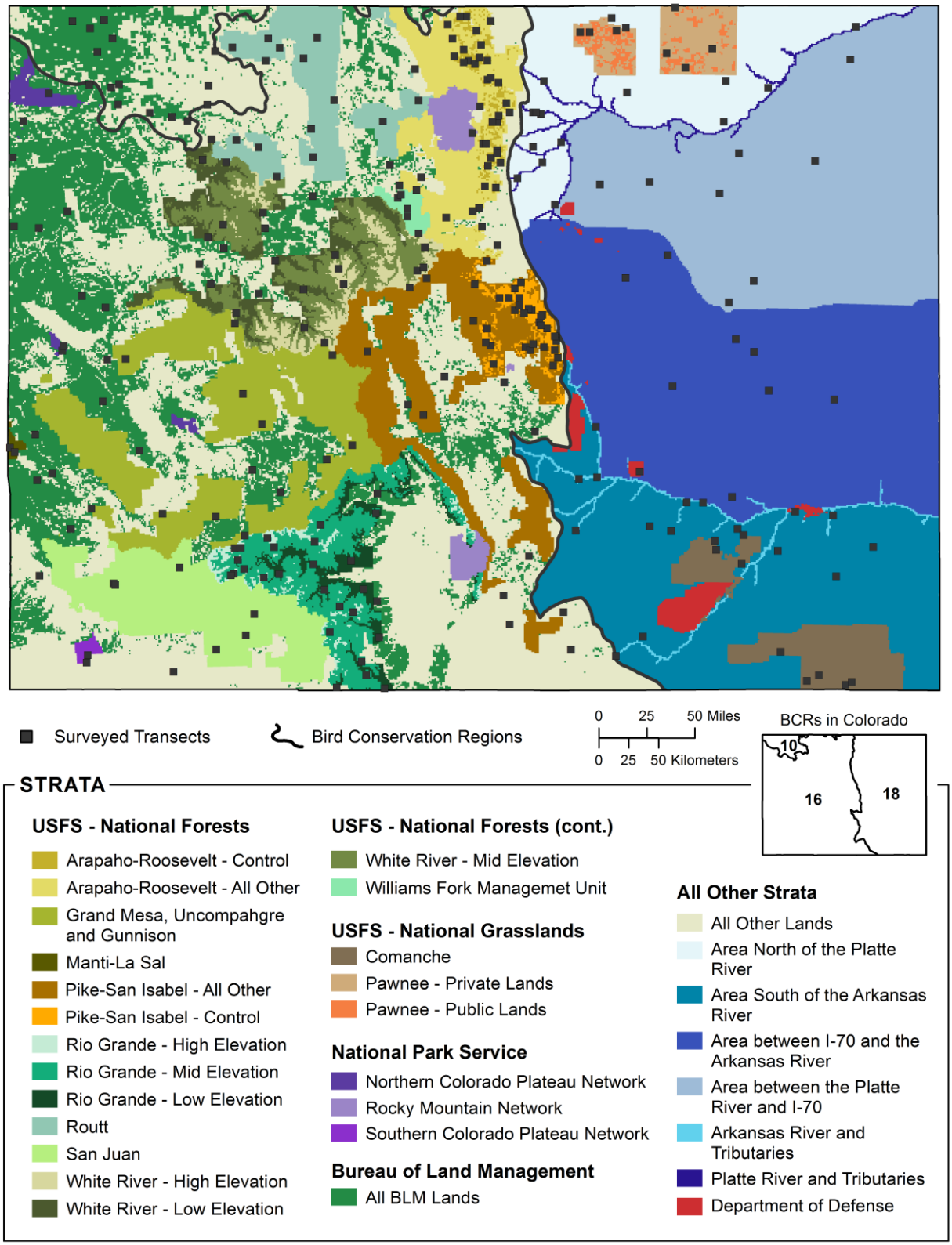


Figure 6. Survey locations in Colorado, 2016.

1. Colorado Statewide

Colorado was the first state to implement the IMBCR design in 2008. In the first season of surveys in Colorado BCR 16, we used cell weighting based on Strahler stream order and elevation to target higher order rivers and streams and higher elevation habitats (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 Colorado BCR 16 were restratified without cell weighting in 2009. No samples were surveyed in the BCR 10 portion of Colorado in 2008 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 it now represents all of BCR 10 in Colorado. The NPS Rocky Mountain Inventory and Monitoring Network (RMNW) and Northern Colorado Plateau Inventory and M Network (NCPN) were restratified because under the initial design some NCPN park units were misclassified 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.

In 2013, the Pawnee National Grasslands stratum in BCR 18 was split into two strata – public lands and private lands – since Pawnee National Grasslands contains a large amount of private land within its borders. This allowed the USFS to concentrate more survey effort specifically on public lands.

In 2014, the Arapaho and Roosevelt and the Pike and San Isabel National Forests were restratified to allow these forests to monitor treatments within heavy beetle kill areas. Each forest was divide into two strata – a control stratum and the remainder of the forest. The control portion of the Arapaho and Roosevelt National Forests consisted of lands ranging in elevation from 6,000 ft. to 9,000 ft., excluding burn areas. The Pike and San Isabel control stratum ranges from 6,300 ft. to 9,000 ft. and excludes burn areas. An experiment overlay stratum was created for Arapaho-Roosevelt and Pike-San Isabel National Forests consisting of actual treatment areas. Since this stratum spans multiple forests it is not actually considered to be a part of the IMBCR design and is not presented in this report. However, detections from this stratum do contribute to the number of detections used in analyses for IMBCR.

In 2015, the DoD stratum in Colorado BCR 18 was restratified as part of a DoD Legacy Resource Management Program Grant to represent six individual military installations: US Air Force Academy, Fort Carson, Pueblo Chemical Depot, Piñon Canyon, and All Other DoD Lands. This DoD installation-level stratification will allow for the generation of

density and occupancy estimates for each installation. Fort Carson and Piñon Canyon were further stratified by areas within range fans (training zones) and areas outside of range fans to allow the DoD to assess the effects of military training on bird species.

Surprisingly, the Rocky Mountain Arsenal National Wildlife Refuge also came out of this 2015 restratification. During WWII, the Rocky Mountain Arsenal, as it was originally known, was a chemical weapons manufacturing facility. At the time of the 2008 IMBCR stratification in the state Colorado, it was still partially owned by the US Army and was included in the DoD stratum. The refuge is now in its own individual stratum.

In 2016 the eight DoD strata in BCR18 Colorado were combined back into one stratum. This stratification is the same that was used prior to 2015.

a) Colorado Statewide: Total

We obtained results for Colorado by compiling and jointly analyzing data from 32 Strata (Figure 6). For results on BLM, NPS, DoD and USFS Lands within Colorado, refer to section III: Land Ownership.

Field technicians completed all 279 planned surveys (100%) in 2016. Technicians conducted 3,402 point counts within the 279 surveyed grid cells between 9 May and 14 July. They detected 201 bird species, including 39 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 175 species, 31 of which are priority species. The data yielded robust density estimates (CV < 50%) for 103 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Colorado for 170 species, 27 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 119 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Colorado Statewide Results

b) All Other Lands in Colorado

We obtained results for All Other Lands in Colorado by compiling and jointly analyzing data from seven strata (Figure 6).

Field technicians completed all 59 planned surveys (100%) in 2016. Technicians conducted 698 point counts within the 59 surveyed grid cells between 9 May and 28 June. They detected 145 bird species, including 25 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 126 species, 18 of which are priority species. The data yielded robust density estimates (CV < 50%) for 57 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in Colorado for 123 species, 17 of which are priority

species. The data yielded robust occupancy estimates (CV < 50%) for 69 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

All Other Lands in Colorado Results

2. Colorado BCR 10

a) Colorado BCR 10: Total

We obtained results for Colorado BCR 10 by compiling and jointly analyzing data from two Strata (Figure 6).

Field technicians completed all 13 planned surveys (100%) in 2016. Technicians conducted 175 point counts within the 13 surveyed grid cells between 16 May and 4 June. They detected 75 bird species, including 12 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 68 species, 10 of which are priority species. The data yielded robust density estimates (CV < 50%) for 20 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Colorado BCR 10 for 65 species, 8 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 24 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Colorado BCR 10 Results

b) All Other Lands in Colorado BCR 10

We obtained results for All Other Lands in Colorado BCR 10 by analyzing data from one stratum (Figure 6).

Field technicians completed all 5 planned surveys (100%) in 2016. Technicians conducted 68 point counts within the 5 surveyed grid cells between 16 May and 1 June. They detected 68 bird species, including 7 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 62 species, 7 of which are priority species. The data yielded robust density estimates (CV < 50%) for 12 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in Colorado BCR 10 for 57 species, 5 of which are

priority species. The data yielded robust occupancy estimates (CV < 50%) for 15 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

All Other Lands in Colorado BCR 10 Results

3. Colorado BCR 16

a) Colorado BCR 16: Total

We obtained results for Colorado BCR 16 by compiling and jointly analyzing data from 20 strata (Figure 6).

Field technicians completed all 201 planned surveys (100%) in 2016. Technicians conducted 2,450 point counts within the 201 surveyed grid cells between 10 May and 14 July. They detected 154 bird species, including 27 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 138 species, 21 of which are priority species. The data yielded robust density estimates (CV < 50%) for 80 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Colorado BCR 16 for 135 species, 19 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 94 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Colorado BCR 16 Results

b) All Other Lands in Colorado BCR 16

We obtained results for All Other Lands in Colorado BCR 16 by analyzing data from one stratum (Figure 6).

Field technicians completed all 20 planned surveys (100%) in 2016. Technicians conducted 203 point counts within the 20 surveyed grid cells between 10 May and 28 June. They detected 112 bird species, including 12 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 101 species, 8 of which are priority species. The data yielded robust density estimates (CV < 50%) for 31 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in Colorado BCR 16 for 97 species, 7 of which are

priority species. The data yielded robust occupancy estimates (CV < 50%) for 45 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

All Other Lands in Colorado BCR 16 Results

4. Colorado BCR 18

a) Colorado BCR 18: Total

We obtained results for Colorado BCR 18 by compiling and jointly analyzing data from 10 strata (Figure 6).

Field technicians completed all 65 planned surveys (100%) in 2016. Technicians conducted 777 point counts within the 65 surveyed grid cells between 9 May and 30 May. They detected 141 bird species, including 19 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 110 species, 14 of which are priority species. The data yielded robust density estimates (CV < 50%) for 30 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Colorado BCR 18 for 104 species, 12 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 42 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Colorado BCR 18 Results

b) Colorado BCR 18 Rivers

We obtained results for Colorado BCR 18 Rivers by compiling and jointly analyzing data from two strata (Figure 6).

Field technicians completed all 16 planned surveys (100%) in 2016. Technicians conducted 167 point counts within the 16 surveyed grid cells between 16 May and 28 May. They detected 116 bird species, including 11 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 91 species, 7 of which are priority species. The data yielded robust density estimates (CV < 50%) for 32 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Colorado BCR 18 Rivers for 85 species, 6 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 40 of these species.

To view a map of survey locations, density and occupancy results and species counts within Colorado BCR 18 Rivers 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 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Colorado BCR 18 Rivers Results

c) All Other Lands in Colorado BCR 18

We obtained results for All Other Lands in Colorado BCR 18 by compiling and jointly analyzing data from five strata (Figure 6).

Field technicians completed all 34 planned surveys (100%) in 2016. Technicians conducted 427 point counts within the 34 surveyed grid cells between 9 May and 30 May. They detected 73 bird species, including 14 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 53 species, 9 of which are priority species. The data yielded robust density estimates (CV < 50%) for 17 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in Colorado BCR 18 for 48 species, 9 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 23 of these species.

To view a map of survey locations, density and occupancy results and species counts within All Other 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

All Other Lands in Colorado BCR 18 Results

B. Utah

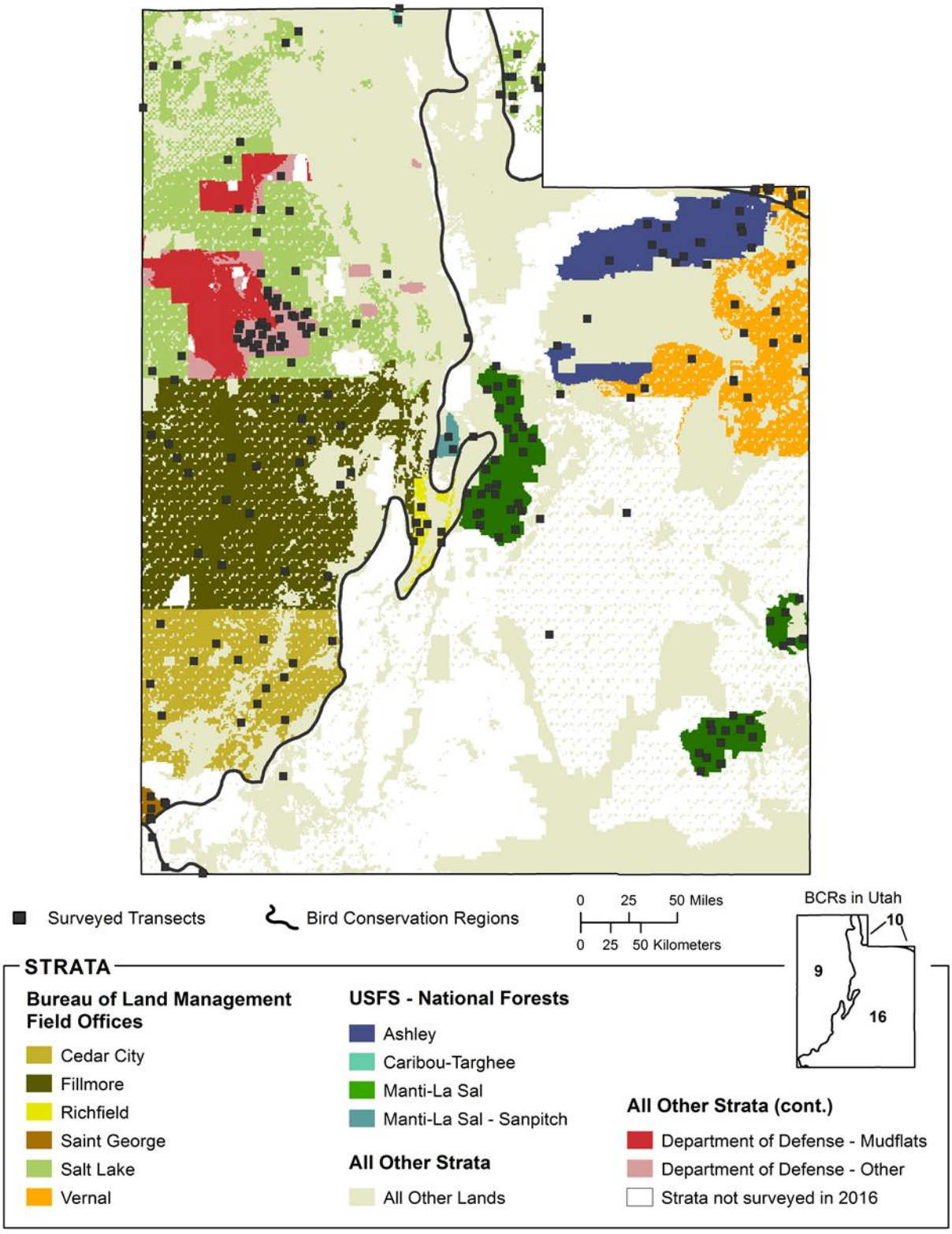


Figure 7. Survey location in Utah, 2016

1. Utah statewide

In 2016, the state of Utah was added to the IMBCR program. Bird Conservancy, DoD, IBO, UDWR, and UT BLM collaborated to develop a stratification scheme and sampling plan for Utah. The entire state was stratified into BLM lands by Field Office, USFS lands by unit, DoD lands by installation, and All Other Lands. We took a fairly new approach to sampling in Utah by dividing the sampling effort across multiple organizations. Bird Conservancy and IBO staff surveyed select BLM and USFS lands, DoD personnel sampled on DoD lands, and UDWR staff sampled across select All Other Lands strata. Staff across all of these organizations and agencies trained together at the beginning of the field season to ensure consistent sampling throughout the state.

This year was somewhat of a pilot year, with select BLM, USFS, DoD, and all other lands strata sampled across the state. No statewide density or occupancy estimates were generated for Utah this year since we did not sample across all strata within the state. In future years, sampling will be increased statewide to allow for density and occupancy estimates at the state level.

2. All Other Lands in Utah BCR 9

We obtained results for All Other Lands in Utah BCR 9 by analyzing data from one stratum.

Field technicians completed all 5 planned surveys (100%) in 2016. Technicians conducted 68 point counts within the 5 surveyed grid cells between 19 May and 22 June. They detected 39 bird species.

Bird Conservancy estimated densities and population sizes for 32 species. The data yielded robust density estimates (CV < 50%) for 2 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in Utah BCR 9 for 28 species. The data yielded robust occupancy estimates (CV < 50%) for 2 of these species.

To view a map of survey locations, density and occupancy results and species counts within All Other Lands in Utah BCR 9 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 2016, 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 2016, hit “Add Filter”, then “Run Query”.

All Other Lands in Utah BCR 9 Results

3. All Other Lands in Utah BCR 16

We obtained results for All Other Lands in Utah BCR 16 by analyzing data from one stratum.

Field technicians completed all 7 planned surveys (100%) in 2016. Technicians conducted 92 point counts within the 7 surveyed grid cells between 26 May and 30 June. They detected 71 bird species.

Bird Conservancy estimated densities and population sizes for 63 species. The data yielded robust density estimates (CV < 50%) for 2 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in Utah BCR 16 for 56 species. The data yielded robust occupancy estimates (CV < 50%) for 6 of these species.

To view a map of survey locations, density and occupancy results and species counts within All Other Lands in Utah 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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

All Other Lands in Utah BCR 16 Results

4. All Other Lands in Utah BCR 33

We obtained results for All Other Lands in Utah BCR 33 by analyzing data from one stratum.

Field technicians completed all 4 planned surveys (100%) in 2016. Technicians conducted 62 point counts within the 4 surveyed grid cells between 26 May and 3 June. They detected 21 bird species.

Bird Conservancy estimated densities and population sizes for 20 species. The data yielded robust density estimates (CV < 50%) for 1 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in Utah BCR 33 for 16 species. The data yielded robust occupancy estimates (CV < 50%) for 3 of these species.

To view a map of survey locations, density and occupancy results and species counts within All Other Lands in Utah BCR 33 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 2016, 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 2016, hit "Add Filter", then "Run Query".

All Other Lands in Utah BCR 33 Results

5. DOD Lands in Utah BCR 9

We obtained results for DOD lands in Utah BCR 9 by compiling and jointly analyzing data from two Strata.

Field technicians completed all 38 planned surveys (100%) in 2016. Technicians conducted 532 point counts within the 38 surveyed grid cells between 23 May and 20 June. They detected 62 bird species, including 3 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 53 species, 2 of which are priority species. The data yielded robust density estimates (CV < 50%) for 16 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout DOD lands in Utah BCR 9 for 50 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 18 of these species.

To view a map of survey locations, density and occupancy results and species counts within Department of Defense Lands in Utah BCR 9 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 2016, 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 2016, hit “Add Filter”, then “Run Query”.

DOD Lands in Utah BCR 9 Results

C. Wyoming

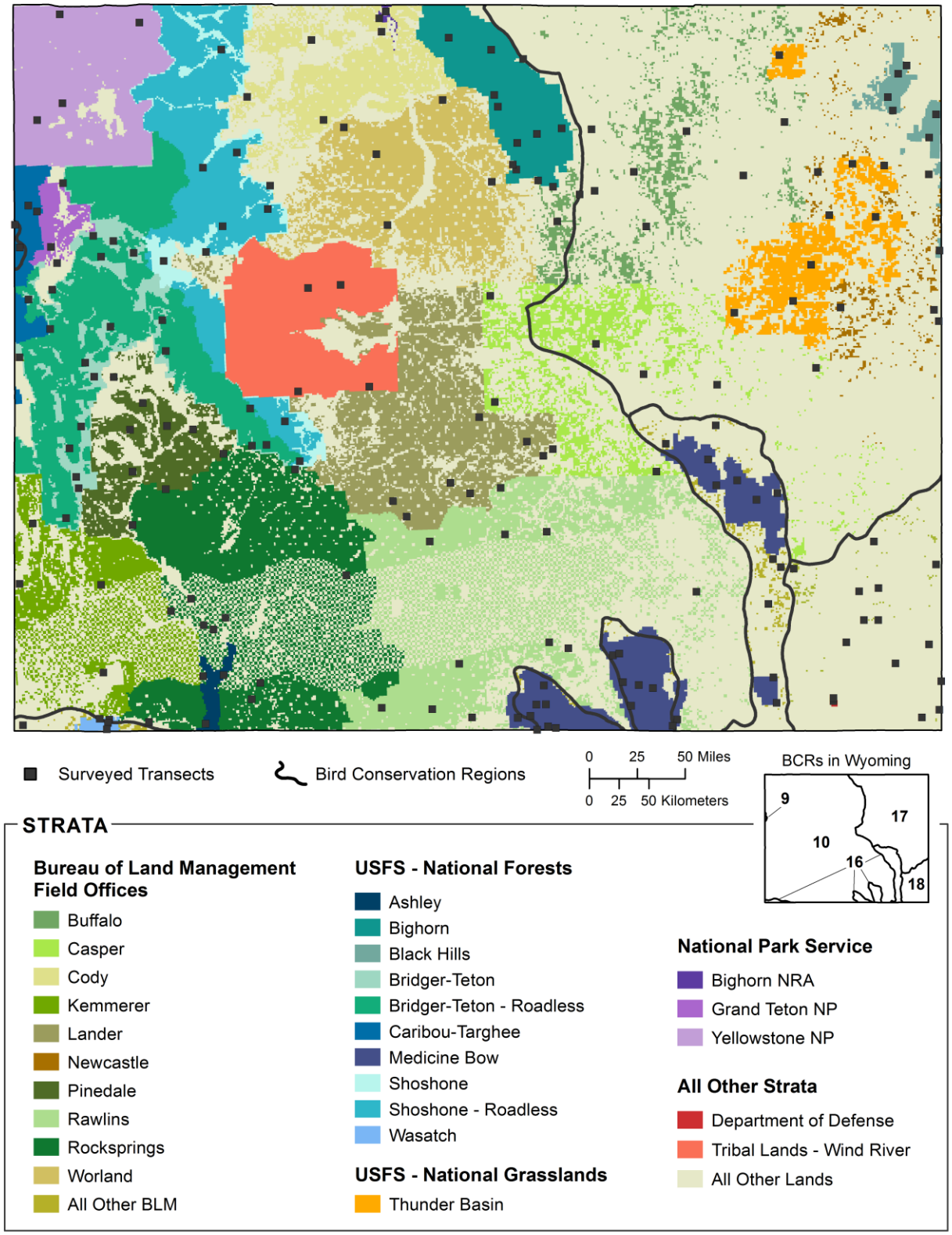


Figure 8. Survey locations in Wyoming, 2016.

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 and elevation to target higher order rivers and streams and higher elevation habitats (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. Later, in 2014, the remainder of USFS Region 4 was split out into three separate strata, one for each remaining national forest (Caribou-Targhee, Ashley, and Wasatch). This restratification was done to allow for density and occupancy estimation at the national forest level within Wyoming for these USFS Region 4 Forests.

a) Wyoming Statewide: Total

We obtained results for Wyoming by compiling and jointly analyzing data from 37 strata (Figure 7). For results on BLM, DoD, NPS, Tribal and USFS lands within Wyoming refer to section III: Land Ownership.

