

Integrated Monitoring in Bird Conservation Regions (IMBCR):

2019 Field Season Report



March 2020



Connecting People, Birds and Land

Bird Conservancy of the Rockies

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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 the twelfth consecutive year of landbird monitoring 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, occupancy rates, and trends 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 increases sample sizes and improves the accuracy and precision of population estimates. Analyzing the data collectively allows us to estimate detection probabilities for species that would otherwise have insufficient numbers of detections at local scales.

In 2019, the IMBCR program's area of inference encompassed four entire states (Colorado, Montana, Utah, and Wyoming) and portions of 12 additional states (Arizona, California, Idaho, Kansas, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, and Texas). We surveyed across US Forest Service (USFS) Regions 1, 2, and 4 and in portions of Region 3; all of the Badlands and Prairies Bird Conservation Region (BCR 17), all of the Shortgrass Prairie Bird Conservation Region (BCR 18), and portions of eight other BCRs: Great Basin (9), Northern Rockies (10), Prairie Potholes (11), Sierra Nevada (15), Southern Rockies/Colorado Plateau (16), Central Mixed Grass Prairie (19), Sonoran and Mojave Deserts (33), and Sierra Madre Occidental (34). Observers conducted 17,880 point counts within the 1,546 surveyed sampling units between April 22 and August 15, 2019. They detected 225,814 individual birds representing 357 species.

This report summarizes the results of the 2019 field season. 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 (RMADC) at <http://rmbo.org/v3/avian/ExploretheData.aspx>. Instructions for using the RMADC are included in Appendix A of this report and are available on the RMADC itself (hover over the "Explore the Data" tab for tutorials). Each stratum or combination of strata presented in this report's Results section contains a web link that leads directly to the RMADC 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 RMADC.

To demonstrate the use of IMBCR monitoring data for bird conservation, we focus on population estimates from 2016-2019 for five priority grassland species in the Playa Lakes Joint Venture (PLJV) region. Occupancy rates appear relatively stable for Cassin's Sparrow, Eastern Meadowlark, Grasshopper Sparrow, Northern Bobwhite, and Scissor-tailed Flycatcher across the region, but Grasshopper Sparrow density decreased during the monitoring period. Trend estimates reveal declining populations for all but the Scissor-tailed Flycatcher, although additional years of monitoring should provide greater insight into population change over time. A comparison of regional and local estimates highlights discrepancies and allows managers and biologists to form hypotheses about potential drivers of change in local populations (e.g., National Grassland or National Park). For example, although Northern Bobwhite are declining across the PLJV region, they are increasing in Cimarron National Grassland in Kansas.

The IMBCR program is well-positioned to address conservation and management needs for a wide range of stakeholders at various spatial scales. By focusing on relevant scales from local management units to state-wide, IMBCR can easily be integrated within an interdisciplinary approach to bird conservation that combines monitoring, research, and management.

Acknowledgements

Many individuals helped make the 2019 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: Colorado Parks and Wildlife; Department of Defense; Montana Fish, Wildlife and Parks; National Fish and Wildlife Foundation; 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. Funding for surveys in the PLJV region was provided by Colorado Parks & Wildlife; Kansas Department of Wildlife, Parks & Tourism; Nebraska Game & Parks Commission; New Mexico Department of Game & Fish; Oklahoma Department of Wildlife Conservation; Texas Parks & Wildlife Department; Farm Service Agency (USDA); and US Forest Service. We thank Department of Defense, Great Basin Bird Observatory, Intermountain Bird Observatory, Klamath 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, Erin Youngberg with help from Jenny Berven and Tiffany Peeken, contacted county assessors to determine land ownership of survey locations. We thank Mevin Hooten at Colorado State University and Elise Zipkin at Michigan State University for input during model development. We thank Ryan Wermager of The Nature Conservancy for providing excellent training facilities at the Whitney Preserve for the Northern Great Plains and Wyoming monitoring efforts. We also thank the many field observers 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 observers 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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Introduction

Monitoring is an essential component of wildlife management and conservation science (Marsh & Trenham, 2008; Witmer, 2005). Common goals of population monitoring are to estimate the population status of target species and to detect changes in populations over time (Sauer & Knutson, 2008; Thompson, White, & Gowan, 1998). In addition to providing basic information on species distributions, effective monitoring programs can identify species that are at-risk because of small or declining populations (Dreitz, Lukacs, & Knopf, 2006); provide an understanding of how management actions affect populations (Alexander, Stephens, Geupel, & Will, 2008; Lyons, Runge, Laskowski, & Kendall, 2008); and evaluate population responses to landscape alteration and climate change (Baron et al., 2008; Lindenmayer & Likens, 2009).