Field technicians completed 198 of 200 planned surveys (99%) in 2016. Technicians conducted 2,540 point counts within the 198 surveyed grid cells between 16 May and 19 July. They detected 185 bird species, including 47 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 152 species, 30 of which are priority species. The data yielded robust density estimates (CV < 50%) for 80 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Wyoming for 155 species, 32 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 87 of these species

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Wyoming Statewide Results

b) All Other Lands in Wyoming

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

Field technicians completed 43 of 44 planned surveys (97.7%) in 2016. Technicians conducted 511 point counts within the 43 surveyed grid cells between 17 May and 29 June. They detected 131 bird species, including 29 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 114 species, 23 of which are priority species. The data yielded robust density estimates (CV < 50%) for 32 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in Wyoming for 109 species, 21 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 41 of these species

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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

All Other Lands in Wyoming Results

2. Wyoming BCR 10

a) Wyoming BCR 10: Total

We obtained results for Wyoming BCR 10 by compiling and jointly analyzing data from 23 strata (Figure 7).

Field technicians completed all 120 planned surveys (100%) in 2016. Technicians conducted 1,625 point counts within the 120 surveyed grid cells between 20 May and 19 July. They detected 167 bird species, including 40 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 136 species, 25 of which are priority species. The data yielded robust density estimates (CV < 50%) for 62 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Wyoming BCR 10 for 135 species, 26 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 72 of these species.

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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Wyoming BCR 10 Results

b) All Other Lands in Wyoming BCR 10

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

Field technicians completed all 15 planned surveys (100%) in 2016. Technicians conducted 191 point counts within the 15 surveyed grid cells between 30 May and 29 June. They detected 110 bird species, including 22 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 95 species, 18 of which are priority species. The data yielded robust density estimates (CV < 50%) for 18 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in Wyoming BCR 10 for 86 species, 14 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 23 of these species.

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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

All Other Lands in Wyoming BCR 10 Results

3. Wyoming BCR 16

a) Wyoming BCR 16: Total

We obtained results for Wyoming BCR 16 by compiling and jointly analyzing data from four strata (Figure 7).

Field technicians completed 28 of 29 planned surveys (96.5%) in 2016. Technicians conducted 306 point counts within the 28 surveyed grid cells between 19 May and 16 July. They detected 99 bird species, including 15 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 83 species, 11 of which are priority species. The data yielded robust density estimates (CV < 50%) for 33 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Wyoming BCR 16 for 80 species, 10 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 40 of these species.

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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Wyoming BCR 16 Results

b) All Other Lands in Wyoming BCR 16

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

Field technicians completed all 5 planned surveys (100%) in 2016. Technicians conducted 56 point counts within the 5 surveyed grid cells between 19 May and 22 June. They detected 38 bird species, including 7 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 26 species, 5 of which are priority species. The data yielded robust density estimates (CV < 50%) for 5 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in Wyoming BCR 16 for 19 species, 5 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 6 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

All Other Lands in Wyoming BCR 16 Results

4. Wyoming BCR 17

a) Wyoming BCR 17: Total

We obtained results for Wyoming BCR 17 by compiling and jointly analyzing data from six strata (Figure 4).

Field technicians completed all 33 planned surveys (100%) in 2016. Technicians conducted 404 point counts within the 33 surveyed grid cells between 16 May and 3 June. They detected 104 bird species, including 16 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 93 species, 15 of which are priority species. The data yielded robust density estimates (CV < 50%) for 24 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Wyoming BCR 17 for 90 species, 13 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 30 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Wyoming BCR 17 Results

b) All Other Lands in Wyoming BCR 17

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

Field technicians completed all 12 planned surveys (100%) in 2016. Technicians conducted 132 point counts within the 12 surveyed grid cells between 17 May and 3 June. They detected 73 bird species, including 12 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 64 species, 11 of which are priority species. The data yielded robust density estimates (CV < 50%) for 11 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in Wyoming BCR 17 for 59 species, 9 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 16 of these species.

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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

All Other Lands in Wyoming BCR 17 Results

5. Wyoming BCR 18

a) Wyoming BCR 18: Total

We obtained results for Wyoming BCR 18 by compiling and jointly analyzing data from three strata (Figure 7).

Field technicians completed 15 of 16 planned surveys (93.7%) in 2016. Technicians conducted 179 point counts within the 15 surveyed grid cells between 24 May and 6 June. They detected 69 bird species, including 14 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 53 species, 10 of which are priority species. The data yielded robust density estimates (CV < 50%) for 11 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Wyoming BCR 18 for 46 species, 9 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 19 of these species.

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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Wyoming BCR 18 Results

b) All Other Lands in Wyoming BCR 18

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

Field technicians completed 11 of 12 planned surveys (91.7%) in 2016. Technicians conducted 132 point counts within the 11 surveyed grid cells between 24 May and 4 June. They detected 61 bird species, including 12 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 43 species, 8 of which are priority species. The data yielded robust density estimates (CV < 50%) for 10 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in Wyoming BCR 18 for 36 species, 6 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 14 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

All Other Lands in Wyoming BCR 18 Results

III. Joint Ventures

A. Playa Lakes Joint Venture

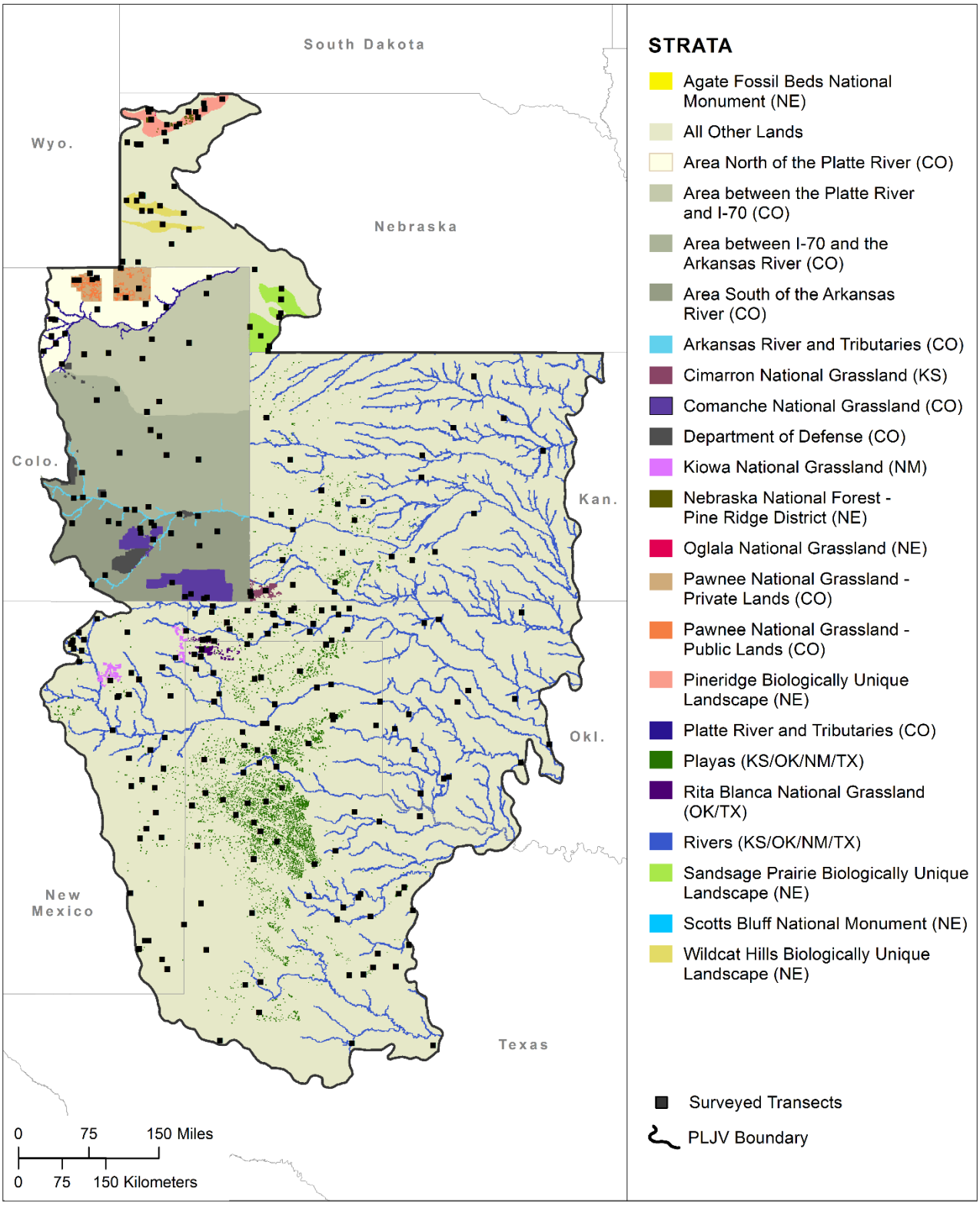


Figure 9 Survey locations in the Playa Lakes Joint Venture area

1. Playa Lakes Joint Venture Total

In 2016, the Playa Lakes Joint Venture (PLJV) coordinated a partnership between several state wildlife agencies and Bird Conservancy to expand sampling in five of the joint venture's six states: Nebraska, Kansas, New Mexico, Oklahoma, and Texas. PLJV's sixth state, Colorado, was already included in the IMBCR program starting in 2008. This expansion now provides the program with nearly complete coverage of two BCRs that were only sparsely covered in past years: Shortgrass Prairie (BCR 18) and Central Mixed Grass Prairie (BCR 19). The BCR 18 and 19 portions of these 5 states were divided into several strata, including, playas, rivers, biologically unique landscapes in Nebraska, and all other lands.

With the expansion of IMBCR throughout the PLJV region, several existing strata needed to be fit to the US National Grid to make them consistent with the rest of the IMBCR program in the region: Cimarron, Kiowa, and Rita Blanca National Grasslands in Kansas, Oklahoma, New Mexico, and Texas. In addition, we determined that the portion of Rita Blanca National Grassland that fell in New Mexico was actually managed by Kiowa National Grassland, so that portion was moved to the Kiowa National Grasslands stratum.

We obtained results for the Playa Lakes Joint Venture Area by compiling and jointly analyzing data from 43 Strata in six states.

Field technicians completed 300 of 330 planned surveys (90.9%) in 2016. Technicians conducted 2,847 point counts within the 300 surveyed grid cells between 26 April and 9 July. They detected 226 bird species.

Bird Conservancy estimated densities and population sizes for 156 species. The data yielded robust density estimates (CV < 50%) for 65 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Playa Lakes Joint Venture Area for 158 species. The data yielded robust occupancy estimates (CV < 50%) for 86 of these species.

To view a map of survey locations, density and occupancy results and species counts within the Playa Lakes Joint Venture 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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Playa Lakes Joint Venture Results

2. Playas

a) Playas in BCR 18

We obtained results for Playas in BCR 18 by compiling and jointly analyzing data from four Strata in four states.

Field technicians completed all 40 planned surveys (100%) in 2016. Technicians conducted 355 point counts within the 40 surveyed grid cells between 26 April and 25 May. They detected 99 bird species, including 22 priority species (Appendix B).

Bird Conservancy estimated densities and population sizes for 61 species, 19 of which are priority species. The data yielded robust density estimates (CV < 50%) for 15 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Playas in BCR 18 for 59 species, 19 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 21 of these species.

To view a map of survey locations, density and occupancy results and species counts within playas in 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Playas in BCR 18 Results

b) Playas in BCR 19

We obtained results for Playas in BCR 19 by compiling and jointly analyzing data from three Strata in three states.

Field technicians completed 12 of 13 planned surveys (92.3%) in 2016. Technicians conducted 81 point counts within the 12 surveyed grid cells between 28 April and 28 May. They detected 67 bird species, including 17 priority species (Appendix B).

Bird Conservancy estimated densities and population sizes for 46 species, 15 of which are priority species. The data yielded robust density estimates (CV < 50%) for 17 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Playas in BCR 19 for 39 species, 13 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 24 of these species.

To view a map of survey locations, density and occupancy results and species counts within playas in BCR 19 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 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Playas in BCR 19 Results

3. Rivers

a) Rivers in BCR 18

We obtained results for Rivers in BCR 18 by compiling and jointly analyzing data from six Strata in five states.

Field technicians completed 48 of 57 planned surveys (84.2%) in 2016. Technicians conducted 447 point counts within the 48 surveyed grid cells between 27 April and 28 May. They detected 160 bird species, including 29 priority species (Appendix B).

Bird Conservancy estimated densities and population sizes for 128 species, 27 of which are priority species. The data yielded robust density estimates (CV < 50%) for 57 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Rivers in BCR 18 for 123 species, 24 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 69 of these species.

To view a map of survey locations, density and occupancy results and species counts within Rivers in 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Rivers in BCR 18 Results

b) Rivers in BCR 19

We obtained results for Rivers in BCR 19 by compiling and jointly analyzing data from three Strata in three states.

Field technicians completed 19 of 26 planned surveys (73.1%) in 2016. Technicians conducted 154 point counts within the 19 surveyed grid cells between 26 April and 27 May. They detected 124 bird species, including 29 priority species (Appendix B).

Bird Conservancy estimated densities and population sizes for 86 species, 24 of which are priority species. The data yielded robust density estimates (CV < 50%) for 37 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Rivers in BCR 19 for 83 species, 22 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 45 of these species.

To view a map of survey locations, density and occupancy results and species counts within Rivers in BCR 19 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 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Rivers in BCR 19 Results

4. All Other Lands

a) All Other Lands in BCR 18

We obtained results for All Other Lands in BCR 18 by compiling and jointly analyzing data from four Strata in four states.

Field technicians completed 45 of 50 planned surveys (90%) in 2016. Technicians conducted 378 point counts within the 45 surveyed grid cells between 27 April and 27 May. They detected 107 bird species, including 24 priority species (Appendix B).

Bird Conservancy estimated densities and population sizes for 76 species, 22 of which are priority species. The data yielded robust density estimates (CV < 50%) for 22 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in BCR 18 for 67 species, 21 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 27 of these species.

To view a map of survey locations, density and occupancy results and species counts within All Other Lands in 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

PLJV All Other Lands in BCR 18 Results

b) All Other Lands in BCR 19

We obtained results for All Other Lands in BCR 19 by compiling and jointly analyzing data from three Strata in three states.

Field technicians completed 25 of 32 planned surveys (78.1%) in 2016. Technicians conducted 208 point counts within the 25 surveyed grid cells between 27 April and 2 July. They detected 113 bird species, including 28 priority species (Appendix B).

Bird Conservancy estimated densities and population sizes for 79 species, 26 of which are priority species. The data yielded robust density estimates (CV < 50%) for 30 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in BCR 19 for 78 species, 25 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 36 of these species.

To view a map of survey locations, density and occupancy results and species counts within All Other Lands in 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

PLJV All Other Lands in BCR 19 Results

VI. 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. Results for All Other Lands strata within Colorado and Wyoming are reported in Section II: States.

1. All Other Lands in Montana BCR 11

We obtained results for All Other Lands in Montana BCR 11 from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 19 point counts within the 2 surveyed grid cells between 28 June and 1 July. They detected 33 bird species, including 4 priority species (Appendix C).

Bird Conservancy 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, 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

All Other Lands in Montana BCR 11 Results

2. All Other Lands in Montana BCR 17

We obtained results for All Other Lands in Montana BCR 17 by analyzing data from one stratum.

Field technicians completed all 16 planned surveys (100%) in 2016. They also completed one extra survey in All Other Lands in Montana BCR 17. Technicians conducted 176 point counts within the 17 surveyed grid cells between 18 May and 25 June. They detected 91 bird species, including 10 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 73 species, 6 of which are priority species. The data yielded robust density estimates (CV < 50%) for 25 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in Montana BCR 17 for 70 species, 6 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 27 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

All Other Lands in Montana BCR 17 Results

3. All Other Lands in Nebraska BCR 17

We obtained results for All Other Lands in Nebraska BCR 17 from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 14 point counts within the 2 surveyed grid cells between 25 June and 26 June. They detected 16 bird species, including 1 priority species (Appendix C).

Bird Conservancy 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 species counts within All Other Lands in 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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

All Other Lands in Nebraska BCR 17 Results

4. All Other Lands in North Dakota BCR 17

We obtained results for All Other Lands in North Dakota BCR 17 by compiling and jointly analyzing data from two strata.

Field technicians completed all 12 planned surveys (100%) in 2016. Technicians conducted 106 point counts within the 12 surveyed grid cells between 1 June and 1 July. They detected 67 bird species, including 13 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 59 species, 13 of which are priority species. The data yielded robust density estimates (CV < 50%) for 22 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in North Dakota BCR 17 for 54 species, 10 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 24 of these species

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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

All Other Lands in North Dakota BCR 17 Results

5. All Other Lands in South Dakota BCR 17

We obtained results for All Other Lands in South Dakota BCR 17 by compiling and jointly analyzing data from two strata.

Field technicians completed all 8 planned surveys (100%) in 2016. Technicians conducted 56 point counts within the 8 surveyed grid cells between 19 May and 1 July. They detected 63 bird species, including 7 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 54 species, 5 of which are priority species. The data yielded robust density estimates (CV < 50%) for 7 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout All Other Lands in South Dakota BCR 17 for 42 species, 4 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 14 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

All Other Lands in South Dakota BCR 17 Results

B. Bureau of Land Management

1. BLM in Colorado

a) BLM in Colorado: Total

We obtained results for BLM in Colorado by compiling and jointly analyzing data from two strata.

Field technicians completed all 33 planned surveys (100%) in 2016. Technicians conducted 422 point counts within the 33 surveyed grid cells between 10 May and 12 July. They detected 112 bird species, including 2 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 100 species, 2 of which are priority species. The data yielded robust density estimates (CV < 50%) for 43 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout BLM in Colorado for 97 species, 2 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 54 of these species.

To view a map of survey locations, density and occupancy results and species counts within BLM 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

BLM in Colorado Results

b) BLM in Colorado BCR 10

We obtained results for BLM in Colorado BCR 10 by analyzing data from one stratum.

Field technicians completed all 8 planned surveys (100%) in 2016. Technicians conducted 107 point counts within the 8 surveyed grid cells between 18 May and 4 June. They detected 44 bird species, including 2 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 42 species, 1 of which is a priority species. The data yielded robust density estimates (CV < 50%) for 10 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout BLM in Colorado BCR 10 for 36 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 11 of these species

To view a map of survey locations, density and occupancy results and species counts within BLM 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

BLM in Colorado BCR 10 Results

c) BLM in Colorado BCR 16

We obtained results for BLM in Colorado BCR 16 by analyzing data from one stratum.

Field technicians completed all 25 planned surveys (100%) in 2016. Technicians conducted 315 point counts within the 25 surveyed grid cells between 10 May and 12 July. They detected 109 bird species, including 2 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 97 species, 2 of which are priority species. The data yielded robust density estimates (CV < 50%) for 38 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout BLM in Colorado BCR 16 for 92 species, 2 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 49 of these species.

To view a map of survey locations, density and occupancy results and species counts within BLM 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

BLM in Colorado BCR 16 Results

2. BLM in Idaho

a) Boise District Office

We obtained results for the Boise District Office in Idaho by compiling and jointly analyzing data from three Strata.

Field technicians completed all 20 planned surveys (100%) in 2016. Technicians conducted 244 point counts within the 20 surveyed grid cells between 29 May and 9 June. They detected 81 bird species, including 11 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 59 species, 8 of which are priority species. The data yielded robust density estimates (CV < 50%) for 10 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout the Boise District Office in Idaho for 51 species, 7 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 15 of these species.

To view a map of survey locations, density and occupancy results and species counts within the Boise District 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Boise District Office

b) Twin Falls District Office

We obtained results for the Twin Falls District Office in Idaho by compiling and jointly analyzing data from three Strata.

Field technicians completed all 33 planned surveys (100%) in 2016. Technicians conducted 422 point counts within the 33 surveyed grid cells between 28 May and 25 June. They detected 59 bird species, including 13 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 46 species, 10 of which are priority species. The data yielded robust density estimates (CV < 50%) for 14 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout the Twin Falls District Office in Idaho for 43 species, 11 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 16 of these species.

To view a map of survey locations, density and occupancy results and species counts within the Twin Falls District 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Twin Falls District Office

c) Four Rivers Field Office in BCR 10

We obtained results for the Four Rivers Field Office in Idaho from one stratum

Field technicians completed all 2 planned surveys (100%) in 2016. Technicians conducted 15 point counts within the 2 surveyed grid cells between 7 June and 9 July. They detected 28 bird species, including 2 priority species (Appendix D).

Bird Conservancy 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, density and occupancy results and species counts within the Four Rivers 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Four Rivers Field Office in BCR 10

d) Shoshone Field Office in BCR 10

We obtained results for the Shoshone Field Office in Idaho from one stratum

Field technicians completed all 2 planned surveys (100%) in 2016. Technicians conducted 16 point counts within the 2 surveyed grid cells between 26 June and 27 June. They detected 34 bird species, including 2 priority species (Appendix D).

Bird Conservancy 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, density and occupancy results and species counts within the Shoshone 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Shoshone Field Office in BCR 10

3. BLM in Montana

a) BLM in Montana: Total

We obtained results for BLM in Montana by compiling and jointly analyzing data from five Strata.

Field technicians completed all 31 planned surveys (100%) in 2016. They also completed one extra survey in BLM lands in Montana. Technicians conducted 406 point counts within the 32 surveyed grid cells between 18 May and 2 July. They detected 130 bird species, including 12 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 107 species, 10 of which are priority species. The data yielded robust density estimates (CV < 50%) for 29 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout BLM in Montana for 103 species, 10 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 39 of these species.

To view a map of survey locations, density and occupancy results and species counts within BLM 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

BLM in Montana Results

b) BLM in Montana BCR 10

We obtained results for BLM in Montana BCR 10 by compiling and jointly analyzing data from two strata.

Field technicians completed all 4 planned surveys (100%) in 2016. They also completed one extra survey in BLM lands in Montana BCR 10. Technicians conducted 77 point counts within the 5 surveyed grid cells between 27 May and 18 June. They detected 71 bird species, including 3 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 58 species, 3 of which are priority species. The data yielded robust density estimates (CV < 50%) for 17 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout BLM in Montana BCR 10 for 54 species, 3 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 25 of these species.

To view a map of survey locations, density and occupancy results and species counts within BLM 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

BLM in Montana BCR 10 Results

c) BLM in Montana BCR 11

We obtained results for BLM in Montana BCR 11 by compiling and jointly analyzing data from two Strata.

Field technicians completed 17 of 18 planned surveys (94.4%) in 2016. They also completed one extra survey in BLM lands in Montana BCR 11. Technicians conducted 225 point counts within the 17 surveyed grid cells between 19 May and 2 July. They detected 80 bird species, including 11 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 57 species, 8 of which are priority species. The data yielded robust density estimates (CV < 50%) for 15 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout BLM in Montana BCR 11 for 53 species, 8 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 18 of these species.

To view a map of survey locations, density and occupancy results and species counts within BLM 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

BLM in Montana BCR 11 Results

d) BLM in Montana BCR 17

We obtained results for BLM in Montana BCR 17 by analyzing data from one stratum.

Field technicians completed all 9 planned surveys (100%) in 2016. Technicians conducted 104 point counts within the 9 surveyed grid cells between 18 May and 21 June. They detected 52 bird species, including 10 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 47 species, 8 of which are priority species. The data yielded robust density estimates (CV < 50%) for 8 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout BLM in Montana BCR 17 for 44 species, 7 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 10 of these species

To view a map of survey locations, density and occupancy results and species counts within BLM 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

BLM in Montana BCR 17 Results

4. BLM in North Dakota BCR 17

We obtained results for BLM in North Dakota BCR 17 by analyzing data from one stratum.

Field technicians completed all 5 planned surveys (100%) in 2016. Technicians conducted 68 point counts within the 5 surveyed grid cells between 20 June and 27 June. They detected 69 bird species, including 6 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 62 species, 6 of which are priority species. The data yielded robust density estimates (CV < 50%) for 8 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout BLM in North Dakota BCR 17 for 60 species, 6 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 13 of these species.

To view a map of survey locations, density and occupancy results and species counts within BLM 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

BLM in North Dakota BCR 17 Results

5. BLM in South Dakota BCR 17

We obtained results for BLM in South Dakota BCR 17 by analyzing data from one stratum.

Field technicians completed all 5 planned surveys (100%) in 2016. Technicians conducted 59 point counts within the 5 surveyed grid cells between 1 June and 10 June. They detected 74 bird species, including 7 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 68 species, 7 of which are priority species. The data yielded robust density estimates (CV < 50%) for 5 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout BLM in South Dakota BCR 17 for 59 species, 5 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 5 of these species.

To view a map of survey locations, density and occupancy results and species counts within BLM 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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

BLM in South Dakota BCR 17 Results

6. BLM in Utah

a) BLM in Utah BCR 9

We obtained results for BLM in Utah BCR 9 by compiling and jointly analyzing data from five Strata.

Field technicians completed all 62 planned surveys (100%) in 2016. Technicians conducted 761 point counts within the 62 surveyed grid cells between 10 May and 12 June. They detected 110 bird species, including 6 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 100 species, 4 of which are priority species. The data yielded robust density estimates (CV < 50%) for 30 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout BLM in Utah BCR 9 for 91 species, 5 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 35 of these species.

To view a map of survey locations, density and occupancy results and species counts within BLM in Utah BCR 9 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 2016, 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 2016, hit "Add Filter", then "Run Query".

BLM in Utah BCR 9 Results

b) BLM in Utah BCR 10

We obtained results for BLM in Utah BCR 10 by compiling and jointly analyzing data from two Strata.

Field technicians completed all 14 planned surveys (100%) in 2016. Technicians conducted 192 point counts within the 14 surveyed grid cells between 16 May and 31 May. They detected 66 bird species, including 2 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 58 species, 1 of which is a priority species. The data yielded robust density estimates (CV < 50%) for 20 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout BLM in Utah BCR 10 for 53 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 31 of these species.

To view a map of survey locations, density and occupancy results and species counts within BLM in Utah 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

BLM in Utah BCR 10 Results

7. BLM in Wyoming

a) BLM in Wyoming: Total

We obtained results for BLM in Wyoming by compiling and jointly analyzing data from 14 strata.

Field technicians completed all 54 planned surveys (100%) in 2016. Technicians conducted 730 point counts within the 54 surveyed grid cells between 17 May and 19 July. They detected 111 bird species, including 10 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 92 species, 7 of which are priority species. The data yielded robust density estimates (CV < 50%) for 30 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout BLM in Wyoming for 85 species, 7 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 39 of these species.

To view a map of survey locations, density and occupancy results and species counts within BLM 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

BLM in Wyoming Results

b) Buffalo Field Office

We obtained results for the Buffalo Field Office by compiling and jointly analyzing data from two strata.

Field technicians completed all 4 planned surveys (100%) in 2016. Technicians conducted 55 point counts within the 4 surveyed grid cells between 29 May and 19 July. They detected 53 bird species, including 3 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 41 species, 2 of which are priority species. The data yielded robust density estimates (CV < 50%) for 8 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout the Buffalo Field Office for 36 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 13 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Buffalo Field Office Results

c) Casper Field Office

We obtained results for the Casper Field Office by compiling and jointly analyzing data from two strata.

Field technicians completed all 4 planned surveys (100%) in 2016. Technicians conducted 55 point counts within the 4 surveyed grid cells between 17 May and 21 June. They detected 37 bird species, including 2 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 34 species, 2 of which are priority species. The data yielded robust density estimates (CV < 50%) for 4 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout the Casper Field Office for 29 species, 2 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 6 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Casper Field Office Results

d) Cody Field Office

We obtained results for the Cody Field Office from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 18 point counts within the 2 surveyed grid cells between 22 May and 23 May. They detected 19 bird species, including 1 priority species (Appendix D).

Bird Conservancy 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Cody Field Office Results

e) Kemmerer Field Office

We obtained results for the Kemmerer Field Office from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 28 point counts within the 2 surveyed grid cells between 3 June and 4 June. They detected 11 bird species, including 4 priority species (Appendix D).

Bird Conservancy 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Kemmerer Field Office Results

f) Lander Field Office

We obtained results for the Lander Field Office from one stratum.

Field technicians completed all 6 planned surveys (100%) in 2016. Technicians conducted 80 point counts within the 6 surveyed grid cells between 31 May and 23 June. They detected 50 bird species, including 5 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 38 species, 4 of which are priority species. The data yielded robust density estimates (CV < 50%) for 8 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout the Lander Field Office for 33 species, 4 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 8 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Lander Field Office Results

g) Newcastle Field Office

We obtained results for the Newcastle Field Office from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 28 point counts within the 2 surveyed grid cells between 17 May and 18 May. They detected 24 bird species, including 2 priority species (Appendix D).

Bird Conservancy 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Newcastle Field Office Results

h) Pinedale Field Office

We obtained results for the Pinedale Field Office by analyzing data from one stratum.

Field technicians completed all 8 planned surveys (100%) in 2016. Technicians conducted 117 point counts within the 8 surveyed grid cells between 13 June and 24 June. They detected 21 bird species, including 3 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 21 species, 3 of which are priority species. The data yielded robust density estimates (CV < 50%) for 8 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout the Pinedale Field Office for 17 species, 3 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 6 of these species

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Pinedale Field Office Results

i) Rawlins Field Office

We obtained results for the Rawlins Field Office by analyzing data from one stratum.

Field technicians completed all 8 planned surveys (100%) in 2016. Technicians conducted 122 point counts within the 8 surveyed grid cells between 1 June and 29 June. They detected 32 bird species, including 5 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 23 species, 5 of which are priority species. The data yielded robust density estimates (CV < 50%) for 7 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout the Rawlins Field Office for 20 species, 5 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 5 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Rawlins Field Office Results

j) Rock Springs Field Office

We obtained results for the Rock Springs Field Office by analyzing data from one stratum.

Field technicians completed all 8 planned surveys (100%) in 2016. Technicians conducted 109 point counts within the 8 surveyed grid cells between 6 June and 1 July. They detected 40 bird species, including 4 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 29 species, 4 of which are priority species. The data yielded robust density estimates (CV < 50%) for 6 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout the Rock Springs Field Office for 27 species, 4 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 8 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Rock Springs Field Office Results

k) Worland Field Office

We obtained results for the Worland Field Office by analyzing data from one stratum.

Field technicians completed all 6 planned surveys (100%) in 2016. Technicians conducted 76 point counts within the 6 surveyed grid cells between 20 May and 3 July. They detected 36 bird species, including 7 priority species (Appendix D).

Bird Conservancy estimated densities and population sizes for 31 species, 6 of which are priority species. The data yielded robust density estimates (CV < 50%) for 8 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout the Worland Field Office for 27 species, 6 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 8 of these species.

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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Worland Field Office Results

l) BLM in Wyoming BCR 16

We obtained results for BLM in Wyoming BCR 16 from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 17 point counts within the 2 surveyed grid cells between 4 June and 11 June. They detected 31 bird species.

Bird Conservancy 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 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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

BLM in Wyoming BCR 16 Results

m) BLM in Wyoming BCR 18

We obtained results for BLM in Wyoming BCR 18 from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 25 point counts within the 2 surveyed grid cells between 29 May and 1 June. They detected 25 bird species, including 2 priority species (Appendix D).

Bird Conservancy 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 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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

BLM in Wyoming BCR 18 Results

C. Department of Defense

1. DOD Lands in Colorado BCR 18

We obtained results for DOD lands in Colorado BCR 18 from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 25 point counts within the 2 surveyed grid cells between 10 May and 19 May. They detected 55 bird species, including 5 priority species (Appendix C).

Bird Conservancy 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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

DOD in Colorado BCR 18 Results

2. DOD Lands in Wyoming BCR 18

We obtained results for DOD lands in Wyoming BCR 18 from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 22 point counts within the 2 surveyed grid cells between 5 June and 6 June. They detected 30 bird species, including 6 priority species (Appendix C)

Bird Conservancy 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 Fort Carson 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 2016, 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 2016, hit "Add Filter", then "Run Query".

DOD in Wyoming BCR 18 Results

D. National Park Service

1. Greater Yellowstone Network

a) Greater Yellowstone Network: Total

We obtained results for the Greater Yellowstone Network by compiling and jointly analyzing data from three strata.

Field technicians completed all 8 planned surveys (100%) in 2016. Technicians conducted 119 point counts within the 8 surveyed grid cells between 23 May and 3 July. They detected 74 bird species.

Bird Conservancy estimated densities and population sizes for 61 species. The data yielded robust density estimates (CV < 50%) for 11 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout the Greater Yellowstone Network for 63 species. The data yielded robust occupancy estimates (CV < 50%) for 23 of these 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Greater Yellowstone Network Results

b) Bighorn Canyon National Recreation Area
We obtained results for Bighorn Canyon National Recreation Area from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 26 point counts within the 2 surveyed grid cells between 31 May and 1 June. They detected 18 bird species.

Bird Conservancy 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Bighorn Canyon National Recreation Area Results

c) Grand Teton National Park
We obtained results for Grand Teton National Park from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 32 point counts within the 2 surveyed grid cells between 23 May and 28 June. They detected 41 bird species.

Bird Conservancy 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Grand Teton National Park Results

d) Yellowstone National Park

We obtained results for Yellowstone National Park from one stratum.

Field technicians completed all 4 planned surveys (100%) in 2016. Technicians conducted 61 point counts within the 4 surveyed grid cells between 27 June and 3 July. They detected 52 bird species.

Bird Conservancy estimated densities and population sizes for 46 species. The data yielded robust density estimates (CV < 50%) for 8 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Yellowstone National Park for 48 species. The data yielded robust occupancy estimates (CV < 50%) for 18 of these species.

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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Yellowstone National Park Results

2. Northern Colorado Plateau Network in Colorado

We obtained results for Northern Colorado Plateau Network in Colorado from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 22 point counts within the 2 surveyed grid cells between 25 May and 30 May. They detected 37 bird species.

Bird Conservancy 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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Northern Colorado Plateau Network Results

3. Northern Great Plains Network

a) Agate Fossil Beds National Monument

We obtained results for Agate Fossil Beds National Monument by analyzing data from one stratum.

Field technicians completed all 9 planned surveys (100%) in 2016. Technicians conducted 96 point counts within the 9 surveyed grid cells between 1 June and 14 June. They detected 64 bird species.

Bird Conservancy estimated densities and population sizes for 52 species. The data yielded robust density estimates (CV < 50%) for 19 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Agate Fossil Beds National Monument for 50 species. The data yielded robust occupancy estimates (CV < 50%) for 22 of these species

To view a map of survey locations, density and occupancy results and species counts within Agate Fossil Beds National Monument 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 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Agate Fossil Beds National Monument Results

b) Badlands National Park - North Unit

We obtained results for North Unit of the Badlands National Park by analyzing data from one stratum.

Field technicians completed all 16 planned surveys (100%) in 2016. Technicians conducted 215 point counts within the 16 surveyed grid cells between 20 May and 5 June. They detected 73 bird species.

Bird Conservancy estimated densities and population sizes for 57 species. The data yielded robust density estimates (CV < 50%) for 18 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout North Unit of the Badlands National Park for 50 species. The data yielded robust occupancy estimates (CV < 50%) for 17 of these species.

To view a map of survey locations, density and occupancy results and species counts within the North Unit of the Badlands 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Badlands National Park - North Unit Results

c) Jewel Cave National Monument

We obtained results for Jewel Cave National Monument by analyzing data from one stratum.

Field technicians completed all 5 planned surveys (100%) in 2016. Technicians conducted 51 point counts within the 5 surveyed grid cells between 9 June and 16 June. They detected 39 bird species.

Bird Conservancy estimated densities and population sizes for 37 species. The data yielded robust density estimates (CV < 50%) for 17 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Jewel Cave National Monument for 33 species. The data yielded robust occupancy estimates (CV < 50%) for 18 of these species.

To view a map of survey locations, density and occupancy results and species counts within Jewel Cave National Monument 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 2016, 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 2016, hit "Add Filter", then "Run Query".

Jewel Cave National Monument Results

d) Knife River Indian Villages National Historic Site

We obtained results for Knife River Indian Villages National Historic Site by analyzing data from one stratum.

Field technicians completed all 5 planned surveys (100%) in 2016. Technicians conducted 58 point counts within the 5 surveyed grid cells between 14 June and 20 June. They detected 74 bird species.

Bird Conservancy estimated densities and population sizes for 63 species. The data yielded robust density estimates (CV < 50%) for 26 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Knife River Indian Villages National Historic Site for 56 species. The data yielded robust occupancy estimates (CV < 50%) for 28 of these species.

To view a map of survey locations, density and occupancy results and species counts within Knife River Indian Villages National Historic Site 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 2016, 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 2016, hit "Add Filter", then "Run Query".

Knife River Indian Villages National Historic Site Results

e) Missouri National Recreational River

We obtained results for Missouri National Recreational River by compiling and jointly analyzing data from two strata.

Field technicians completed all 16 planned surveys (100%) in 2016. Technicians conducted 146 point counts within the 16 surveyed grid cells between 30 May and 8 July. They detected 96 bird species.

Bird Conservancy estimated densities and population sizes for 73 species. The data yielded robust density estimates (CV < 50%) for 47 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Missouri National Recreational River for 71 species. The data yielded robust occupancy estimates (CV < 50%) for 48 of these species.

To view a map of survey locations, density and occupancy results and species counts within Missouri National Recreational River 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 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Missouri National Recreational River Results

(1) Missouri National Recreational River - 59 Mile District

We obtained results for Missouri National Recreational River - 59 Mile District by analyzing data from one stratum.

Field technicians completed all 8 planned surveys (100%) in 2016. Technicians conducted 74 point counts within the 8 surveyed grid cells between 30 May and 8 July. They detected 86 bird species.

Bird Conservancy estimated densities and population sizes for 64 species. The data yielded robust density estimates (CV < 50%) for 26 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Missouri National Recreational River - 59 Mile District for 63 species. The data yielded robust occupancy estimates (CV < 50%) for 39 of these species.

To view a map of survey locations, density and occupancy results and species counts within Missouri National Recreational River – 59 Mile District 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 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Missouri National Recreational River – 59 Mile District Results

(2) Missouri National Recreational River - 39 Mile District

We obtained results for Missouri National Recreational River - 39 Mile District by analyzing data from one stratum.

Field technicians completed all 8 planned surveys (100%) in 2016. Technicians conducted 72 point counts within the 8 surveyed grid cells between 1 June and 30 June. They detected 81 bird species.

Bird Conservancy estimated densities and population sizes for 68 species. The data yielded robust density estimates (CV < 50%) for 35 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Missouri National Recreational River - 39 Mile District for 64 species. The data yielded robust occupancy estimates (CV < 50%) for 41 of these species.

To view a map of survey locations, density and occupancy results and species counts within Missouri National Recreational River – 39 Mile District 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 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Missouri National Recreational River – 39 Mile District Results

f) Mount Rushmore National Monument

We obtained results for Mount Rushmore National Monument by analyzing data from one stratum.

Field technicians completed all 6 planned surveys (100%) in 2016. Technicians conducted 66 point counts within the 6 surveyed grid cells between 10 June and 15 June. They detected 48 bird species.

Bird Conservancy estimated densities and population sizes for 43 species. The data yielded robust density estimates (CV < 50%) for 22 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Mount Rushmore National Monument for 40 species. The data yielded robust occupancy estimates (CV < 50%) for 25 of these species.

To view a map of survey locations, density and occupancy results and species counts within Mount Rushmore National Monument 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 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Mount Rushmore National Monument Results

g) Niobrara National Scenic River

We obtained results for Niobrara National Scenic River by analyzing data from one stratum.

Field technicians completed all 14 planned surveys (100%) in 2016. Technicians conducted 110 point counts within the 14 surveyed grid cells between 17 June and 29 June. They detected 81 bird species.

Bird Conservancy estimated densities and population sizes for 72 species. The data yielded robust density estimates (CV < 50%) for 36 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Niobrara National Scenic River for 69 species. The data yielded robust occupancy estimates (CV < 50%) for 40 of these species.

To view a map of survey locations, density and occupancy results and species counts within Niobrara National Scenic River 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 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Niobrara National Scenic River Results

h) Scotts Bluff National Monument

We obtained results for Scotts Bluff National Monument by analyzing data from one stratum.

Field technicians completed all 7 planned surveys (100%) in 2016. Technicians conducted 65 point counts within the 7 surveyed grid cells between 2 June and 2 July. They detected 57 bird species.

Bird Conservancy estimated densities and population sizes for 47 species. The data yielded robust density estimates (CV < 50%) for 16 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Scotts Bluff National Monument for 38 species. The data yielded robust occupancy estimates (CV < 50%) for 16 of these species.

To view a map of survey locations, density and occupancy results and species counts within Scotts Bluff National Monument 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 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Scotts Bluff National Monument Results

i) Theodore Roosevelt National Park

We obtained results for Theodore Roosevelt National Park by compiling and jointly analyzing data from two strata.

Field technicians completed all 14 planned surveys (100%) in 2016. Technicians conducted 172 point counts within the 14 surveyed grid cells between 12 June and 30 June. They detected 68 bird species.

Bird Conservancy estimated densities and population sizes for 56 species. The data yielded robust density estimates (CV < 50%) for 30 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Theodore Roosevelt National Park for 53 species. The data yielded robust occupancy estimates (CV < 50%) for 32 of these species.

To view a map of survey locations, density and occupancy results and species counts within Theodore Roosevelt 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Theodore Roosevelt National Park Results

j) Wind Cave National Park

We obtained results for Wind Cave National Park by analyzing data from one stratum.

Field technicians completed all 14 planned surveys (100%) in 2016. Technicians conducted 188 point counts within the 14 surveyed grid cells between 1 June and 15 June. They detected 80 bird species.

Bird Conservancy estimated densities and population sizes for 68 species. The data yielded robust density estimates (CV < 50%) for 23 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Wind Cave National Park for 58 species. The data yielded robust occupancy estimates (CV < 50%) for 27 of these species.

To view a map of survey locations, density and occupancy results and species counts within Wind Cave 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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Wind Cave National Park Results

4. Rocky Mountain Network in Colorado

We obtained results for Rocky Mountain Network in Colorado from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 26 point counts within the 2 surveyed grid cells between 1 June and 2 June. They detected 36 bird species.

Bird Conservancy 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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Rocky Mountain Network in Colorado Results

5. Southern Colorado Plateau Network in Colorado

We obtained results for Southern Colorado Plateau Network in Colorado from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 26 point counts within the 2 surveyed grid cells between 1 June and 2 June. They detected 36 bird species.

Bird Conservancy 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Southern Colorado Plateau Network in Colorado Results

6. Craters of the Moon National Monument

We obtained results for Craters of the Moon National Monument in the Upper Columbia Basin Network by compiling and jointly analyzing data from two strata.

Field technicians completed all 13 planned surveys (100%) in 2016. Technicians conducted 166 point counts within the 13 surveyed grid cells between 26 May and 29 May. They detected 50 bird species.

Bird Conservancy estimated densities and population sizes for 30 species. The data yielded robust density estimates (CV < 50%) for 11 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Craters of the Moon National Monument for 30 species. The data yielded robust occupancy estimates (CV < 50%) for 15 of these species.

To view a map of survey locations and get species counts within the Craters of the Moon National Monument 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 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Craters of the Moon National Monument Results

E. Tribal Lands

1. Blackfeet, Fort Belknap, Fort Peck and Rocky Boys Tribal Lands in Montana BCR 11

We obtained results for Blackfeet, Fort Belknap, Fort Peck, and Rocky Boys Tribal Lands in Montana BCR 11 from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 32 point counts within the 2 surveyed grid cells between 21 June and 28 June. They detected 28 bird species, including 6 priority species (Appendix C).

Bird Conservancy 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 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Blackfeet, Fort Belknap, Fort Peck and Rocky Boys Tribal Lands in Montana BCR 11 Results

2. Wind River Tribal Lands in Wyoming BCR 10

We obtained results for Wind River Tribal Lands in Wyoming BCR 10 by analyzing data from one stratum.

Field technicians completed all 4 planned surveys (100%) in 2016. Technicians conducted 57 point counts within the 4 surveyed grid cells between 2 June and 7 June. They detected 53 bird species, including 6 priority species (Appendix C).

Bird Conservancy estimated densities and population sizes for 47 species, 6 of which are priority species. The data yielded robust density estimates (CV < 50%) for 6 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Wind River Tribal Lands in Wyoming BCR 10 for 42 species, 6 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 12 of these species

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Wind River Tribal Lands in Wyoming BCR 10 Results

F. US Fish and Wildlife Service

1. Charles M. Russell National Wildlife Refuge

We obtained results for Charles M. Russell National Wildlife Refuge by compiling and jointly analyzing data from two strata.

Field technicians completed all 4 planned surveys (100%) in 2016. Technicians conducted 43 point counts within the 4 surveyed grid cells between 20 June and 29 June. They detected 54 bird species, including 2 priority species (Appendix I).

Bird Conservancy estimated densities and population sizes for 48 species, 2 of which are priority species. The data yielded robust density estimates (CV < 50%) for 11 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Charles M. Russell National Wildlife Refuge for 44 species, 2 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 17 of these species.

To view a map of survey locations, density and occupancy results and species counts within Charles M. Russell National Wildlife Refuge 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 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Charles M. Russell National Wildlife Refuge Results

2. Montana BCR 11 US Fish and Wildlife Service

We obtained results for US Fish and Wildlife Service Lands in Montana BCR 11 by compiling and jointly analyzing data from two strata.

Field technicians completed all 4 planned surveys (100%) in 2016. Technicians conducted 60 point counts within the 4 surveyed grid cells between 27 June and 30 June. They detected 53 bird species, including 7 priority species (Appendix I).

Bird Conservancy estimated densities and population sizes for 45 species, 5 of which are priority species. The data yielded robust density estimates (CV < 50%) for 6 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Montana BCR 11 US Fish and Wildlife Service for 40 species, 4 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 12 of these species.

To view a map of survey locations, density and occupancy results and species counts within US 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Montana BCR 11 US Fish and Wildlife Service Results

3. Montana BCR 17 US Fish and Wildlife Service

We obtained results for U.S. Fish and Wildlife Service Lands in Montana BCR 17 by compiling and jointly analyzing data from two strata.

Field technicians completed all 4 planned surveys (100%) in 2016. Technicians conducted 39 point counts within the 4 surveyed grid cells between 20 June and 26 June. They detected 66 bird species, including 4 priority species (Appendix I).