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 (Dreitz, Stinson, Hahn, Tack, & Lukacs, 2017; Lindenmayer & 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, Hayward, & Squires, 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, Schlesinger, Roth, & Van Horne, 2005; Sauer & Knutson, 2008).

Before monitoring can be used by land managers to guide conservation efforts, sound program designs and analytical methods are necessary to produce unbiased population estimates (Sauer & 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, Anderson, Giesen, Leukering, & Carter, 2002; Thompson, 2002). Addressing spatial variation entails the use of probabilistic sampling designs, which allows 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 analytical methods to address the fact that few, if any, species are so conspicuous that they are detected with certainty when present during a survey. Accounting for these two sources of variation ensures that observed trends reflect true population changes rather than artifacts of the sampling and observation processes (Pollock et al., 2002; Thompson, 2002).

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

- 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, Bird Conservancy of the Rockies and partners initiated a broad-scale collaborative bird monitoring program in 2008, entitled “Integrated Monitoring in Bird Conservation Regions” (IMBCR) (Blakesley & Hanni, 2009). See Appendix B: IMBCR Program and Stratification History for a complete history of this program. The monitoring objectives of the IMBCR partnership 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 landbird 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 effectively merges records between regional data nodes and 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.

The IMBCR design uses Bird Conservation Regions (BCRs) as sampling frames (Figure 1), stratified by land ownership inside each BCR (NABCI Monitoring Subcommittee, 2007). BCRs provide a spatially consistent framework for bird conservation in North America. Each BCR represents a distinct ecological region with similar bird communities, vegetation types, and resource management interests (NABCI, 2000). Population monitoring within BCRs can be implemented with a flexible hierarchical framework of nested units, where information on 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 objectives at various scales applicable to land managers (Pavlacky et al., 2017; Ruth et al., 2003).

Important properties of the IMBCR design are:

- all areas are available for sampling, including all vegetation types;
- strata are based on fixed attributes, which allows 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 inference;
- aggregation of stratum-wide estimates to BCR- or state-wide estimates is built into the design;
- local population trends are directly comparable to regional trends; and
- coordination among partners reduces the costs and increases efficiencies of monitoring per partner.