Bird Conservancy estimated densities and population sizes for 50 species, 3 of which are priority species. The data yielded robust density estimates (CV < 50%) for 10 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Montana BCR 17 US Fish and Wildlife Service for 42 species, 3 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 17 of these species.

To view a map of survey locations, density and occupancy results and 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Montana BCR 17 US Fish and Wildlife Service Results

G. US Forest Service

1. Region 1

a) Region 1 National Forests

Within this sampling design each national forest in Region 1 is stratified separately. 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

We obtained results for Region 1 National Forests by compiling and jointly analyzing data from 29 Strata in three states.

Field technicians completed all 220 planned surveys (100%) in 2016. Technicians conducted 2282 point counts within the 220 surveyed grid cells between 25 May and 9 July. They detected 165 bird species, including 27 priority species (Appendix E).

Bird Conservancy estimated densities and population sizes for 134 species, 16 of which are priority species. The data yielded robust density estimates (CV < 50%) for 80 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Region 1 National Forests for 134 species, 13 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 92 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Region 1 National Forests Results

(2) Beaverhead-Deerlodge National Forest

We obtained results for Beaverhead-Deerlodge National Forest 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 13 planned surveys (100%) in 2016. Technicians conducted 190 point counts within the 13 surveyed grid cells between 26 May and 6 July. They detected 70 bird species.

Bird Conservancy estimated densities and population sizes for 65 species. The data yielded robust density estimates (CV < 50%) for 18 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Beaverhead-Deerlodge National Forest for 64 species. The data yielded robust occupancy estimates (CV < 50%) for 34 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Beaverhead-Deerlodge National Forest Results

(3) Bitterroot National Forest

We obtained results for Bitterroot National Forest by compiling and jointly analyzing data from three strata in two states: Montana front-country/managed areas, Montana designated roadless/wilderness areas and Idaho. This forest-level stratification distinction in Montana 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 stratification distinction between states is made to allow for the summation of the data for individual states involved.

There were some significant stratification changes made to the BCR 10 portion of Idaho between the 2013 and 2014 field seasons. The “All Other Lands in the Region 1 portion of Idaho BCR 10” (all lands outside of national forest boundaries), “All Other Lands in the Region 4 portion of Idaho BCR 10” (all lands outside of national forest boundaries), “other USFS lands in the Region 1 portion of Idaho BCR 10” and “USFS designated roadless/wilderness areas within the Region 4 portion of Idaho BCR 10” strata were further subdivided. The new strata created in Idaho BCR 10 include the Idaho portion of Bitterroot National Forest. Since Bitterroot National Forest spans Idaho and Montana, 2014 density and occupancy estimates for this forest will include strata from both states. In the past, “forest-wide” estimates have only represented the Montana portion of this forest.

Field technicians completed all 15 planned surveys (100%) in 2016. Technicians conducted 190 point counts within the 15 surveyed grid cells between 28 May and 8 July. They detected 80 bird species, including 1 priority species (Appendix E).

Bird Conservancy estimated densities and population sizes for 68 species, 1 of which is a priority species. The data yielded robust density estimates (CV < 50%) for 25 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Bitterroot National Forest for 65 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 43 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Bitterroot National Forest Results

(4) Clearwater National Forest

We obtained results for Clearwater National Forest 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 22 planned surveys (100%) in 2016. Technicians conducted 153 point counts within the 22 surveyed grid cells between 27 May and 6 July. They detected 71 bird species, including 1 priority species (Appendix E).

Bird Conservancy estimated densities and population sizes for 58 species, 1 of which is a priority species. The data yielded robust density estimates (CV < 50%) for 20 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Clearwater National Forest for 61 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 25 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Clearwater National Forest Results

(5) Custer National Forest

We obtained results for Custer National Forest 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 17 planned surveys (100%) in 2016. Technicians conducted 161 point counts within the 17 surveyed grid cells between 3 June and 3 July. They detected 101 bird species, including 8 priority species (Appendix E).

Bird Conservancy estimated densities and population sizes for 83 species, 7 of which are priority species. The data yielded robust density estimates (CV < 50%) for 28 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Custer National Forest for 79 species, 7 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 39 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Custer National Forest Results

(6) Flathead National Forest

We obtained results for Flathead National Forest 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 13 planned surveys (100%) in 2016. Technicians conducted 117 point counts within the 13 surveyed grid cells between 29 May and 24 June. They detected 69 bird species.

Bird Conservancy estimated densities and population sizes for 62 species. The data yielded robust density estimates (CV < 50%) for 22 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Flathead National Forest for 60 species. The data yielded robust occupancy estimates (CV < 50%) for 31 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Flathead National Forest Results

(7) Gallatin National Forest

We obtained results for Gallatin National Forest 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 13 planned surveys (100%) in 2016. Technicians conducted 159 point counts within the 13 surveyed grid cells between 17 June and 9 July. They detected 70 bird species.

Bird Conservancy estimated densities and population sizes for 63 species. The data yielded robust density estimates (CV < 50%) for 21 of these species. Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Gallatin National Forest for 58 species. The data yielded robust occupancy estimates (CV < 50%) for 28 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Gallatin National Forest Results

(8) Helena National Forest

We obtained results for Helena National Forest 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 13 planned surveys (100%) in 2016. Technicians conducted 143 point counts within the 13 surveyed grid cells between 25 May and 16 June. They detected 82 bird species, including 2 priority species (Appendix E).

Bird Conservancy estimated densities and population sizes for 71 species, 2 of which are priority species. The data yielded robust density estimates (CV < 50%) for 27 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Helena National Forest for 68 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 32 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Helena National Forest Results

(9) Idaho Panhandle National Forest

We obtained results for Idaho Panhandle National Forest 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 33 planned surveys (100%) in 2016. Technicians conducted 289 point counts within the 33 surveyed grid cells between 11 June and 7 July. They detected 83 bird species, including 8 priority species (Appendix E).

Bird Conservancy estimated densities and population sizes for 64 species, 6 of which are priority species. The data yielded robust density estimates (CV < 50%) for 34 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Idaho Panhandle National Forest for 68 species, 6 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 45 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Idaho Panhandle National Forest Results

(10) Kootenai National Forest

We obtained results for Kootenai National Forest by compiling and jointly analyzing data from three strata; Montana front-country/managed areas, Montana designated roadless/wilderness areas and Idaho. This forest-level stratification distinction in Montana 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 stratification distinction between states is made to allow for the summation of the data for individual states involved.

There were some significant stratification changes made to the BCR 10 portion of Idaho between the 2013 and 2014 field seasons. The “All Other Lands in the Region 1 portion of Idaho BCR 10” (all lands outside of National Forest boundaries), “All Other Lands in the Region 4 portion of Idaho BCR 10” (all lands

outside of National Forest boundaries), “other USFS lands in the Region 1 portion of Idaho BCR 10” and “USFS designated roadless/wilderness areas within the Region 4 portion of Idaho BCR 10” strata were further subdivided. The new strata created in Idaho BCR 10 include the Idaho portion of Kootenai National Forest. Since Kootenai National Forest spans Idaho and Montana, 2014 density and occupancy estimates for this forest will include strata from both states. In the past, “forest-wide” estimates have only represented the Montana portion of this forest.

Field technicians completed all 35 planned surveys (100%) in 2016. Technicians conducted 448 point counts within the 35 surveyed grid cells between 25 May and 3 July. They detected 88 bird species, including 6 priority species (Appendix E).

Bird Conservancy estimated densities and population sizes for 77 species, 6 of which are priority species. The data yielded robust density estimates (CV < 50%) for 40 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Kootenai National Forest for 77 species, 6 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 43 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Kootenai National Forest Results

(11) Lewis and Clark National Forest

We obtained results for Lewis and Clark National Forest 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 11 planned surveys (100%) in 2016. Technicians conducted 108 point counts within the 11 surveyed grid cells between 8 June and 7 July. They detected 73 bird species, including 1 priority species (Appendix E).

Bird Conservancy estimated densities and population sizes for 63 species. The data yielded robust density estimates (CV < 50%) for 17 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Lewis and Clark National Forest for 63 species. The data yielded robust occupancy estimates (CV < 50%) for 31 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Lewis and Clark National Forest Results

(12) Lolo National Forest

We obtained results for Lolo National Forest 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 13 planned surveys (100%) in 2016. Technicians conducted 153 point counts within the 13 surveyed grid cells between 25 May and 4 July. They detected 87 bird species, including 2 priority species (Appendix E).

Bird Conservancy estimated densities and population sizes for 74 species, 1 of which is a priority species. The data yielded robust density estimates (CV < 50%) for 25 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Lolo National Forest for 73 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 33 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Lolo National Forest Results

(13) Nez Perce National Forest

We obtained results for Nez Perce National Forest 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 22 planned surveys (100%) in 2016. Technicians conducted 171 point counts within the 22 surveyed grid cells between 25 May and 9 July. They detected 77 bird species, including 2 priority species (Appendix E).

Bird Conservancy estimated densities and population sizes for 69 species, 1 of which is a priority species. The data yielded robust density estimates (CV < 50%) for 24 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Nez Perce National Forest for 68 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 36 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Nez Perce National Forest Results

b) Region 1 National Grasslands

We obtained results for Region 1 National Grasslands by compiling and jointly analyzing data from three strata in two states: 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. All of the national grasslands in USFS Region 1 fall within the Dakota Prairie National Grasslands. We did not survey one national grassland within Region 1 – Sheyenne National Grassland. We have collect data from this grassland using a different study design in the past. 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 15 planned surveys (100%) in 2016. Technicians conducted 185 point counts within the 15 surveyed grid cells between 1 June and 27 June. They detected 86 bird species, including 16 priority species (Appendix E).

Bird Conservancy estimated densities and population sizes for 73 species, 13 of which are priority species. The data yielded robust density estimates (CV < 50%) for 16 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Region 1 National Grasslands for 67 species, 12 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 24 of these species.

To view a map of survey locations, density and occupancy results and species counts within Region 1 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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Region 1 National Grasslands Results

2. Region 2

a) Region 2 National Forests

Within this sampling design each national forest in Region 2 is stratified separately. 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

We obtained results for Region 2 National Forests by compiling and jointly analyzing data from 25 Strata in four 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 235 of 236 planned surveys (99.6%) in 2016. Technicians conducted 2,893 point counts within the 235 surveyed grid cells between 17 May and 18 July. They detected 176 bird species, including 15 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 151 species, 7 of which are priority species. The data yielded robust density estimates (CV < 50%) for 83 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Region 2 National Forests for 151 species, 9 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 98 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Region 2 National Forests Results

(2) Arapaho and Roosevelt National Forests

We obtained results for this section by analyzing data from compiling and jointly analyzing data from two strata.

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

In 2014, the Arapaho and Roosevelt National Forests were re-stratified to allow these forests to monitor treatments intended to mitigate fire hazard and improve forest health. The forest was divide into two strata – a control stratum and the remainder of the forest. The control portion consists of lands ranging in elevation from 6,000 ft. to 9,000 ft. and excludes treatment areas and areas burned between 1998 and 2013. An experiment overlay stratum was created for Arapaho and Roosevelt and Pike and San Isabel National Forests consisting of actual treatment areas (areas with >30% treatment). Since this stratum spans multiple forests it is not integrated into IMBCR design. However, detections from this stratum do contribute to the number of detections used in analyses.

Field technicians completed all 35 planned surveys (100%) in 2016. Technicians conducted 390 point counts within the 35 surveyed grid cells between 31 May and 6 July. They detected 89 bird species, including 6 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 74 species, 6 of which are priority species. The data yielded robust density estimates (CV < 50%) for 21 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Arapaho and Roosevelt National Forests for 74 species, 6 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 29 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Arapaho and Roosevelt National Forests Results

(3) Bighorn National Forest

We obtained results for Bighorn National Forest by analyzing data from one stratum.

Field technicians completed all 9 planned surveys (100%) in 2016. Technicians conducted 113 point counts within the 9 surveyed grid cells between 11 June and 18 July. They detected 51 bird species, including 1 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 48 species, 1 of which is a priority species. The data yielded robust density estimates (CV < 50%) for 12 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Bighorn National Forest for 46 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 18 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Bighorn National Forest Results

(4) Black Hills National Forest

We obtained results for the Black Hills National Forest 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 states. In 2011, the South Dakota Black Hills National Forest stratum was split into two strata based on watersheds in the Forest: Hydrologic Code 7 Watersheds and all other watersheds. This stratification by watershed allows for adjusting sampling intensity to target Management Indicator Species on the Forest.

Field technicians completed all 37 planned surveys (100%) in 2016. Technicians conducted 458 point counts within the 37 surveyed grid cells between 17 May and 30 June. They detected 106 bird species, including 11 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 89 species, 8 of which are priority species. The data yielded robust density estimates (CV < 50%) for 44 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Black Hills National Forest for 84 species, 10 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 47 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Black Hills National Forest Results

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

Field technicians completed all 7 planned surveys (100%) in 2016. Technicians conducted 86 point counts within the 7 surveyed grid cells between 6 June and 5 July. They detected 58 bird species, including 2 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 49 species, 2 of which are priority species. The data yielded robust density estimates (CV < 50%) for 14 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Grand Mesa, Uncompaghre and Gunnison National Forests for 51 species, 2 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 28 of these species.

To view a map of survey locations, density and occupancy results and species counts within Grand Mesa, Uncompaghre 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Grand Mesa, Uncompaghre and Gunnison National Forest Results

(6) Medicine Bow National Forest
We obtained results for Medicine Bow National Forest 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 22 of 23 planned surveys (95.6%) in 2016. Technicians conducted 234 point counts within the 22 surveyed grid cells

between 5 June and 16 July. They detected 85 bird species, including 4 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 75 species, 3 of which are priority species. The data yielded robust density estimates (CV < 50%) for 30 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Medicine Bow National Forest for 76 species, 3 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 36 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Medicine Bow National Forest Results

(7) Nebraska National Forests

We obtained results for Nebraska National Forests 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 9 planned surveys (100%) in 2016. Technicians conducted 117 point counts within the 9 surveyed grid cells between 30 May and 5 June. They detected 72 bird species, including 2 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 61 species, 2 of which are priority species. The data yielded robust density estimates (CV < 50%) for 17 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Nebraska National Forests for 55 species, 2 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 33 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Nebraska National Forest Results

(8) Pike and San Isabel National Forests

We obtained results for Pike and San Isabel National Forests by compiling and jointly analyzing data from two Strata.

In 2014, the Pike and San Isabel National Forests were restratified to allow these forests to monitor treatments intended to mitigate fire hazard and improve forest health. The forest was divide into two strata – a control stratum and the remainder of the forest. The control portion consists of lands ranging from 6,000 ft to 9,500 ft and excludes treatment areas and areas burned between 1998 and 2013. An experiment overlay stratum was created for Arapaho and Roosevelt and Pike and San Isabel National Forests consisting of actual treatment areas (areas with >30% treatment). Since this stratum spans multiple forests it is not actually considered to be a part of the IMBCR design. However, detections from this stratum do contribute to the number of detections used in analyses.

Field technicians completed all 35 planned surveys (100%) in 2016. Technicians conducted 474 point counts within the 35 surveyed grid cells between 28 May and 8 July. They detected 91 bird species.

Bird Conservancy estimated densities and population sizes for 83 species. The data yielded robust density estimates (CV < 50%) for 31 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Pike and San Isabel National Forests for 85 species. The data yielded robust occupancy estimates (CV < 50%) for 39 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Pike and San Isabel National Forests Results

(9) Rio Grande National Forest

We obtained results for Rio Grande National Forest 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 all 24 planned surveys (100%) in 2016. Technicians conducted 320 point counts within the 24 surveyed grid cells between 11 June and 14 July. They detected 86 bird species, including 5 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 79 species, 5 of which are priority species. The data yielded robust density estimates (CV < 50%) for 39 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Rio Grande National Forest for 78 species, 5 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 44 of these species.

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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Rio Grande National Forest Results

(10) Routt National Forest

We obtained results for Routt National Forest 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. The Williams Fork Area 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 22 planned surveys (100%) in 2016. Technicians conducted 260 point counts within the 22 surveyed grid cells between 4 June and 9 July. They detected 74 bird species, including 2 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 69 species, 2 of which are priority species. The data yielded robust density estimates (CV < 50%) for 32 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Routt National Forest for 62 species, 2 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 35 of these species.

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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Routt National Forest Results

(11) San Juan National Forest

We obtained results for San Juan National Forest by analyzing data from one stratum.

Field technicians completed all 7 planned surveys (100%) in 2016. Technicians conducted 107 point counts within the 7 surveyed grid cells between 31 May and 4 July. They detected 74 bird species, including 3 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 71 species, 3 of which are priority species. The data yielded robust density estimates (CV < 50%) for 18 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout San Juan National Forest for 70 species, 3 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 26 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

San Juan National Forest Results

(12) Shoshone National Forest

We obtained results for Shoshone National Forest 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 10 planned surveys (100%) in 2016. Technicians conducted 132 point counts within the 10 surveyed grid cells between 7 June and 18 July. They detected 79 bird species, including 3 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 61 species, 2 of which are priority species. The data yielded robust density estimates (CV < 50%) for 18 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Shoshone National Forest for 58 species, 2 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 26 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Shoshone National Forest Results

(13) White River National Forest

We obtained results for White River National Forest 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 18 planned surveys (100%) in 2016. Technicians conducted 202 point counts within the 18 surveyed grid cells between 3 June and 14 July. They detected 75 bird species, including 3 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 66 species, 3 of which are priority species. The data yielded robust density estimates (CV < 50%) for 28 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout White River National Forest for 66 species, 3 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 43 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

White River National Forest Results

b) Region 2 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

We obtained results for Region 2 National Grasslands by compiling and jointly analyzing data from eight Strata in 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 36 planned surveys (100%) in 2016. Technicians conducted 473 point counts within the 36 surveyed grid cells between 8 May and 23 June. They detected 126 bird species, including 14 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 107 species, 12 of which are priority species. The data yielded robust density estimates (CV < 50%) for 21 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Region 2 National Grasslands for 101 species, 10 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 32 of these species.

To view a map of survey locations and species counts within 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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Region 2 National Grasslands Results

(2) Nebraska National Grasslands (Buffalo Gap, Fort Pierre and Oglala)
We obtained results for Nebraska National Grasslands by analyzing data from four strata in two states; 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 in Oglala National Grassland is made to allow for the summation of the data for individual BCRs.

Field technicians completed all 12 planned surveys (100%) in 2016. Technicians conducted 167 point counts within the 12 surveyed grid cells between 17 May and 23 June. They detected 93 bird species, including 8 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 84 species, 7 of which are priority species. The data yielded robust density estimates (CV < 50%) for 7 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Nebraska National Grasslands for 74 species, 5 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 28 of these species.

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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Nebraska National Grasslands Results

(3) Cimarron National Grassland
We obtained results for Cimarron National Grassland by analyzing data from one stratum.

Field technicians completed all 3 planned surveys (100%) in 2016. Technicians conducted 41 point counts within the 3 surveyed grid cells between 8 May and 16 May. They detected 30 bird species, including 1 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 19 species, 1 of which is a priority species. The data yielded robust density estimates (CV < 50%) for 7 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Cimarron National Grassland for 14 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 8 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Cimarron National Grassland Results

(4) Comanche National Grassland
We obtained results for Comanche National Grassland by analyzing data from one stratum.

Field technicians completed all 8 planned surveys (100%) in 2016. Technicians conducted 92 point counts within the 8 surveyed grid cells between 9 May and 22 May. They detected 45 bird species, including 1 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 37 species, 1 of which is a priority species. The data yielded robust density estimates (CV < 50%) for 9 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Comanche National Grassland for 36 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 10 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Comanche National Grassland Results

(5) Public Lands on Pawnee National Grassland
We obtained results for Public Lands on Pawnee National Grassland by analyzing data from one stratum.

In 2013, Pawnee National Grasslands was split into two strata – public lands and private lands – since Pawnee National Grasslands contains a large amount of private land within its borders. This allowed the USFS to concentrate more

survey effort on public lands. We only present estimates for the public lands portion of Pawnee National Grasslands in this report.

Field technicians completed all 5 planned surveys (100%) in 2016. Technicians conducted 66 point counts within the 5 surveyed grid cells between 9 May and 23 May. They detected 28 bird species, including 2 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 19 species, 1 of which is a priority species. The data yielded robust density estimates (CV < 50%) for 5 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Public Lands on Pawnee National Grassland for 18 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 5 of these species.

To view a map of survey locations, density and occupancy results and species counts within Public Lands on 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Pawnee National Grassland Results

(6) Thunder Basin National Grassland

We obtained results for Thunder Basin National Grassland by analyzing data from one stratum.

Field technicians completed all 8 planned surveys (100%) in 2016. Technicians conducted 107 point counts within the 8 surveyed grid cells between 16 May and 27 May. They detected 60 bird species, including 2 priority species (Appendix F).

Bird Conservancy estimated densities and population sizes for 45 species, 2 of which are priority species. The data yielded robust density estimates (CV < 50%) for 4 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Thunder Basin National Grassland for 44 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 10 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Thunder Basin National Grassland Results

3. Region 3

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

a) Coconino National Forest

We obtained results for Coconino National Forest by analyzing data from one stratum.

Field technicians completed all 40 planned surveys (100%) in 2016. Technicians conducted 408 point counts within the 40 surveyed grid cells between 2 May and 20 June. They detected 135 bird species, including 5 priority species (Appendix G).

Bird Conservancy estimated densities and population sizes for 112 species, 5 of which are priority species. The data yielded robust density estimates (CV < 50%) for 55 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Coconino National Forest for 108 species, 4 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 62 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Coconino National Forest Results

b) Kaibab National Forest

We obtained results for Kaibab National Forest 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. Stratification by elevation allows for adjusting sampling intensity to target different Management Indicator Species on the Forest.

Field technicians completed all 45 planned surveys (100%) in 2016. Technicians conducted 551 point counts within the 45 surveyed grid cells between 4 May and 15 June. They detected 113 bird species, including 3 priority species (Appendix G). Bird Conservancy estimated densities and population sizes for 97 species, 3 of which are priority species. The data yielded robust density estimates (CV < 50%) for 45 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Kaibab National Forest for 94 species, 3 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 53 of these species.

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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Kaibab National Forest Results

c) Kiowa National Grassland

We obtained results for Kiowa National Grassland from one stratum.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 28 point counts within the 2 surveyed grid cells between 10 May and 21 May. They detected 25 bird species.

Bird Conservancy 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, 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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Kiowa National Grassland Results

d) Rita Blanca National Grassland

We obtained results for Rita Blanca National Grassland by analyzing data from two strata corresponding to the portions of the Rita Blanca National Grassland that lie within Texas and Oklahoma. This state-level stratification distinction is made is made to allow for the summation of the data for individual states.

Field technicians completed all 4 planned surveys (100%) in 2016. Technicians conducted 40 point counts within the 4 surveyed grid cells between 3 May and 23 May. They detected 29 bird species.

Bird Conservancy estimated densities and population sizes for 24 species. The data yielded robust density estimates (CV < 50%) for 7 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Rita Blanca National Grassland for 19 species. The data yielded robust occupancy estimates (CV < 50%) for 7 of these species.

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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Rita Blanca National Grasslands Results

4. Region 4

In this section, we summarize results for all or portions of nine national forests in Region 4. 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. Similarly, in 2013 the remaining USFS Region 4 stratum was restratified into three separate strata, one for each Forest (Caribou-Targhee, Ashley, and Wasatch NFs). This allows for forest-wide estimates within Caribou-Targhee National Forest since the remainder of the forest outside of Wyoming was also sampled. If in the future Ashley and Wasatch National Forests are completely sampled, this will also allow for forest-wide estimates in each of those forests. There were some significant stratification changes made to the BCR 10 portion of Idaho between the 2013 and 2014 field seasons. The boundary between USFS Regions 1 and 4 runs through Idaho and was taken into account when restratifying so that estimates could be generated at the USFS Region level. The new USFS Region 4 strata created in Idaho BCR 10 include Boise National Forest, Payette National Forest, Salmon-Challis National Forest, and Sawtooth National Forest.

a) Ashley National Forest

We obtained results for Ashley National Forest from one stratum in Wyoming.

These samples were added to supplement statewide estimates in Wyoming and were supported by state and regional partners. Only the Wyoming portion of Ashley National Forest was surveyed using the IMBCR design.

Field technicians completed both planned surveys (100%) in 2016. Technicians conducted 32 point counts within the 2 surveyed grid cells between 7 June and 19 June. They detected 11 bird species.

Bird Conservancy 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 Ashley 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Ashley National Forest Results

b) Boise National Forest

We obtained results for Boise National Forest by analyzing data from one stratum. There were some significant stratification changes made to the BCR 10 portion of Idaho between the 2013 and 2014 field seasons. The “All Other Lands in the Region 1 portion of Idaho BCR 10” (all lands outside of national forest boundaries), “All Other Lands in the Region 4 portion of Idaho BCR 10” (all lands outside of national forest boundaries), “other USFS lands in the Region 1 portion of Idaho BCR 10” and “USFS designated roadless/wilderness areas within the Region 4 portion of Idaho BCR 10” strata were further subdivided. The new strata created in Idaho BCR 10

include Boise National Forest. This is the first year density and occupancy estimates were generated specifically within Boise National Forest.

Field technicians completed all 4 planned surveys (100%) in 2016. Technicians conducted 29 point counts within the 4 surveyed grid cells between 5 June and 28 June. They detected 47 bird species, including 2 priority species (Appendix H).

Bird Conservancy estimated densities and population sizes for 40 species, 1 of which is a priority species. The data yielded robust density estimates (CV < 50%) for 10 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Boise National Forest for 41 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 18 of these species.

To view a map of survey locations, density and occupancy results and species counts within Boise 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Boise National Forest Results

c) 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. We separated this forest from the rest of the Region 4 USFS lands to estimate density and occupancy at the National Forest level for the Bridger-Teton National Forest. We obtained results for Bridger-Teton National Forest by analyzing data from the front-country/managed stratum and the designated roadless/wilderness stratum. We stratified at the forest-level 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 2016. Technicians conducted 282 point counts within the 20 surveyed grid cells between 24 May and 15 July. They detected 86 bird species, including 1 priority species (Appendix H).

Bird Conservancy estimated densities and population sizes for 74 species, 1 of which is a priority species. The data yielded robust density estimates (CV < 50%) for 19 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Bridger-Teton National Forest for 73 species, 1 of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 30 of these species.

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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Bridger-Teton National Forest Results

d) Caribou-Targhee National Forest

We obtained results for Caribou-Targhee National Forest by compiling and jointly analyzing data from six strata. Caribou-Targhee was separated into six strata because it spans three states and three BCRs. The state-level stratification distinction is made 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 20 planned surveys (100%) in 2016. They also completed seven extra surveys in Caribou-Targhee National Forest. Technicians conducted 348 point counts within the 27 surveyed grid cells between 29 May and 17 July. They detected 104 bird species, including 3 priority species (Appendix H).

Bird Conservancy estimated densities and population sizes for 95 species. The data yielded robust density estimates (CV < 50%) for 41 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Caribou-Targhee National Forest for 89 species. The data yielded robust occupancy estimates (CV < 50%) for 48 of these species.

To view a map of survey locations, density and occupancy results and species counts within Caribou-Targhee 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Caribou-Targhee National Forest Results

e) Manti-La Sal National Forest

We obtained results for Manti-La Sal National Forest by compiling and jointly analyzing data from three strata across two states. In 2014, a new stratum was created for Manti-La Sal National Forest in Utah. Previously, only the Colorado portion of Manti-La Sal was stratified and surveyed. In 2015, Sanpitch Recreation Area was added as an additional stratum and incorporated into forest-wide estimates for Manti-La Sal National Forest. This area is part of Uinta National Forest but administered by Manti-La Sal National Forest. The additional Utah strata allow for the generation of forest-wide estimates for Manti-La Sal National Forest. The state-level stratification distinction is made to allow for the summation of the data for individual states.

Field technicians completed all 47 planned surveys (100%) in 2016. They also completed three extra surveys in Manti-La Sal National Forest. Technicians conducted 554 point counts within the 50 surveyed grid cells between 30 May and 3 July. They detected 116 bird species, including 3 priority species (Appendix H).

Bird Conservancy estimated densities and population sizes for 101 species, 2 of which are priority species. The data yielded robust density estimates (CV < 50%) for 53 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Manti-La Sal National Forest for 98 species, 2 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 62 of these species.

To view a map of survey locations, density and occupancy results and 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Manti-La Sal National Forest Results

f) Payette National Forest

We obtained results for Payette National Forest by analyzing data from one stratum. There were some significant stratification changes made to the BCR 10 portion of Idaho between the 2013 and 2014 field seasons. The “All Other lands in the Region 1 portion of Idaho BCR 10” (all lands outside of national forest boundaries), “All Other lands in the Region 4 portion of Idaho BCR 10” (all lands outside of national forest boundaries), “other USFS lands in the Region 1 portion of Idaho BCR 10” and “USFS designated roadless/wilderness areas within the Region 4 portion of Idaho BCR 10” strata were further subdivided. The new strata created in Idaho BCR 10 include Payette National Forest. This is the first year density and occupancy estimates were generated specifically within Payette National Forest.

Field technicians completed all 4 planned surveys (100%) in 2016. Technicians conducted 30 point counts within the 4 surveyed grid cells between 4 June and 25 June. They detected 55 bird species, including 3 priority species (Appendix H).

Bird Conservancy estimated densities and population sizes for 42 species, 1 of which is a priority species. The data yielded robust density estimates (CV < 50%) for 13 of these species.

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

To view a map of survey locations, density and occupancy results and species counts within Payette 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Payette National Forest Results

g) Salmon-Challis National Forest

We obtained results for Salmon-Challis National Forest by analyzing data from one stratum. There were some significant stratification changes made to the BCR 10 portion of Idaho between the 2013 and 2014 field seasons. The “All Other lands in the Region 1 portion of Idaho BCR 10” (all lands outside of national forest boundaries), “All Other lands in the Region 4 portion of Idaho BCR 10” (all lands outside of national forest boundaries), “other USFS lands in the Region 1 portion of Idaho BCR 10” and “USFS designated roadless/wilderness areas within the Region 4 portion of Idaho BCR 10” strata were further subdivided. The new strata created in Idaho BCR 10 include Salmon-Challis National Forest. This is the first year density and occupancy estimates were generated specifically within Salmon-Challis National Forest.

Field technicians completed all 4 planned surveys (100%) in 2016. Technicians conducted 26 point counts within the 4 surveyed grid cells between 29 June and 2 July. They detected 46 bird species, including 5 priority species (Appendix H).

Bird Conservancy estimated densities and population sizes for 40 species, 5 of which are priority species. The data yielded robust density estimates (CV < 50%) for 4 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Salmon-Challis National Forest for 36 species, 3 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 14 of these species.

To view a map of survey locations, density and occupancy results and species counts within Salmon-Challis 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. If you want to limit results to 2016, 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 2016, hit “Add Filter”, then “Run Query”.

Salmon Challis National Forest Results

h) Sawtooth National Forest

We obtained results for Sawtooth National Forest by analyzing data from one stratum. There were some significant stratification changes made to the BCR 10 portion of Idaho between the 2013 and 2014 field seasons. The “All Other lands in the Region 1 portion of Idaho BCR 10” (all lands outside of national forest boundaries), “All Other lands in the Region 4 portion of Idaho BCR 10” (all lands outside of national forest boundaries), “other USFS lands in the Region 1 portion of Idaho BCR 10” and “USFS designated roadless/wilderness areas within the Region 4 portion of Idaho BCR 10” strata were further subdivided. The new strata created in Idaho BCR 10 include Sawtooth National Forest. This is the first year density and occupancy estimates were generated specifically within Sawtooth National Forest.

Field technicians completed all 4 planned surveys (100%) in 2016. Technicians conducted 34 point counts within the 4 surveyed grid cells between 28 June and 4 July. They detected 41 bird species, including 4 priority species (Appendix H).

Bird Conservancy estimated densities and population sizes for 35 species, 4 of which are priority species. The data yielded robust density estimates (CV < 50%) for 10 of these species.

Bird Conservancy estimated the proportion of 1 km^2 grid cells occupied (Psi) throughout Sawtooth National Forest for 33 species, 3 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 18 of these species.

To view a map of survey locations, density and occupancy results and species counts within Sawtooth 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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Sawtooth National Forest Results

i) Wasatch National Forest

We obtained results for Wasatch National Forest from two strata. Two strata were created for Wasatch National Forest in Wyoming, since the forest spans two BCRs (10 and 16) in that state. The BCR-level stratification distinction is made to allow for the summation of the data for individual BCRs within Wyoming. These samples were added to supplement statewide estimates in Wyoming and were supported by state and regional partners. Only the Wyoming portion of Wasatch National Forest has been surveyed using the IMBCR design. The strata were not combined to generate a single estimate since it would not represent the entirety of the national forest.

Field technicians completed both planned surveys in each of the Wasatch National Forest strata in (100%) in 2016. Technicians conducted 46 point counts within the 4 surveyed grid cells between 30 June and 7 July. They detected 44 bird species, including 1 priority species (Appendix H).

Bird Conservancy did not generate density or occupancy results for either of these strata, 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 species counts within Wasatch 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. If you want to limit results to 2016, 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 2016, hit "Add Filter", then "Run Query".

Wasatch National Forest Results

Discussion

IMBCR, Management, and Adaptive Monitoring

Monitoring is integral to the management and conservation of wildlife populations (Marsh and Trenham 2008, Sauer and Knutson 2008). In particular, monitoring is a key part of adaptive management; providing the means of assessing the impacts of management changes and improving system understanding (Nichols and Williams 2006, Lyons et al. 2008). The IMBCR program accommodates the principles of adaptive monitoring (Lindenmayer and Likens 2009) because it: 1) addresses well-defined and tractable questions; 2) is underpinned by rigorous science; 3) is based on a conceptual model of how bird populations function; and 4) is relevant to the management of natural resources. Under the adaptive monitoring framework, the objectives, sampling design, data collection, analysis, and interpretation are iterative, allowing the program to evolve and develop in response to new information or new management questions. For example, the IMBCR program allows for different stratification schemes and the restratification of local management units to better address partner management objectives. The flexible hierarchical design accommodates restratification and annual fluctuation of sampling intensity without compromising the regional population estimates. The IMBCR program uses the best available science to support natural resource management by providing bird population estimates that appropriately account for spatial variation and incomplete detection (Pollock et al. 2002, Rosenstock et al. 2002, Thompson 2002).

Applications of IMBCR Data

The IMBCR program collects breeding bird information in all or portions of 13 states annually. This information can be used in the following ways to inform avian conservation:

1. Compare bird population estimates across space. The IMBCR program was designed to provide accurate information about bird populations from local management units up to BCRs. The hierarchical framework of nested strata is useful for partitioning bird population estimates according to management units and aggregating bird population estimates at various scales to support both local and large-scale conservation efforts.
    - At the management unit scale, IMBCR population estimates can be used to support local management efforts. Stratum-level estimates can be compared to state and regional estimates to determine whether local populations are above or below estimates for the region. The large-scale context provides biological information for conservation planning and allows an assessment of conservation responsibility.
    - Bird population monitoring is necessary to determine if management actions implemented in previous management cycle(s) are achieving conservation objectives. 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.
    - 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.

2. Compare bird population estimates across time. 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).
    - 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 driven by declines in local abundance. In contrast, if both density and occupancy rates of a species declined, then population change was the result of range contraction or shift.

- 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, Bird Conservancy, unpublished) indicated the IMBCR 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. 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 will provide probability estimates of population decline.
- The IMBCR data can also be used to investigate population, metapopulation, and community dynamics over time. Sampling units that are surveyed every year provide information on dynamic processes that give rise to the patterns of abundance, occupancy and species richness over time.

3. Model habitat relationships and develop spatially explicit abundance and occupancy maps. Although IMBCR does not employ vegetation stratification, the monitoring data can easily be post stratified to estimate vegetation-specific bird 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. The IMBCR design provides a legitimate way to extend population estimates to unsampled regions, and the models provide population estimates that account 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 depends on conservation action. 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). Bird distributions can be summarized for un-sampled management units and regions, extending the ability of IMBCR to inform management and assess conservation responsibility.
    - Because IMBCR strata are based on fixed attributes rather than existing vegetation types, this program is in a strong position to 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). Monitoring data are also useful for evaluating competing hypotheses about how bird populations respond to system dynamics. Understanding 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).

4. The IMBCR data provide a source for decision support tools development to help land managers and resource professionals address important conservation issues. The foundation of these tools are species distribution maps used to prioritize landscapes for conservation and bird-habitat relationships used 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.

5. Auxiliary, or "overlay", projects are a growing component of the IMBCR program that are designed to address specific management questions. Auxiliary projects utilize 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 by incorporating detection data from relevant IMBCR surveys in their analyses. Utilizing the IMBCR design also allows the resulting project-specific population estimates to be placed in a regional context. In this way, the collaborative efficiency of the IMBCR program is extended to auxiliary projects by improving the accuracy and precision of population estimates for infrequently detected species as well as allowing those estimates to be compared to larger, regional populations. In a similar fashion, detection data from auxiliary projects is pooled with IMBCR detection data and contributes to the efficiency the IMBCR program.

Special Focus: Priority grassland bird species of the Badlands and Prairies BCR

Over the past several decades, grassland bird populations have declined more than any other guild of birds. Many of these species are of priority conservation concern at state, regional, and continental scales (Rosenberg et al. 2016). Bird Conservancy, with partners and collaborators, has been monitoring grassland bird species in the Badlands and Prairies BCR (BCR 17) since 2009. The following is a brief summary of the status and trends of five priority species in BCR 17 – Lark Bunting, Baird's Sparrow, Chestnut-collared Longspur, McCown's Longspur, and Sprague's Pipit, using IMBCR data. This analysis demonstrates how IMBCR data can be used to determine status and trends of species of conservation concern.

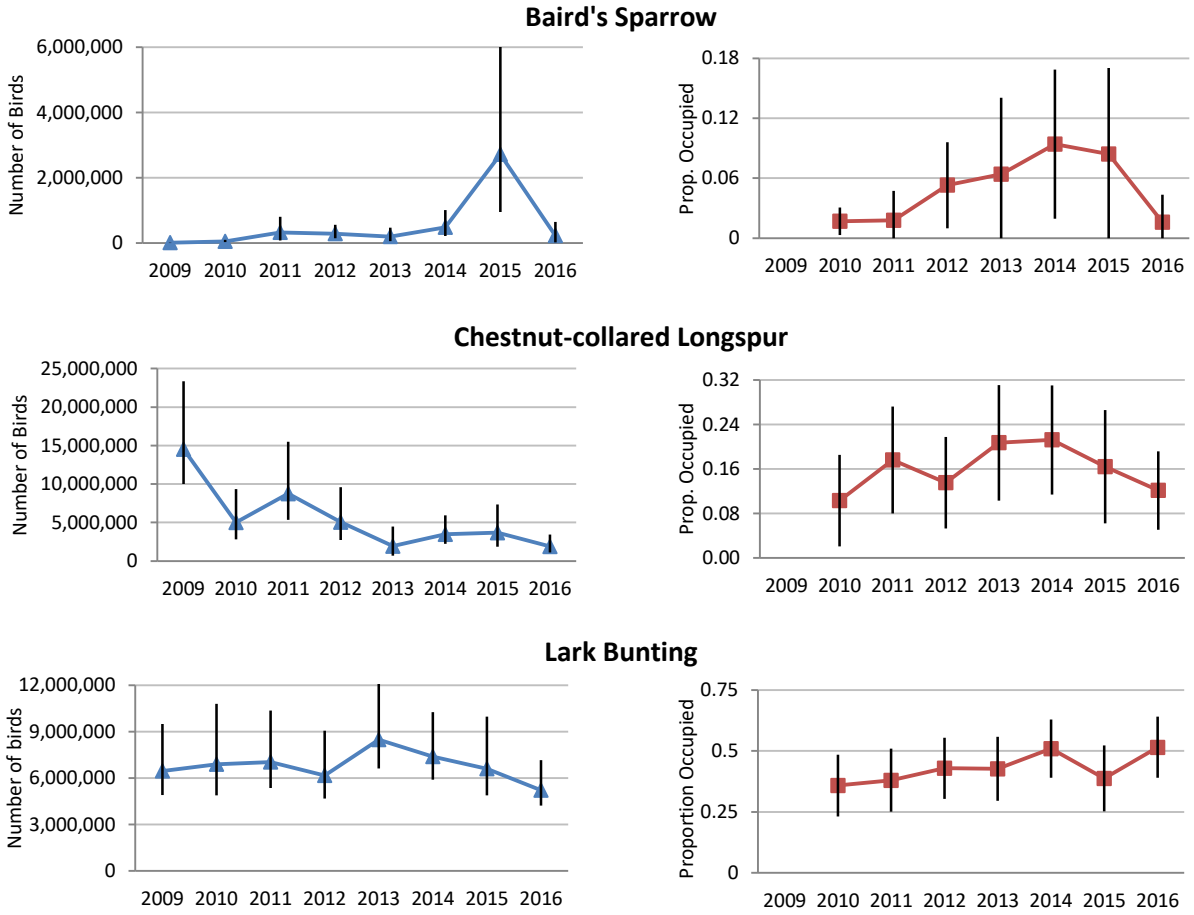
From 2009-2016, the five priority species had different trends in estimated abundances and occupancy rates (Figure 9). Chestnut-collared Longspur and Sprague's Pipit abundances were highest at the beginning of the period; longspur abundance plunged the second year of monitoring while pipit abundance remained relatively high for two years before declining sharply (Figure 9). On the breeding grounds, these two species nest in somewhat different grassland conditions and the reason for the similarity in trends is not immediately clear. Likewise, both Baird's Sparrow and McCown's Longspur densities spiked dramatically in 2015, but as these two species have different habitat requirements, the explanation for the spike is not clear. The IMBCR data can be used for more complex models that incorporate potential factors, such as climate or habitat change, that may provide clues to the reasons for the trends.

The Chestnut-collared Longspur IMBCR data show the clearest indication for concern among the five species. The Badlands and Prairies BCR is estimated to host 35% of all breeding Chestnut-collared Longspurs and encompasses most of this species' breeding range (Correll et al. 2016, Rosenberg et al. 2016). Chestnut-collared Longspur abundance plummeted from approximately 14.5 million (95% CI 23,359,759-10,026,271) birds in 2009 to approximately 2 million (95% CI 3,457,033-1,099,758) in 2016 (Figure 9). Estimated occupancy rates, erratic among years, did not show an overall trend and did not track the density trend. If longspurs are setting up breeding territories in the same number of places but in lower numbers, as these data indicate, then the cause of the decline may be occurring elsewhere during the annual cycle. The IMBCR data clearly show the need for additional analyses, such as full annual cycle modelling. The data also strongly support Partner in Flight's call for immediate conservation action for this species (Rosenberg et al. 2016).

BCR 17 is estimated to host 48% of all Lark Buntings and this species had the highest estimated abundance and occupancy rates in the BCR of the five priority species (Figure 9). In contrast to the Chestnut-collared Longspur, bunting densities and occupancy rates varied relatively little among years and the Lark Bunting population was stable in BCR 17 over the 8-

year period (Figure 9). Although Lark Bunting populations have been decreasing over the long-term according to Breeding Bird Survey data, IMBCR data suggest that the decreasing trend is flattening in BCR 17.

BCR 17 has a relatively smaller proportion of breeding Baird's Sparrow (9%) and these birds are notorious for shifting breeding densities across large landscapes from year-to-year (Green et al. 2002, Rosenberg et al. 2016). These characteristics are reflected in the IMBCR results, which show relatively low and fluctuating occupancy rates and densities in BCR 17 (Figure 9). Despite a population spike in 2015, the Baird's Sparrow population in the BCR was stable over the last eight years. The main breeding populations of both McCown's Longspur and Sprague's Pipit are outside of the Badlands and Prairies BCR and relatively few are recorded within the BCR boundary. We are able to monitor both species in BCR 17 (Figures 9) although estimates for both species have Coefficients of Variation (CVs) greater than 50%. Breeding Sprague's Pipits may be declining in the BCR (Figure 9), a situation that needs to be closely watched. McCown's Longspur is an erratic breeder in the BCR. The IMBCR program also monitors this species in the center of its distribution in BCRs 10 and 18. The BCR 17 McCown's Longspur data can be combined with the other data to more effectively monitor this species across its range.



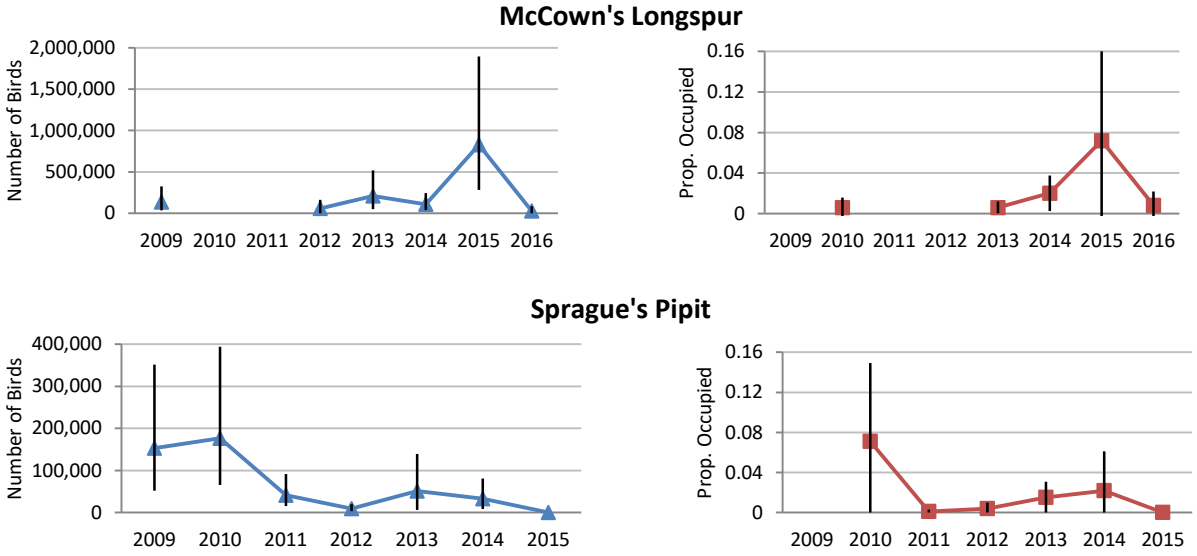


Figure 10. Abundance (left graph) and occupancy (right graph) estimates and 95% confidence intervals for five priority grassland species in the Badlands and Prairies BCR during 2009 – 2016. Note different scales of y-axes for different species.