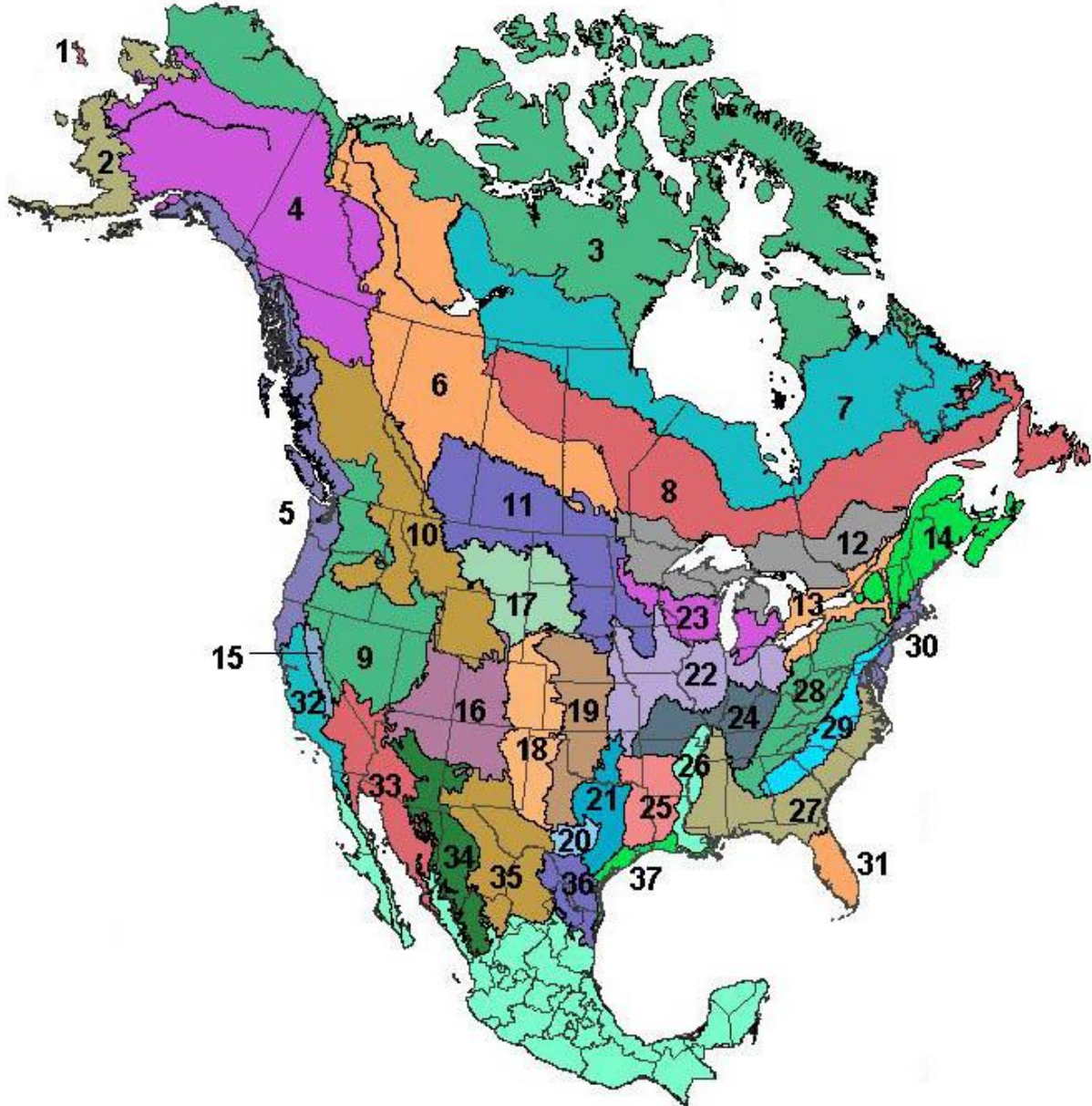


Figure 1. Bird Conservation Regions throughout North America, excluding Hawaii and Mexico (Source: <http://nabci-us.org/resources/bird-conservation-regions-map/>).

Methods

Study Area

In 2019, the IMBCR program’s area of inference encompassed four entire states (Colorado, Montana, Utah, and Wyoming) and portions of 12 additional states (Arizona, California, Idaho, Kansas, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, and Texas). We surveyed across US Forest Service (USFS) Regions 1, 2, and 4 and in portions of Region 3; all of the Badlands and Prairies Bird Conservation Region (BCR 17), all of the Shortgrass Prairie Bird Conservation Region (BCR 18), and portions of eight other BCRs: Great Basin (9), Northern Rockies (10), Prairie Potholes (11), Sierra Nevada (15), Southern Rockies/Colorado Plateau (16), Central Mixed Grass Prairie (19), Sonoran and Mojave Deserts (33), and Sierra Madre Occidental (34) (Figure 2).