Conclusion

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 the conservation and management needs of a wide range of stakeholders, landowners, and government entities at various spatial scales. 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).

Although the importance of long-term and intensive population monitoring is well known, it is expensive, with costs typically determining 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 conduct additional avian-habitat relationship analyses.

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Appendix A: Avian Data Center Usage Tips

Overview

All results, including parameter estimates, distribution maps, raw count data and effort, are available online. To view interactive maps showing survey and detection locations, as well as species counts, and density, population and occupancy results using the IMBCR study design please visit the Rocky Mountain Avian Data Center. Click on the "Explore the Data" tab to view IMBCR results.

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, BCR, State, County, Management Entity, Priority Species List, Species, Year, Superstratum, or Individual Stratum. 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, GRTS, Migration Phenology, NEON, or NPS study designs.

- Selecting the GRTS filter will display data and results for monitoring efforts which used the IMBCR design but do NOT contribute to statewide and regional estimates (also known as "overlays").
- The IMBCR filter will select data and results collected under the IMBCR protocol that contribute to state and BCR-wide estimates.
- The Migration Phenology filter will select data and results for the Migration Phenology project.
- The NEON study design is a specific study design developed by NEON and Bird Conservancy for surveys conducted at NEON research locations.
- 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.

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

Management Entity: This filter will allow users to select data and results for All Other Lands, Colorado State Land Board, The Nature Conservancy (TNC), US Bureau of Indian Affairs (BIA), US Bureau of Land Management (BLM), US Department of Defense (DoD), US Fish and Wildlife Service (USFWS), US Forest Service (USFS), or National Park Service (NPS). 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.

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.

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

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

Superstratum: 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 30 strata).

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

Hierarchy for the different management entities

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

Colorado State Land board:
Tier One – Management Entity – Colorado State Land Board
Tier Two – Management Region – Lowry Range
Tier Three – Management Unit – Not applicable
Tier Four – National Forest or Grassland – Not applicable
Tier Five – Management District – Not applicable

TNC:
Tier One – Management Entity – The Nature Conservancy
Tier Two – Management Region – Cherry Creek
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
Tier Three – Management Unit – Not applicable
Tier Four – National Forest or Grassland – 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

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

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

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) using Google Maps. If you have filtered by species, blue circles represent survey locations where that species was not detected and blue circles with a pink dot in the center represent survey locations where that species was detected. 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 will 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 Bird Conservancy IT staff 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 Bird Conservancy 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, USFS boundaries and BLM Field Office 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. The top-most feature’s name will appear if you left click your mouse inside the layer’s boundaries.

Viewing Occupancy/Density Results (Occupancy and Density Tabs)

Viewing Tables
You may view an occupancy or density results table 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 display species, stratum, year, Psi (proportion of sampling units expected to be occupied), number of sampling units the species was detected on and

standard error (SE) of the estimate and the percent coefficient of variation (% CV). The density tables will display species, stratum or habitat type, year, number of birds expected per km² (D), total number of individuals expected to reside within the stratum (N), percent coefficient of variation (% CV) and the number of independent detections used in analyses (*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, we calculate occupancy and density estimates 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 inform management decisions on 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. **Treatment area population estimates 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 density and occupancy estimates 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 km² and the occupancy estimate for Western Meadowlark is 0.57, managers can estimate that 68,400 km² (120,000 km² * 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/superstrata 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 would 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, occupancy results for 2010 through 2016 and density results for 2008 through 2016 are available via the ADC.

Viewing Raw Count Statistics (Species Counts Tab)

You may view the raw count of detections for each species and the effort (expressed as the number of point count stations surveyed) for your query by clicking on the “Species Counts” tab located just below the drop down filter menu in the upper left corner of the screen. Both the counts (left table) and effort tables (right table) 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 “Superstrata”, viewing counts by Stratum is an excellent way of getting a list of all the strata that comprise a Superstratum. 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 2016, as designated by Partners in Flight. BCRs include BCR 9 (Great Basin), 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). An "X" in the Occupancy or Density Estimated column indicates that occupancy or density estimates were generated for the priority species at some level in one or more of the BCRs where it holds a priority designation.

	Partners In Flight*				Density	Occupancy
Species	BCR9	BCR10	BCR11	BCR16	Estimate	Estimate
American Dipper		RS,UCS				X
American Kestrel	RC,RS,UCS	RC			X	X
Ash-throated Flycatcher					X	X
Baird's Sparrow			RC,RS,TNC,UCC,UCS		X	X
Bank Swallow	CBSD	CBSD	CBSD,RC	CBSD	X	X
Baltimore Oriole					X	X
Barn Swallow	RC				X	X
Black-billed Cuckoo			CBSD,RC,UCC			
Black-billed Magpie	UCS		UCS	UCS	X	X
Brown-capped Rosy-Finch				RC,RS,TNC,UCC,UCS	X	X
Black-chinned Sparrow	CBSD,UCC			CBSD,UCC	X	X
Belted Kingfisher	CBSD,RC	CBSD	CBSD	CBSD	X	X
Bell's Vireo				RC,TNC,UCC	X	X
Black Rosy-Finch	RC,RS,TNC,UCC,UCS	RC,RS,TNC,UCC,UCS		RC,TNC,UCC		
Bobolink		CBSD,UCC	CBSD,RC,RS,UCC,UCS		X	X
Boreal Chickadee		CBSD				
Brewer's Blackbird	UCS				X	X
Brewer's Sparrow	CBSD,RC,RS,UCS	CBSD,RC	CBSD	CBSD,RC	X	X
Brown Thrasher			RC		X	X
Broad-tailed Hummingbird				RS,UCS	X	X
Black-throated Sparrow	UCS				X	X
Black-throated Gray Warbler				RC	X	X
Bullock's Oriole					X	X
Burrowing Owl			RC		X	X
Bushtit					X	X

Species	Partners In Flight*				Density Estimate	Occupancy Estimate
	BCR9	BCR10	BCR11	BCR16		
Cactus Wren					X	X
Cassin's Finch	CBSD,RS,UCC,UCS	CBSD,RC,RS,UCC,UCS		CBSD,RC,UCC	X	X
Calliope Hummingbird	RS,UCS	RS,UCS				
Cassin's Kingbird					X	X
Canyon Towhee					X	X
Canyon Wren					X	X
California Quail	UCS					
Cassin's Sparrow					X	X
Cassin's Vireo		RS,UCS			X	X
Chestnut-collared Longspur			RC,RS,TNC,UCC,UCS		X	X
Clay-colored Sparrow			RS,UCS		X	X
Chihuahuan Raven					X	X
Chipping Sparrow		RC,RS,,UCS			X	X
Chimney Swift			CBSD		X	X
Clark's Nutcracker		RS,UCS		RC,RS,UCS	X	X
Cordilleran Flycatcher				RS,UCS	X	X
Cooper's Hawk				RS,UCS	X	X
Common Nighthawk	CBSD	CBSD	CBSD	CBSD,RC	X	X
Common Poorwill				RC		X
Crissal Thrasher					X	X
Dickcissel			RC		X	X
Dusky Flycatcher		UCS			X	X
Dusky Grouse	RC,RS,UCS	RS,UCS		RS,UCS	X	X
Eastern Kingbird			UCS		X	X
Eastern Meadowlark				CBSD	X	X
Evening Grosbeak		RC			X	X
Ferruginous Hawk	RC,RS,UCS	RC	RC,RS,UCS	RC		X
Field Sparrow			CBSD		X	X
Flammulated Owl	UCC	UCC		RS,UCC,UCS		
Gambel's Quail					X	X
Golden-crowned Kinglet		UCS			X	X

Species	Partners In Flight*				Density Estimate	Occupancy Estimate
	BCR9	BCR10	BCR11	BCR16		
Golden Eagle	RC,RS,UCS		RC	RC	X	
Gray Flycatcher	RS,UCS				X	X
Greater Prairie-Chicken			RC,TNC,UCC		X	
Greater Sage-Grouse	RC,TNC,UCC	RC,RS,TNC,UCC,UCS	RC,TNC,UCC,CBSD,RC	RC,TNC,UCC	X	X
Grasshopper Sparrow	CBSD	CBSD			X	X
Gray Vireo	UCC			RC,RS,UCC,UCS	X	X
Grace's Warbler				RS,UCS	X	X
Green-tailed Towhee	RC,RS,UCS			RS,UCS	X	X
Hammond's Flycatcher		UCS			X	X
Hepatic Tanager					X	X
Horned Lark	CBSD	CBSD	CBSD,RC	CBSD	X	X
Juniper Titmouse				RS,UCS	X	X
Lark Bunting		CBSD	CBSD,RC		X	X
Lark Sparrow	RC				X	X
Lazuli Bunting	RS,UCS	UCS		RC,RS,UCS	X	X
Ladder-backed Woodpecker					X	X
Lesser Prairie-Chicken					X	X
Lewis's Woodpecker	RC,RS,UCS	RC		RC,RS,UCS	X	X
Loggerhead Shrike	CBSD	CBSD	CBSD	CBSD,RC	X	X
Lucy's Warbler					X	X
Marsh Wren			UCS		X	X
McCown's Longspur		RC	RC,RS,UCS		X	X
MacGillivray's Warbler	RC	UCS			X	X
Mississippi Kite						X
Mountain Bluebird	UCS	UCS		RC,RS,UCS	X	X
Mountain Chickadee	RC	UCS			X	X
Northern Bobwhite					X	X
Northern Flicker	CBSD,UCS	CBSD,UCS	CBSD	CBSD,RS,UCS	X	X
Northern Goshawk	RC	RS,UCS				
Northern Harrier	RS,UCS		RC,RS,UCS		X	X
Northern Rough-winged Swallow	RC				X	X

Species	Partners In Flight*				Density Estimate	Occupancy Estimate
	BCR9	BCR10	BCR11	BCR16		
Olive Warbler					X	X
Olive-sided Flycatcher	RC,TNC,UCC	RC,TNC,UCC		RC,TNC,UCC	X	X
Painted Redstart						
Phainopepla					X	X
Pinyon Jay	RC,RS,TNC,UCC,UCS	RC,TNC,UCC		RC,RS,TNC,UCC,UCS	X	X
Pine Siskin	CBSD,RC	CBSD,RS,UCS	CBSD	CBSD,RS,UCS	X	X
Plumbeous Vireo				RS,UCS	X	X
Prairie Falcon	RS,UCS		RC	RC	X	
Pygmy Nuthatch				RS,UCS	X	X
Red-breasted Nuthatch		UCS			X	X
Ruby-crowned Kinglet		UCS			X	X
Rufous-crowned Sparrow					X	X
Red Crossbill					X	X
Red-faced Warbler					X	X
Red-headed Woodpecker			CBSD,RC,UCC		X	X
Ring-necked Pheasant					X	X
Red-naped Sapsucker		RS,UCS			X	X
Rock Wren	CBSD,RS,UCS	CBSD		CBSD,RS,UCS	X	X
Ruffed Grouse	CBSD	CBSD,RS,UCS	CBSD		X	X
Rufous Hummingbird	CBSD,UCC	CBSD,UCC				X
Sagebrush Sparrow	RC,RS,UCS	RC		RC	X	X
Sage Thrasher	RC,RS,UCS				X	X
Say's Phoebe				UCS	X	X
Savannah Sparrow			UCS		X	X
Scott's Oriole					X	X
Scaled Quail					X	X
Short-eared Owl	CBSD,RC	CBSD,RC	CBSD,RC			X
Sedge Wren			UCS		X	X
Spotted Owl				RC,TNC,UCC		
Sprague's Pipit		RC,TNC,UCC	RC,RS,TNC,UCC,UCS		X	X
Sharp-shinned Hawk						X

Species	Partners In Flight*				Density Estimate	Occupancy Estimate
	BCR9	BCR10	BCR11	BCR16		
Scissor-tailed Flycatcher					X	X
Sharp-tailed Grouse	RC	RC	RS,UCS		X	X
Swainson's Hawk			RC,RS,UCS		X	X
Swainson's Thrush		UCS			X	X
Townsend's Solitaire		RS,UCS			X	X
Townsend's Warbler	RC	RS,UCS			X	X
Tree Swallow		UCS			X	X
Varied Thrush		RC			X	X
Verdin					X	X
Vesper Sparrow		RC	UCS		X	X
Violet-green Swallow				UCS	X	X
Virginia's Warbler	UCC			RS,UCC,UCS	X	X
Warbling Vireo		UCS		UCS	X	X
White-breasted Nuthatch					X	X
Western Bluebird					X	X
Western Kingbird					X	X
Western Meadowlark	UCS		UCS		X	X
Willow Flycatcher	RC	RS,UCS			X	X
Williamson's Sapsucker	RC	RS,UCS		RS,UCS	X	X
Wild Turkey					X	X
Wilson's Warbler	CBSD	CBSD		CBSD	X	X
White-tailed Ptarmigan		RC,RS,UCS		RC		X
Yellow-billed Cuckoo	CBSD,RC				X	X
Yellow-headed Blackbird	UCS		UCS		X	X
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 2016, as designated by Partners in Flight (PIF). BCRs include BCR 9 (Great Basin), 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). An "X" in the Occupancy or Density Estimated column indicates that occupancy or density estimates were generated for the priority species at some level in one or more of the BCRs where it holds a priority designation.

	Partners In Flight*					Density	Occupancy
Species	BCR17	BCR18	BCR19	BCR33	BCR34	Estimate	Estimate
American Dipper	RC				RC		X
American Kestrel					RC	X	X
Ash-throated Flycatcher				UCS	UCS	X	X
Baird's Sparrow	RC,TNC,UCC					X	X
Bank Swallow	CBSD	CBSD	CBSD			X	X
Baltimore Oriole			RC,RS,UCS			X	X
Barn Swallow						X	X
Black-billed Cuckoo	CBSD,RC,UCC		CBSD,UCC				
Black-billed Magpie	RC					X	X
Brown-capped Rosy-Finch						X	X
Black-chinned Sparrow				CBSD,UCC	CBSD,RC,RS,UCC,UCS	X	X
Belted Kingfisher	CBSD	CBSD	CBSD		CBSD	X	X
Bell's Vireo		RC,TNC,UCC	RC,TNC,UCC	TNC,UCC	RC,TNC,UCC	X	X
Black Rosy-Finch							
Bobolink	CBSD,UCC		CBSD,UCC			X	X
Boreal Chickadee							
Brewer's Blackbird						X	X
Brewer's Sparrow	CBSD,RC	CBSD,RC		CBSD		X	X
Brown Thrasher			RS,UCS			X	X
Broad-tailed Hummingbird					RC	X	X
Black-throated Sparrow				RC,RS,UCS	RC,RS,UCS	X	X
Black-throated Gray Warbler					RC	X	X
Bullock's Oriole		UCS	RC	RC		X	X
Burrowing Owl	RC	RC,RS,UCS	RC	UCS		X	X
Bushtit					RS,UCS	X	X

Species	Partners In Flight*					Density Estimate	Occupancy Estimate
	BCR17	BCR18	BCR19	BCR33	BCR34		
Cactus Wren				RC,RS,UCS	RC,RS,UCS	X	X
Cassin's Finch						X	X
Calliope Hummingbird							
Cassin's Kingbird					RC,RS,UCS	X	X
Canyon Towhee					RS,UCS	X	X
Canyon Wren					RS,UCS	X	X
California Quail							
Cassin's Sparrow		RC,RS,UCS	RC			X	X
Cassin's Vireo						X	X
Chestnut-collared Longspur	RC,RS,TNC,UCC,UCS	RC,TNC,UCC				X	X
Clay-colored Sparrow						X	X
Chihuahuan Raven		RS,UCS				X	X
Chipping Sparrow						X	X
Chimney Swift		CBSD	CBSD			X	X
Clark's Nutcracker						X	X
Cordilleran Flycatcher					RS,UCS	X	X
Cooper's Hawk					RS,UCS	X	X
Common Nighthawk	CBSD,RC	CBSD,RC	CBSD,UCS		CBSD,RC	X	X
Common Poorwill				UCS	RS,UCS		X
Crissal Thrasher				RS,UCS	RS,UCS	X	X
Dickcissel	RC		RC,RS,UCS			X	X
Dusky Flycatcher						X	X
Dusky Grouse						X	X
Eastern Kingbird	UCS		UCS			X	X
Eastern Meadowlark		CBSD	CBSD,RC,RS,UCS		CBSD	X	X
Evening Grosbeak					RC	X	X
Ferruginous Hawk	RC,RS,UCS	RC,RS,UCS	RC				X
Field Sparrow	CBSD		CBSD,RC			X	X
Flammulated Owl					RS,UCC,UCS		
Gambel's Quail				RS,UCS	RS,UCS	X	X

Species	Partners In Flight*					Density Estimate	Occupancy Estimate
	BCR17	BCR18	BCR19	BCR33	BCR34		
Golden-crowned Kinglet						X	X
Golden Eagle	RC				RC	X	
Gray Flycatcher						X	X
Greater Prairie-Chicken	RC,TNC,UCC	RC,TNC,UCC	RC,RS,TNC,UCC,UCS			X	
Greater Sage-Grouse	RC,RS,TNC,UCC,UCS					X	X
Grasshopper Sparrow	CBSD,RC,RS,UCS	CBSD,RC,RS,UCS	CBSD,RC,RS,UCS		CBSD	X	X
Gray Vireo				RC,UCC	RC,RS,UCC,UCS	X	X
Grace's Warbler					RC,RS,UCS	X	X
Green-tailed Towhee						X	X
Hammond's Flycatcher						X	X
Hepatic Tanager					UCS	X	X
Horned Lark	CBSD	CBSD,RS,UCS	CBSD	CBSD	CBSD	X	X
Juniper Titmouse					RC,RS,UCS	X	X
Lark Bunting	CBSD,RC,RS,UCS	CBSD,RC,RS,UCS	CBSD,RC			X	X
Lark Sparrow	RC	UCS	RC,RS,UCS			X	X
Lazuli Bunting	RS,UCS					X	X
Ladder-backed Woodpecker				RC	RS,UCS	X	X
Lesser Prairie-Chicken		RC,RS,TNC,UCC,UCS	RC,RS,TNC,UCC,UCS			X	X
Lewis's Woodpecker	RC	RC			RC	X	X
Loggerhead Shrike	CBSD	CBSD	CBSD,RC	CBSD	CBSD	X	X
Lucy's Warbler				RC,RS,UCS	RC,RS,UCS	X	X
Marsh Wren						X	X
McCown's Longspur	RC,RS,UCS	RS,UCS				X	X
MacGillivray's Warbler						X	X
Mississippi Kite			RS,UCS				X
Mountain Bluebird						X	X
Mountain Chickadee						X	X
Northern Bobwhite		CBSD	CBSD,UCS			X	X
Northern Flicker	CBSD	CBSD	CBSD	CBSD	CBSD	X	X
Northern Goshawk	RC				RC		

Species	Partners In Flight*					Density Estimate	Occupancy Estimate
	BCR17	BCR18	BCR19	BCR33	BCR34		
Northern Harrier	RC,RS,UCS	RC	RC			X	X
Northern Rough-winged Swallow				RS,UCS		X	X
Olive Warbler					RS,UCS	X	X
Olive-sided Flycatcher					TNC,UCC	X	X
Painted Redstart					RC,RS,UCS		
Phainopepla				RC,RS,UCS	RC,RS,UCS	X	X
Pinyon Jay	RC,TNC,UCC	RC,TNC,UCC			RC,TNC,UCC	X	X
Pine Siskin	CBSD				CBSD	X	X
Plumbeous Vireo					RC,RS,UCS	X	X
Prairie Falcon		RC		RC	RC	X	
Pygmy Nuthatch					RS,UCS	X	X
Red-breasted Nuthatch						X	X
Ruby-crowned Kinglet						X	X
Rufous-crowned Sparrow					RS,UCS	X	X
Red Crossbill	UCS					X	X
Red-faced Warbler					RC,RS,UCS	X	X
Red-headed Woodpecker	CBSD,RC,UCC	CBSD,UCC	CBSD,RS,UCC,UCS			X	X
Ring-necked Pheasant	UCS	RS,UCS				X	X
Red-naped Sapsucker						X	X
Rock Wren	CBSD	CBSD		CBSD,RS,UCS	CBSD	X	X
Ruffed Grouse	CBSD					X	X
Rufous Hummingbird							X
Sagebrush Sparrow	RC			RC		X	X
Sage Thrasher	RC					X	X
Say's Phoebe				RS,UCS		X	X
Savannah Sparrow						X	X
Scott's Oriole					RS,UCS	X	X
Scaled Quail		RC			RC	X	X
Short-eared Owl	CBSD,RC	CBSD					X
Sedge Wren						X	X

Species	Partners In Flight*					Density Estimate	Occupancy Estimate
	BCR17	BCR18	BCR19	BCR33	BCR34		
Spotted Owl					RC,RS,TNC,UCC,UCS		
Sprague's Pipit	RC,TNC,UCC					X	X
Sharp-shinned Hawk					RC		X
Scissor-tailed Flycatcher			RC			X	X
Sharp-tailed Grouse	RS,UCS	RC				X	X
Swainson's Hawk		RS,UCS	RC			X	X
Swainson's Thrush					RC	X	X
Townsend's Solitaire						X	X
Townsend's Warbler						X	X
Tree Swallow						X	X
Varied Thrush						X	X
Verdin			CBSD	CBSD,RC,RS,UCS	CBSD,RS,UCS	X	X
Vesper Sparrow	RC,RS,UCS					X	X
Violet-green Swallow					UCS	X	X
Virginia's Warbler	UCC			UCC	RS,UCC,UCS	X	X
Warbling Vireo						X	X
White-breasted Nuthatch					UCS	X	X
Western Bluebird					RS,UCS	X	X
Western Kingbird		UCS				X	X
Western Meadowlark	UCS	RC,RS,UCS	RC,RS,UCS			X	X
Willow Flycatcher				RC		X	X
Williamson's Sapsucker					RS,UCS	X	X
Wild Turkey			UCS			X	X
Wilson's Warbler						X	X
White-tailed Ptarmigan							X
Yellow-billed Cuckoo		CBSD,RC	CBSD.RC	CBSD	CBSD	X	X
Yellow-headed Blackbird						X	X
Zone-tailed Hawk					RS,UCS		

*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 2016, by state, with management designations by state agencies. Agencies include Arizona Game and Fish Department (AZGFD), Colorado Parks and Wildlife (CPW), Idaho Fish and Game Department (IDFG), Kansas Department of Wildlife, Parks and Tourism (KDWPT), Montana Fish, Wildlife and Parks (MTFWP), North Dakota Game and Fish Department (NDGFD), Nebraska Game and Parks Commission (NGPC). An "X" in the Occupancy or Density Estimated columns indicates estimates were generated for that species at some level in one or more of the states where it holds a priority designation.

	State Agencies*							Density	Occupancy
Species	AZGFD	CPW	IDFG	KDWPT	MTFWP	NDGFD	NGPC	Estimate	Estimate
Acorn Woodpecker	T1C							X	X
Alder Flycatcher					S3B				
American Avocet				Tier II		Level II		X	X
American Bittern	T1B	T2	Tier II	Tier II	S3B	Level I			
American Dipper	T1B								X
American Kestrel						Level II		X	X
American Pipit	T1C							X	X
American Three-toed Woodpecker	T1C							X	X
American White Pelican		T2	Tier II	Tier II	S3B	Level II		X	
American Wigeon							Tier II	X	X
Ash-throated Flycatcher								X	X
Baird's Sandpiper				Tier II					
Baird's Sparrow	T1C			Tier II	S3B	Level I	Tier I	X	X
Bald Eagle	T1A	SSC, T2		Tier II		Level II	Tier II		
Baltimore Oriole				Tier II				X	X
Band-tailed Pigeon	T1C	T2						X	
Bank Swallow								X	X
Barn Owl				Tier II			Tier II		
Barrow's Goldeneye		T2							
Bell's Vireo	T1B			Tier II			Tier I	X	X
Bewick's Wren								X	X
Black Rosy-Finch		T2	Tier III		S2				
Black Tern		T2	Tier II	Tier II	S3B	Level I	Tier II		

Species	State Agencies*							Density Estimate	Occupancy Estimate
	AZGFD	CPW	IDFG	KDWPT	MTFWP	NDGFD	NGPC		
Black-and-white Warbler							Tier II	X	X
Black-backed Woodpecker					S3				X
Black-billed Cuckoo				Tier II	S3B	Level I			
Black-billed Magpie	T1B						Tier II	X	X
Black-chinned Hummingbird								X	X
Black-chinned Sparrow	T1C							X	X
Black-crowned Night-Heron					S3B		Tier II		
Black-necked Stilt				Tier II	S3B		Tier II		
Black-tailed Gnatcatcher	T1C							X	X
Black-throated Gray Warbler	T1C							X	X
Blue Grosbeak								X	X
Blue-gray Gnatcatcher					S2B			X	X
Bobolink		T2	Tier II	Tier II	S3B	Level II		X	X
Boreal Chickadee					S3				
Brewer's Blackbird							Tier II	X	X
Brewer's Sparrow	T1C	T2			S3B	Level III	Tier I	X	X
Brown Creeper					S3		Tier II	X	X
Brown-capped Rosy-Finch		T1						X	X
Brown-crested Flycatcher	T1C							X	
Bullock's Oriole	T1C			Tier II				X	X
Burrowing Owl	T1B	ST, T1	Tier II	Tier II	S3B	Level II	Tier I	X	X
Bushtit								X	X
California Gull			Tier II					X	
Calliope Hummingbird									
Canvasback				Tier II		Level II	Tier II		
Canyon Wren								X	X
Carolina Chickadee									
Carolina Wren							Tier II		X
Cassin's Finch		T2			S3			X	X
Cassin's Kingbird							Tier II	X	X

Species	State Agencies*							Density Estimate	Occupancy Estimate
	AZGFD	CPW	IDFG	KDWPT	MTFWP	NDGFD	NGPC		
Cassin's Sparrow	T1C	T2		Tier II			Tier II	X	X
Cattle Egret									
Chestnut-collared Longspur	T1C	T2		Tier II	S2B	Level I	Tier I	X	X
Chihuahuan Raven				Tier II				X	X
Chuck-will's-widow				Tier II			Tier II		
Cinnamon Teal							Tier II		
Clark's Grebe	T1C		Tier II		S3B		Tier II		
Clark's Nutcracker			Tier III		S3		Tier II	X	X
Common Loon			Tier II		S3B				
Common Nighthawk	T1B		Tier III	Tier II				X	X
Common Poorwill	T1C			Tier II					X
Common Yellowthroat								X	X
Cordilleran Flycatcher	T1C						Tier II	X	X
Costa's Hummingbird	T1C								
Curve-billed Thrasher				Tier II				X	X
Dark-eyed Junco							Tier II	X	X
Dark-eyed Junco (White-winged)									
Dickcissel				Tier II		Level II		X	X
Dusky Flycatcher	T1C							X	X
Dusky Grouse	T1B							X	X
Eared Grebe				Tier II					X
Eastern Bluebird	T1B							X	X
Eastern Kingbird				Tier II				X	X
Eastern Meadowlark	T1C			Tier II				X	X
Eastern Whip-poor-will				Tier II					
Eastern Wood-Pewee				Tier II				X	X
Evening Grosbeak	T1B				S3			X	X
Ferruginous Hawk	T1B	SSC, T2	Tier II	Tier II	S3B	Level I	Tier I		X
Field Sparrow								X	X
Flammulated Owl	T1C	T2			S3B				

Species	State Agencies*							Density Estimate	Occupancy Estimate
	AZGFD	CPW	IDFG	KDWPT	MTFWP	NDGFD	NGPC		
Franklin's Gull			Tier III		S3B	Level I			
Golden Eagle	T1B	T1	Tier II	Tier II	S3	Level II	Tier II	X	
Golden-crowned Kinglet	T1C							X	X
Golden-fronted Woodpecker								X	X
Grace's Warbler	T1C	T2						X	X
Grasshopper Sparrow	T1B	T2	Tier III	Tier II		Level I		X	X
Gray Catbird	T1B							X	X
Gray Flycatcher	T1C							X	X
Gray Jay	T1B							X	X
Gray Vireo	T1C	T2						X	X
Great Blue Heron					S3			X	X
Great Egret	T1C								
Great Gray Owl			Tier III		S3				
Greater Prairie-Chicken		T2		Tier II		Level II	Tier I	X	
Greater Sage-Grouse		SSC, T1	Tier I		S2	Level I		X	X
Greater Yellowlegs				Tier II					
Green Heron									
Green-tailed Towhee					S3B			X	X
Hooded Warbler									
Juniper Titmouse	T1C	T2						X	X
Ladder-backed Woodpecker				Tier II				X	X
Lark Bunting		T2		Tier II		Level I		X	X
Lark Sparrow				Tier II				X	X
Lazuli Bunting	T1C	T2						X	X
Least Tern	T1A	SE, T2		Tier I	S1B	Level II	Tier I		
Lesser Prairie-Chicken		ST, T1		Tier I				X	X
Lesser Scaup						Level II	Tier II		
Lewis's Woodpecker	T1C	T2	Tier II		S2B		Tier II	X	X
Lincoln's Sparrow	T1B							X	X
Loggerhead Shrike		T2		Tier II	S3B	Level II	Tier I	X	X

Species	State Agencies*							Density Estimate	Occupancy Estimate
	AZGFD	CPW	IDFG	KDWPT	MTFWP	NDGFD	NGPC		
Long-billed Curlew		SSC, T2	Tier II	Tier II	S3B	Level I	Tier I	X	X
Long-billed Dowitcher				Tier II					
Long-eared Owl	T1C								
Louisiana Waterthrush							Tier II		
Lucy's Warbler	T1C							X	X
MacGillivray's Warbler	T1B							X	X
Marbled Godwit				Tier II		Level I		X	X
Marsh Wren	T1C							X	X
McCown's Longspur	T1C	T2		Tier II	S3B	Level III	Tier I	X	X
Merlin							Tier II		
Mississippi Kite	T1B			Tier II			Tier II		X
Mountain Bluebird	T1C							X	X
Mountain Plover	T1B	SSC, T1		Tier II	S2B		Tier I	X	X
Mountain Quail			Tier II						
Northern Bobwhite	T1A	T2		Tier II				X	X
Northern Goshawk	T1B	T2			S3				
Northern Harrier		T2				Level II		X	X
Northern Pintail				Tier II		Level II		X	X
Northern Pygmy-Owl	T1C								
Northern Saw-whet Owl	T1C						Tier II		
Olive Warbler	T1C							X	X
Olive-sided Flycatcher	T1C	T2	Tier III					X	X
Orange-crowned Warbler	T1C							X	X
Orchard Oriole								X	X
Osprey								X	
Pacific Wren	T1B				S3			X	X
Painted Bunting				Tier II				X	X
Painted Redstart	T1C								
Pectoral Sandpiper				Tier II					
Peregrine Falcon	T1A	SSC, T2		Tier II	S3	Level III	Tier II		

Species	State Agencies*							Density Estimate	Occupancy Estimate
	AZGFD	CPW	IDFG	KDWPT	MTFWP	NDGFD	NGPC		
Phainopepla	T1C							X	X
Pileated Woodpecker					S3		Tier II	X	X
Pine Grosbeak	T1B							X	X
Pine Siskin							Tier II	X	X
Pinyon Jay	T1B	T2	Tier II		S3		Tier I	X	X
Piping Plover		ST, T2		Tier I	S2B	Level II	Tier I		
Plumbeous Vireo							Tier II	X	X
Prairie Falcon	T1C	T2				Level II	Tier II	X	
Purple Martin	T1C	T2						X	X
Pygmy Nuthatch							Tier II	X	X
Red Crossbill	T1C		Tier II					X	X
Red-eyed Vireo								X	X
Red-faced Warbler	T1C							X	X
Red-headed Woodpecker				Tier II	S3B	Level I		X	X
Red-naped Sapsucker	T1C							X	X
Ring-billed Gull			Tier III					X	X
Ruby-throated Hummingbird							Tier II		
Ruffed Grouse								X	X
Rufous Hummingbird		T2							X
Rufous-crowned Sparrow								X	X
Sage Thrasher	T1C		Tier II		S3B			X	X
Sagebrush Sparrow	T1C	T2	Tier II		S3B			X	X
Sandhill Crane		SSC, T1	Tier III				Tier II	X	
Savannah Sparrow	T1B						Tier II	X	X
Scaled Quail	T1C			Tier II				X	X
Scissor-tailed Flycatcher				Tier II			Tier II	X	X
Scott's Oriole	T1C							X	X
Sedge Wren					S3B		Tier II	X	X
Sharp-shinned Hawk							Tier II		X
Sharp-tailed Grouse		SSC, T1	Tier II		S1	Level II		X	X

Species	State Agencies*							Density Estimate	Occupancy Estimate
	AZGFD	CPW	IDFG	KDWPT	MTFWP	NDGFD	NGPC		
Short-eared Owl		T2	Tier III	Tier II		Level II	Tier I		X
Snowy Egret	T1C								
Snowy Plover	T1B	SSC, T2		Tier I			Tier II		
Solitary Sandpiper									
Sora	T1C							X	
Spotted Owl	T1A	ST, T2							
Spotted Towhee				Tier II				X	X
Sprague's Pipit	T1A			Tier II	S3B	Level I	Tier I	X	X
Summer Tanager	T1C						Tier II	X	X
Swainson's Hawk	T1C	T2		Tier II		Level I	Tier II	X	X
Swainson's Thrush	T1B							X	X
Swamp Sparrow							Tier II		
Townsend's Solitaire							Tier II	X	X
Tufted Titmouse							Tier II		
Upland Sandpiper		T2		Tier II		Level II		X	X
Varied Thrush					S3B			X	X
Veery		T2			S3B			X	X
Vermilion Flycatcher	T1C								
Vesper Sparrow								X	X
Violet-green Swallow							Tier II	X	X
Virginia Rail	T1C								
Virginia's Warbler	T1C	T2						X	X
Western Bluebird								X	X
Western Grebe	T1C		Tier II	Tier II			Tier II		
Western Kingbird				Tier II				X	X
Western Meadowlark						Level II		X	X
Western Scrub-Jay	T1C							X	X
White-crowned Sparrow	T1C							X	X
White-faced Ibis		T2	Tier II		S3B		Tier II		
White-tailed Ptarmigan		T1			S3				X

Species	State Agencies*							Density Estimate	Occupancy Estimate
	AZGFD	CPW	IDFG	KDWPT	MTFWP	NDGFD	NGPC		
White-throated Swift	T1C						Tier II	X	X
Wild Turkey	T1B							X	X
Willet						Level II		X	X
Williamson's Sapsucker	T1C							X	X
Willow Flycatcher	T1A	SE, T1						X	X
Wilson's Phalarope				Tier II		Level I		X	X
Wilson's Snipe							Tier II	X	X
Wood Duck	T1B								X
Wood Thrush							Tier I		X
Yellow Warbler	T1B							X	X
Yellow-billed Cuckoo	T1A	SSC, T1	Tier I		S3B			X	X
Yellow-breasted Chat	T1C							X	X
Yellow-throated Vireo							Tier II		
Zone-tailed Hawk									

*__AZGFD:__ T1A = scored 1 for vulnerability and meets one of the following criteria: federally listed species, candidate for federal listing species, species covered under a signed conservation agreement, species recently removed from listing, closed season species; T1B = scored 1 for vulnerability and does not meet any of the criteria for T1A; T1C = unknown status species (Arizona Game and Fish Department 2012); **CPW:** T1 = species of highest conservation priority in the state; T2 = important in light of forestalling population trends or habitat conditions; FE = Federally Endangered; FT= Federally Threatened; SSC = State Special Concern; SE = State Endangered; ST = State Threatened (Colorado Parks and Wildlife (CPW) 2015); **IDFG:** T1 = Tier 1 priority species; T2 = Tier 2 priority species; T3 = Tier 3 priority species (Idaho Department of Fish and Game 2005); **KDWPT:** Tier 1 priority species; T2 = Tier 2 priority species (Rohweder 2015); **MTFWP:** S1 = at high risk; S1B = at high risk, breeding; S1M = at high risk, migratory; S2 = at risk; S2B = at risk, breeding; S3 = potentially at risk; S3B = potentially at risk, breeding; S4 = apparently secure; S5N = common, nonbreeding (Montana Fish, Wildlife and Parks 2015); **NDGFD**: L1 = Level 1: species having a high level of conservation priority because of declining status either here or across their range or a high rate of occurrence in North Dakota constituting the core of the species breeding range (i.e. “responsibility” species) but are at-risk range wide; L2 = Level 2: Species having a moderate level of conservation priority or a high level of conservation priority but a substantial level of non-SWG funding is available to them; L3 = Level 3: species having a moderate level of conservation priority but are believed to be peripheral or non-breeding in North Dakota (Hagen et al. 2005); **NGPC:** T1 = Tier I: Globally or nationally most at-risk of extinction; T2 = Tier II: State Critically Imperiled, State Imperiled or State Vulnerable (Schneider et al. 2011).

Appendix C Continued. Priority species detected in 2016, by state, with management designations by state agencies. Agencies include New Mexico Department of Game and Fish (NMDGF), Oklahoma Department of Wildlife Conservation (ODWC), South Dakota Game, Fish and Parks (SDGFP), Texas Parks and Wildlife (TPWD), Utah Division of Wildlife Resources (UDWR) and Wyoming Game and Fish Department (WGFD). An "X" in the Occupancy or Density Estimated columns indicates estimates were generated for that species at some level in one or more of the states where it holds a priority designation.

	State Agencies*						Density	Occupancy
Species	NMDGF	ODWC	SDGFP	TPWD	UDWR	WYGFD	Estimate	Estimate
Acorn Woodpecker							X	X
Alder Flycatcher								
American Avocet							X	X
American Bittern	SGCN				S3,S4B,S3N	Tier II		
American Dipper			1					X
American Kestrel				S4B		Tier III	X	X
American Pipit						Tier III	X	X
American Three-toed Woodpecker			3				X	X
American White Pelican			2b	S2B,S3N	S3B	Tier II	X	
American Wigeon							X	X
Ash-throated Flycatcher						Tier II	X	X
Baird's Sandpiper								
Baird's Sparrow	ST,SGCN	Tier III	2a	S2		Tier II	X	X
Bald Eagle	ST,SGCN	Tier III	1	S3B,S3N	S2B,S4N	Tier II		
Baltimore Oriole							X	X
Band-tailed Pigeon					S3B		X	
Bank Swallow	SGCN						X	X
Barn Owl		Tier III						
Barrow's Goldeneye								
Bell's Vireo	ST,SGCN	Tier II		S3B			X	X
Bewick's Wren				S5B		Tier III	X	X
Black Rosy-Finch					S1	Tier II		
Black Tern			2a	S3		Tier II		
Black-and-white Warbler							X	X
Black-backed Woodpecker			3			Tier II		X

Species	State Agencies*						Density Estimate	Occupancy Estimate
	NMDGF	ODWC	SDGFP	TPWD	UDWR	WYGFD		
Black-billed Cuckoo						Tier II		
Black-billed Magpie							X	X
Black-chinned Hummingbird						Tier II	X	X
Black-chinned Sparrow	SGCN						X	X
Black-crowned Night-Heron						Tier II		
Black-necked Stilt								
Black-tailed Gnatcatcher							X	X
Black-throated Gray Warbler	SGCN					Tier II	X	X
Blue Grosbeak						Tier III	X	X
Blue-gray Gnatcatcher						Tier III	X	X
Bobolink						Tier II	X	X
Boreal Chickadee								
Brewer's Blackbird							X	X
Brewer's Sparrow						Tier II	X	X
Brown Creeper							X	X
Brown-capped Rosy-Finch	SGCN					Tier II	X	X
Brown-crested Flycatcher							X	
Bullock's Oriole		Tier III					X	X
Burrowing Owl	SGCN	Tier II	3	S3B	S3B	Tier I	X	X
Bushtit						Tier II	X	X
California Gull							X	
Calliope Hummingbird						Tier II		
Canvasback		Tier III						
Canyon Wren						Tier III	X	X
Carolina Chickadee				S5B				
Carolina Wren								X
Cassin's Finch	SGCN						X	X
Cassin's Kingbird							X	X
Cassin's Sparrow	SGCN	Tier II		S4B			X	X
Cattle Egret						Tier II		

Species	State Agencies*						Density Estimate	Occupancy Estimate
	NMDGF	ODWC	SDGFP	TPWD	UDWR	WYGFD		
Chestnut-collared Longspur	SGCN	Tier II	2a			Tier II	X	X
Chihuahuan Raven							X	X
Chuck-will's-widow				S3S4B				
Cinnamon Teal								
Clark's Grebe	SGCN					Tier II		
Clark's Nutcracker	SGCN					Tier II	X	X
Common Loon						Tier I		
Common Nighthawk	SGCN					Tier III	X	X
Common Poorwill								X
Common Yellowthroat				S5B		Tier III	X	X
Cordilleran Flycatcher							X	X
Costa's Hummingbird	ST,SGCN							
Curve-billed Thrasher							X	X
Dark-eyed Junco							X	X
Dark-eyed Junco (White-winged)			2b					
Dickcissel				S4B		Tier II	X	X
Dusky Flycatcher							X	X
Dusky Grouse							X	X
Eared Grebe	SGCN							X
Eastern Bluebird							X	X
Eastern Kingbird							X	X
Eastern Meadowlark				S5B			X	X
Eastern Whip-poor-will								
Eastern Wood-Pewee							X	X
Evening Grosbeak	SGCN						X	X
Ferruginous Hawk		Tier III	3	S2B,S4N	S3B	Tier II		X
Field Sparrow				S5B			X	X
Flammulated Owl	SGCN				S3,S4B	Tier III		
Franklin's Gull				S2		Tier II		
Golden Eagle		Tier III		S3B	S4	Tier II	X	

Species	State Agencies*						Density Estimate	Occupancy Estimate
	NMDGF	ODWC	SDGFP	TPWD	UDWR	WYGFD		
Golden-crowned Kinglet							X	X
Golden-fronted Woodpecker		Tier III					X	X
Grace's Warbler	SGCN						X	X
Grasshopper Sparrow	ST,SGCN			S3B		Tier II	X	X
Gray Catbird							X	X
Gray Flycatcher							X	X
Gray Jay							X	X
Gray Vireo	ST,SGCN					Tier II	X	X
Great Blue Heron						Tier II	X	X
Great Egret								
Great Gray Owl						Tier II		
Greater Prairie-Chicken		Tier III	2a	S1B			X	
Greater Sage-Grouse			3		S3	Tier II	X	X
Greater Yellowlegs								
Green Heron				S5B				
Green-tailed Towhee							X	X
Hooded Warbler		Tier II						
Juniper Titmouse	SGCN	Tier III				Tier II	X	X
Ladder-backed Woodpecker							X	X
Lark Bunting			2a				X	X
Lark Sparrow				S4B			X	X
Lazuli Bunting							X	X
Least Tern	SE,SGCN	Tier II	1	S3B				
Lesser Prairie-Chicken	SGCN	Tier II		S2B			X	X
Lesser Scaup		Tier III						
Lewis's Woodpecker	SGCN		3		S3	Tier II	X	X
Lincoln's Sparrow							X	X
Loggerhead Shrike	SGCN	Tier I		S4B		Tier II	X	X
Long-billed Curlew	SGCN	Tier I	2a	S3B,S5N		Tier II	X	X
Long-billed Dowitcher								

Species	State Agencies*						Density Estimate	Occupancy Estimate
	NMDGF	ODWC	SDGFP	TPWD	UDWR	WYGFD		
Long-eared Owl								
Louisiana Waterthrush		Tier III		S3B				
Lucy's Warbler	SGCN						X	X
MacGillivray's Warbler						Tier II	X	X
Marbled Godwit			2a				X	X
Marsh Wren							X	X
McCown's Longspur	SGCN	Tier II		S4		Tier II	X	X
Merlin						Tier III		
Mississippi Kite				S4B				X
Mountain Bluebird	SGCN						X	X
Mountain Plover	SGCN	Tier I		S2		Tier I	X	X
Mountain Quail								
Northern Bobwhite		Tier III		S4B			X	X
Northern Goshawk			3			Tier I		
Northern Harrier				S2B,S3N			X	X
Northern Pintail		Tier III		S3B,S5N			X	X
Northern Pygmy-Owl					S3,S4B	Tier II		
Northern Saw-whet Owl								
Olive Warbler							X	X
Olive-sided Flycatcher	SGCN				S3,S4B		X	X
Orange-crowned Warbler							X	X
Orchard Oriole				S4B			X	X
Osprey			1				X	
Pacific Wren							X	X
Painted Bunting		Tier II		S4B			X	X
Painted Redstart	SGCN							
Pectoral Sandpiper								
Peregrine Falcon	ST,SGCN	Tier III	1	S3	S3B	Tier II		
Phainopepla							X	X
Pileated Woodpecker				S4B			X	X

Species	State Agencies*						Density Estimate	Occupancy Estimate
	NMDGF	ODWC	SDGFP	TPWD	UDWR	WYGFD		
Pine Grosbeak							X	X
Pine Siskin							X	X
Pinyon Jay	SGCN	Tier III					X	X
Piping Plover		Tier III	1	S2				
Plumbeous Vireo							X	X
Prairie Falcon		Tier III					X	
Purple Martin						Tier III	X	X
Pygmy Nuthatch	SGCN					Tier II	X	X
Red Crossbill						Tier II	X	X
Red-eyed Vireo						Tier II	X	X
Red-faced Warbler	SGCN						X	X
Red-headed Woodpecker	SGCN	Tier II		S3B		Tier II	X	X
Red-naped Sapsucker							X	X
Ring-billed Gull							X	X
Ruby-throated Hummingbird								
Ruffed Grouse			3				X	X
Rufous Hummingbird						Tier II		X
Rufous-crowned Sparrow				S4B			X	X
Sage Thrasher						Tier II	X	X
Sagebrush Sparrow	SGCN					Tier II	X	X
Sandhill Crane							X	
Savannah Sparrow							X	X
Scaled Quail		Tier III		S4B			X	X
Scissor-tailed Flycatcher				S3B			X	X
Scott's Oriole						Tier II	X	X
Sedge Wren				S4			X	X
Sharp-shinned Hawk								X
Sharp-tailed Grouse					S2	Tier II	X	X
Short-eared Owl		Tier III		S4N		Tier II		X
Snowy Egret		Tier III		S5B		Tier II		

Species	State Agencies*						Density Estimate	Occupancy Estimate
	NMDGF	ODWC	SDGFP	TPWD	UDWR	WYGFD		
Snowy Plover	SGCN	Tier I		S3B	S3B	Tier III		
Solitary Sandpiper		Tier III						
Sora							X	
Spotted Owl	SGCN			S1B	S2			
Spotted Towhee							X	X
Sprague's Pipit	SGCN	Tier III	2a	S3N			X	X
Summer Tanager				S5B			X	X
Swainson's Hawk		Tier II		S4B		Tier II	X	X
Swainson's Thrush							X	X
Swamp Sparrow								
Townsend's Solitaire							X	X
Tufted Titmouse								
Upland Sandpiper		Tier III				Tier II	X	X
Varied Thrush							X	X
Veery							X	X
Vermilion Flycatcher								
Vesper Sparrow	SGCN						X	X
Violet-green Swallow							X	X
Virginia Rail						Tier III		
Virginia's Warbler	SGCN					Tier II	X	X
Western Bluebird	SGCN						X	X
Western Grebe						Tier II		
Western Kingbird							X	X
Western Meadowlark							X	X
Western Scrub-Jay						Tier II	X	X
White-crowned Sparrow							X	X
White-faced Ibis				S4B	S2,S3B	Tier II		
White-tailed Ptarmigan	SE,SGCN							X
White-throated Swift							X	X
Wild Turkey	ST,SGCN			S5B			X	X

Species	State Agencies*						Density Estimate	Occupancy Estimate
	NMDGF	ODWC	SDGFP	TPWD	UDWR	WYGFD		
Willet			2b				X	X
Williamson's Sapsucker	SGCN					Tier II	X	X
Willow Flycatcher	SE,SGCN	Tier III			S1B	Tier III	X	X
Wilson's Phalarope		Tier III	2b				X	X
Wilson's Snipe							X	X
Wood Duck								X
Wood Thrush		Tier II		S4B				X
Yellow Warbler							X	X
Yellow-billed Cuckoo	SGCN			S4,S5B	S2B	Tier II	X	X
Yellow-breasted Chat							X	X
Yellow-throated Vireo								
Zone-tailed Hawk				S3B				

__NMDGF:__ SGCN = Species of Greatest Conservation Need; ST = State Threatened; SE = State Endangered (New Mexico Department of Game and Fish 2016); __ODWC:__ Tier 1 = Species receiving a combined score of 13 to 15 on Oklahoma's Species of Greatest Conservation Need Selection and Scoring Criteria; Tier 2 = Species receiving a combined score of 11 or 12 on Oklahoma's Species of Greatest Conservation Need Selection and Scoring Criteria; Tier 3 = Species receiving a combined score of 6 to 10 on Oklahoma's Species of Greatest Conservation Need Selection and Scoring Criteria (Oklahoma Department of Wildlife Conservation 2015); __SDGFP:__ 1 = State or federally listed species for which the state has a mandate for recovery 2A = Species that are regionally or globally imperiled and for which South Dakota represents an important portion of their remaining range; 2B = Species that are regionally or globally secure and for which South Dakota represents an important portion of their remaining range; 3 = Species with characteristics that make them vulnerable; (South Dakota Department of Game, Fish and Parks 2014); __TPWD:__ S1 = Critically Imperiled; S1B = Critically Imperiled Breeding; S2 = Imperiled; S2B = Imperiled Breeding; S3 = Vulnerable; S3B = Vulnerable Breeding; S3N = Vulnerable Nonbreeding; S4 = Apparently Secure; S4B = Apparently Secure Breeding; S5 = Secure; S5B = Secure Breeding; SHB = Possibly Extirpated Breeding; SXB = Presumed Extirpated Breeding; (Texas Parks and Wildlife Department 2012); __UDWR:__ S1 = Critically Imperiled; S1B = Critically Imperiled Breeding; S2 = Imperiled; S2B = Imperiled Breeding; S3 = Vulnerable; S3B = Vulnerable Breeding; S3N = Vulnerable Nonbreeding; S4 = Apparently secure; S4B = Apparently secure Breeding; S4N = Apparently secure Nonbreeding; SU = Unrankable, due to conflicting or inadequate information; (Utah Wildlife Action Plan Joint Team 2015); __WGFD:__ Tier 1 = Species scoring 37-54 on WYGFD’s ranking matrix; Tier 2 = Species scoring 19-36 on WYGFD’s ranking matrix; Tier 3 = Species scoring 1-88 on the WYGFD’s ranking matrix (Wyoming Game and Fish Department 2016).

Appendix D

Priority species detected on Bureau of Land Management lands in 2016, with management designations by state. An “X” in the Occupancy or Density Estimated columns indicates estimates were generated for that species in at least one BLM stratum in one or more of the states where it holds a priority designation.

	Bureau of Land Management*							Density	Occupancy
Species	**Colorado**	**Idaho**	**Montana**	**North Dakota**	**South Dakota**	**Utah**	**Wyoming**	**Estimate**	**Estimate**
American White Pelican	SS					SS		X	
Baird's Sparrow			SS	SS	SS		SS	X	X
Bobolink			SS	SS	SS	SS		X	X
Brewer's Sparrow	SS	Type II	SS	SS	SS		SS	X	X
Black-throated Sparrow		Type II						X	X
Burrowing Owl	SS	Type II	SS	SS	SS	SS	SS	X	X
Cassin's Finch		Type II						X	X
Chestnut-collared Longspur			SS	SS	SS			X	X
Dickcissel				SS	SS			X	X
Ferruginous Hawk	SS	Type II	SS	SS	SS	SS	SS		X
Golden Eagle		Type II	SS	SS	SS			X	
Greater Sage-Grouse	SS	Type II	SS	SS	SS	SS	SS	X	X
Grasshopper Sparrow		Type II				SS		X	X
Green-tailed Towhee		Type II						X	X
Long-billed Curlew	SS	Type II	SS	SS	SS	SS	SS	X	X
Loggerhead Shrike		Type II	SS	SS	SS		SS	X	X
McCown's Longspur			SS	SS	SS			X	X
Mountain Plover	SS		SS	SS	SS	SS	SS	X	X
Northern Goshawk	SS	Type II	SS	SS	SS	SS	SS		
Peregrine Falcon	SS		SS	SS	SS		SS		
Sagebrush Sparrow		Type II	SS	SS	SS		SS	X	X
Sage Thrasher		Type II	SS	SS	SS		SS	X	X
Short-eared Owl		Type II				SS			X
Sedge Wren			SS	SS	SS			X	X
Sprague's Pipit			SS	SS	SS			X	X

Species	Bureau of Land Management*							Density Estimate	Occupancy Estimate
	Colorado	Idaho	Montana	North Dakota	South Dakota	Utah	Wyoming		
Swainson's Hawk				SS	SS			X	X
White-faced Ibis	SS		SS	SS	SS		SS		
Willow Flycatcher		Type II				SS		X	X

*SS = Sensitive Species; Colorado (Bureau of Land Management 2000); Montana (Montana Natural Heritage Program (MTNHP) 2015); North Dakota, South Dakota (Bureau of Land Management 2009); Utah (Bureau of Land Management 2010a); Wyoming (Bureau of Land Management 2010b); T2 = Tier 2 Sensitive Species; Idaho (USDI Bureau of Land Management (BLM) 2015).

Appendix E

Priority species detected on US Forest Service lands in Region 1 in 2016, with management designations by region and unit. Codes for Units: Bitterroot NF (BINF), Clearwater NF (CLNF), Custer NF (CUNF), Flathead NF (FLNF), Gallatin NF (GANF), Helena NF (HENF), Idaho Panhandle NF (IPNF). An "X" in the Occupancy or Density Estimated columns indicates estimates were generated for that species in at least one USFS stratum where it holds a priority designation.

	USFS Region 1*								Density	Occupancy
Species	**Region 1**	**BINF**	**CLNF**	**CUNF**	**FLNF**	**GANF**	**HENF**	**IPNF**	**Estimate**	**Estimate**
American Dipper	Other									X
Bald Eagle	R1SS	MIS	MIS	MIS	MIS	MIS	MIS	MIS		
Baird's Sparrow	R1SS								X	X
Black-and-white Warbler	Other								X	X
Black-backed Woodpecker	R1SS				MIS					X
Bobolink	Other								X	X
Boreal Chickadee	Other									
Brewer's Sparrow				MIS					X	X
Bullock's Oriole				MIS					X	X
Chestnut-collared Longspur	Other								X	X
Chipping Sparrow								MIS	X	X
Clark's Nutcracker	Other								X	X
Common Loon	R1SS				MIS					
Dickcissel	Other								X	X
Dusky Flycatcher								MIS	X	X
Dusky Grouse									X	X
Great Gray Owl	Other									
Gray Jay	Other								X	X
Grasshopper Sparrow	Other								X	X
Hammond's Flycatcher								MIS	X	X
Hairy Woodpecker							MIS	MIS	X	X
Lark Bunting	Other								X	X
Lark Sparrow				MIS					X	X
Long-billed Curlew	R1SS								X	X

Species	USFS Region 1*								Density Estimate	Occupancy Estimate
	Region 1	BINF	CLNF	CUNF	FLNF	GANF	HENF	IPNF		
Lewis's Woodpecker	Other								X	X
Loggerhead Shrike	R1SS								X	X
Marbled Godwit	Other								X	X
Mountain Quail	R1SS									
Northern Goshawk			MIS	MIS		MIS	MIS	MIS		
Northern Harrier	Other								X	X
Olive-sided Flycatcher	Other							MIS	X	X
Osprey	Other								X	
Ovenbird				MIS					X	X
Peregrine Falcon	R1SS	MIS		MIS	MIS		MIS			
Pileated Woodpecker		MIS	MIS				MIS	MIS	X	X
Pygmy Nuthatch	R1SS								X	X
Red-headed Woodpecker	Other								X	X
Red-naped Sapsucker	Other								X	X
Sandhill Crane	Other								X	
Sage Thrasher	Other								X	X
Short-eared Owl	Other									X
Spotted Towhee				MIS					X	X
Sharp-tailed Grouse				MIS					X	X
Swainson's Hawk	Other								X	X
Upland Sandpiper	Other								X	X
Western Kingbird				MIS					X	X
Wilson's Phalarope	Other								X	X
Williamson's Sapsucker	Other								X	X
Yellow-billed Cuckoo	Other								X	X
Yellow Warbler				MIS					X	X

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

Appendix E continued. Priority species detected on US Forest Service lands in Region 1 in 2016, with management designations by region and unit. Codes for Units: Kootenai NF (KONF), Lewis and Clark NF (LCNF), Lolo NF (LONF), Nez Perce NF (NPNF), Cedar River NG (CRNG), Grand River NG (GRNG) and Little Missouri NG (LMNG). An "X" in the Occupancy or Density Estimated columns indicates estimates were generated for that species in at least one USFS stratum where it holds a priority designation.

	USFS Region 1*								Density	Occupancy
Species	Region 1	KONF	LCNF	LONF	NPNF	CRNG	GRNG	LMNG	Estimate	Estimate
American Dipper	Other									X
Bald Eagle	R1SS	MIS	MIS	MIS	MIS					
Baird's Sparrow	R1SS								X	X
Black-and-white Warbler	Other								X	X
Black-backed Woodpecker	R1SS									X
Bobolink	Other								X	X
Boreal Chickadee	Other									
Brewer's Sparrow									X	X
Bullock's Oriole									X	X
Chestnut-collared Longspur	Other								X	X
Chipping Sparrow		MIS							X	X
Clark's Nutcracker	Other								X	X
Common Loon	R1SS									
Dickcissel	Other								X	X
Dusky Flycatcher		MIS							X	X
Dusky Grouse			MIS						X	X
Great Gray Owl	Other									
Gray Jay	Other								X	X
Grasshopper Sparrow	Other								X	X
Hammond's Flycatcher		MIS							X	X
Hairy Woodpecker		MIS							X	X
Lark Bunting	Other								X	X
Lark Sparrow									X	X
Long-billed Curlew	R1SS								X	X
Lewis's Woodpecker	Other								X	X
Loggerhead Shrike	R1SS								X	X
Marbled Godwit	Other								X	X

Species	USFS Region 1*								Density Estimate	Occupancy Estimate
	Region 1	KONF	LCNF	LONF	NPNF	CRNG	GRNG	LMNG		
Mountain Quail	R1SS									
Northern Goshawk			MIS	MIS	MIS					
Northern Harrier	Other								X	X
Olive-sided Flycatcher	Other	MIS							X	X
Osprey	Other								X	
Ovenbird									X	X
Peregrine Falcon	R1SS	MIS	MIS	MIS	MIS					
Pileated Woodpecker		MIS		MIS	MIS				X	X
Pygmy Nuthatch	R1SS								X	X
Red-headed Woodpecker	Other								X	X
Red-naped Sapsucker	Other								X	X
Sandhill Crane	Other								X	
Sage Thrasher	Other								X	X
Short-eared Owl	Other									X
Spotted Towhee									X	X
Sharp-tailed Grouse						MIS	MIS	MIS	X	X
Swainson's Hawk	Other								X	X
Upland Sandpiper	Other								X	X
Western Kingbird									X	X
Wilson's Phalarope	Other								X	X
Williamson's Sapsucker	Other								X	X
Yellow-billed Cuckoo	Other								X	X
Yellow Warbler									X	X

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

Appendix F

Priority species detected on US Forest Service lands in Region 2 in 2016, with management designations by region and unit. Codes for 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), Routt NF (RONF). An "X" in the Occupancy or Density Estimated columns indicates estimates were generated for that species in at least one USFS stratum where it holds a priority designation.

	USFS Region 2*										Density	Occupancy
Species	**Region 2**	**ARNF**	**BHNF**	**BINF**	**GMUG**	**MBNF**	**NENF**	**PSINF**	**RGNF**	**RONF**	**Estimate**	**Estimate**
American Bittern	R2SS											
American Pipit											X	X
Bald Eagle	R2SS				MIS							
Black-and-white Warbler			SLC								X	X
Black-backed Woodpecker	R2SS		MIS									X
Brewer's Sparrow	R2SS			MIS	MIS						X	X
Broad-winged Hawk			SLC									
Brown Creeper			MIS			SSC			MIS		X	X
Bullock's Oriole											X	X
Burrowing Owl	R2SS	MIS									X	X
Cassin's Sparrow	R2SS										X	X
Chestnut-collared Longspur	R2SS										X	X
Cooper's Hawk			SLC								X	X
Flammulated Owl	R2SS											
Golden-crowned Kinglet		MIS	MIS	SLC		MIS				MIS	X	X
Grasshopper Sparrow	R2SS		MIS								X	X
Greater Prairie-Chicken	R2SS						MIS				X	
Greater Sage-Grouse	R2SS										X	X
Green-tailed Towhee											X	X
Hairy Woodpecker		MIS			MIS						X	X
Hermit Thrush									MIS		X	X
Lark Bunting		MIS									X	X
Lewis's Woodpecker	R2SS				MIS						X	X

Species	USFS Region 2*										Density Estimate	Occupancy Estimate
	Region 2	ARNF	BHNF	BINF	GMUG	MBNF	NENF	PSINF	RGNF	RONF		
Lincoln's Sparrow						MIS			MIS		X	X
Loggerhead Shrike	R2SS										X	X
Long-billed Curlew	R2SS										X	X
McCown's Longspur	R2SS										X	X
Mountain Bluebird		MIS									X	X
Northern Goshawk	R2SS				MIS	MIS				MIS		
Northern Harrier	R2SS										X	X
Olive-sided Flycatcher	R2SS										X	X
Peregrine Falcon	R2SS				MIS							
Purple Martin	R2SS										X	X
Pygmy Nuthatch		MIS	SLC	SLC			MIS		MIS		X	X
Red Crossbill					MIS						X	X
Red-breasted Nuthatch				MIS							X	X
Ruffed Grouse			MIS								X	X
Sharp-shinned Hawk			SLC									X
Sharp-tailed Grouse	R2SS						MIS				X	X
Short-eared Owl	R2SS											X
Song Sparrow			MIS								X	X
Vesper Sparrow									MIS	MIS	X	X
Virginia's Warbler											X	X
Warbling Vireo		MIS									X	X
White-tailed Ptarmigan	R2SS											X
Wilson's Warbler		MIS				MIS			MIS	MIS	X	X
Yellow-billed Cuckoo	R2SS										X	X

*R2SS = Region 2 Sensitive Species (US Forest Service 2008b); MIS = Management Indicator Species; SOLC = Species of Local Concern; SOC = Species of Concern; SVC = Species of Viability Concern; SSC = Species of Special Concern.

Appendix F continued. Priority species detected on US Forest Service lands in Region 2 in 2016, with management designations by region and unit. Codes for Units: Samuel R. McKelvie NF (SMNF), San Juan NF (SJNF), Shoshone NF (SHNF), White River NF (WRNF), Comanche NG (CONG), Pawnee NG (PANG), Nebraska NG (NBNG) and Thunder Basin NG (TBNG). An "X" in the Occupancy or Density Estimated columns indicates estimates were generated for that species in at least one USFS stratum where it holds a priority designation.

	USFS Region 2*									Density	Occupancy
Species	**Region 2**	**NENF**	**SJNF**	**SHNF**	**WRNF**	**CONG**	**NBNG**	**PANG**	**TBNG**	**Estimate**	**Estimate**
American Bittern	R2SS										
American Pipit					MIS					X	X
Bald Eagle	R2SS			MIS							
Black-and-white Warbler										X	X
Black-backed Woodpecker	R2SS										X
Brewer's Sparrow	R2SS			MIS	MIS					X	X
Broad-winged Hawk											
Brown Creeper										X	X
Bullock's Oriole						MIS				X	X
Burrowing Owl	R2SS							MIS		X	X
Cassin's Sparrow	R2SS									X	X
Chestnut-collared Longspur	R2SS									X	X
Cooper's Hawk										X	X
Flammulated Owl	R2SS										
Golden-crowned Kinglet								MIS		X	X
Grasshopper Sparrow	R2SS									X	X
Greater Prairie-Chicken	R2SS	MIS					MIS			X	
Greater Sage-Grouse	R2SS						MIS		MIS	X	X
Green-tailed Towhee			MIS							X	X
Hairy Woodpecker			MIS	MIS				MIS		X	X
Hermit Thrush										X	X
Lark Bunting								MIS		X	X
Lewis's Woodpecker	R2SS									X	X
Lincoln's Sparrow										X	X
Loggerhead Shrike	R2SS									X	X
Long-billed Curlew	R2SS					MIS				X	X

Species	USFS Region 2*									Density Estimate	Occupancy Estimate
	Region 2	NENF	SJNF	SHNF	WRNF	CONG	NBNG	PANG	TBNG		
McCown's Longspur	R2SS									X	X
Mountain Bluebird			MIS					MIS		X	X
Northern Goshawk	R2SS		MIS	MIS							
Northern Harrier	R2SS									X	X
Olive-sided Flycatcher	R2SS									X	X
Peregrine Falcon	R2SS			MIS	SC						
Purple Martin	R2SS									X	X
Pygmy Nuthatch		MIS			SVC			MIS		X	X
Red Crossbill										X	X
Red-breasted Nuthatch										X	X
Ruffed Grouse				MIS						X	X
Sharp-shinned Hawk											X
Sharp-tailed Grouse	R2SS	MIS	MIS				MIS		MIS	X	X
Short-eared Owl	R2SS										X
Song Sparrow										X	X
Vesper Sparrow										X	X
Virginia's Warbler					MIS					X	X
Warbling Vireo								MIS		X	X
White-tailed Ptarmigan	R2SS										X
Wilson's Warbler								MIS		X	X
Yellow-billed Cuckoo	R2SS									X	X

*R2SS = Region 2 Sensitive Species (US Forest Service 2008b); MIS = Management Indicator Species; SOLC = Species of Local Concern; SOC = Species of Concern; SVC = Species of Viability Concern; SSC = Species of Special Concern.

Appendix G

Priority species detected on US Forest Service lands in Region 3 in 2016, with management designations by region and unit. An “X” in the Occupancy or Density Estimated columns indicates estimates were generated for that species in at least one USFS stratum where it holds a priority designation.

Species	USFS Region 3*					Density Estimate	Occupancy Estimate
	Region 3	Coconino NF	Kaibab NF	Kiowa NG	Rita Blanca NG		
Bald Eagle	R3SS						
Costa's Hummingbird	R3SS						
Grace's Warbler			MIS			X	X
Grasshopper Sparrow	R3SS					X	X
Gray Vireo	R3SS					X	X
Hairy Woodpecker		MIS				X	X
Juniper Titmouse		MIS				X	X
Lucy's Warbler		MIS				X	X
Peregrine Falcon	R3SS						
Pygmy Nuthatch		MIS				X	X
Ruby-crowned Kinglet			MIS			X	X
Western Bluebird			MIS			X	X
Wild Turkey	R3SS	MIS				X	X

*R3SS = USFS Region 3 Sensitive Species (US Forest Service 2013); MIS = Management Indicator Species; PMIS = Proposed Management Indicator Species; SOC = Species of Concern.

Appendix H

Priority species detected on US Forest Service lands in Region 4 in 2016, with management designations by region and unit. Codes for Units: Ashley NF (ASNF), Boise NF (BONF), Bridger-Teton NF (BTNF), Caribou-Targhee NF (CTNF), Manti-La Sal NF (MLNF), Payette NF (PANF), Salmon-Challis National Forest (SCNF), Sawtooth NF (SANF), Uinta-Wasatch-Cache National Forest (UWCNF). An "X" in the Occupancy or Density Estimated columns indicates estimates were generated for that species in at least one USFS stratum where it holds a priority designation.

	USFS Region 4*										Density	Occupancy
Species	**Region 4**	**ASNF**	**BONF**	**BTNF**	**CTNF**	**MLNF**	**PANF**	**SCNF**	**SANF**	**UWANF**	**Estimate**	**Estimate**
American Three-toed Woodpecker	SS		S							MIS	X	X
Bald Eagle	SS		S	MIS	MIS							
Black-backed Woodpecker			MIS									
Brewer's Sparrow				MIS			MIS				X	X
Brown Creeper								MIS			X	X
Golden Eagle		MIS				MIS					X	
Great Gray Owl	SS		S					MIS				
Greater Sage-Grouse	SS	MIS	S/C				MIS	PMIS	MIS		X	X
Lewis's Woodpecker							MIS				X	X
Lincoln's Sparrow		MIS									X	X
Mountain Bluebird								MIS			X	X
Mountain Chickadee							MIS				X	X
Mountain Quail	SS											
Northern Goshawk	SS	MIS	S		MIS	MIS		MIS	MIS	MIS		
Peregrine Falcon	SS		S		MIS							
Pileated Woodpecker			MIS				MIS	MIS	MIS		X	X
Red-naped Sapsucker		MIS									X	X
Ruby-crowned Kinglet								MIS			X	X
Song Sparrow		MIS									X	X
Vesper Sparrow							MIS	MIS			X	X
Warbling Vireo		MIS									X	X
Williamson's Sapsucker							MIS				X	X
Willow Flycatcher	FE										X	X

Species	USFS Region 4*										Density Estimate	Occupancy Estimate
	Region 4	ASNF	BONF	BTNF	CTNF	MLNF	PANF	SCNF	SANF	UWANF		
Yellow Warbler							MIS	MIS			X	X

*FE = Federally Endangered Species; C = Federal Candidate Species; MIS = Management Indicator Species; R4SS = Region 4 Sensitive Species (US Forest Service 2008a); S = Sensitive Species.