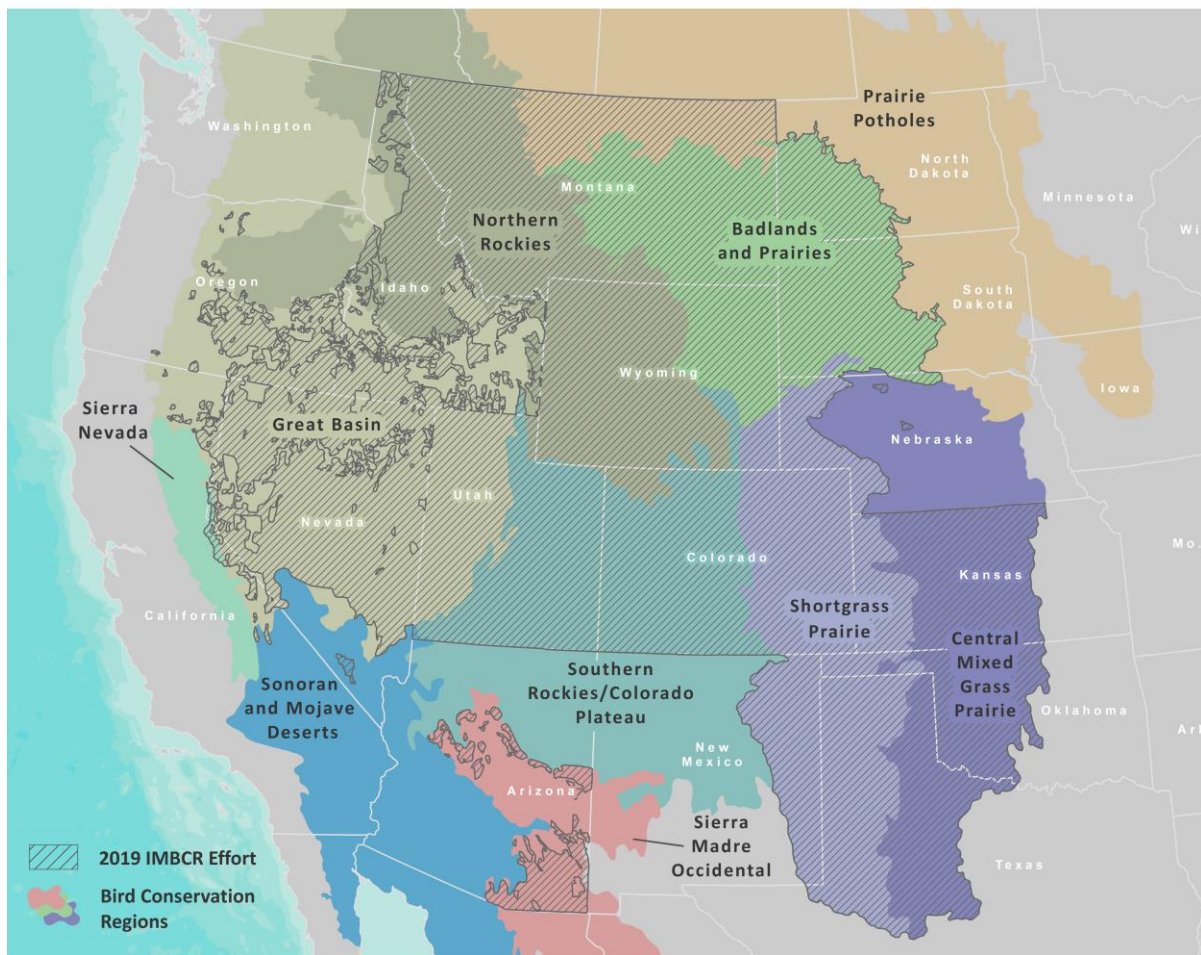


Figure 2. Spatial extent of sampled Bird Conservation Regions using the IMBCR design, 2019.

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 define strata based on areas to which IMBCR partners wanted to make inferences. We defined the largest sampling frame by the intersection of state and BCR boundaries (e.g., Wyoming BCR 10). We base the strata within the state-BCR sampling frames on fixed attributes, such as land ownership boundaries, elevation zones, major river systems and wilderness/roadless designations.

Sampling Units

The IMBCR design defines 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. We then assign each cell to a stratum using ArcGIS version 10.X and higher (Environmental Systems Research Institute, 2017). For all stratifications developed after 2012, we use the United States National Grid (USNG), a nonproprietary alphanumeric referencing system derived from the Military Grid Reference System that was created by the Federal Geographic Data Committee.

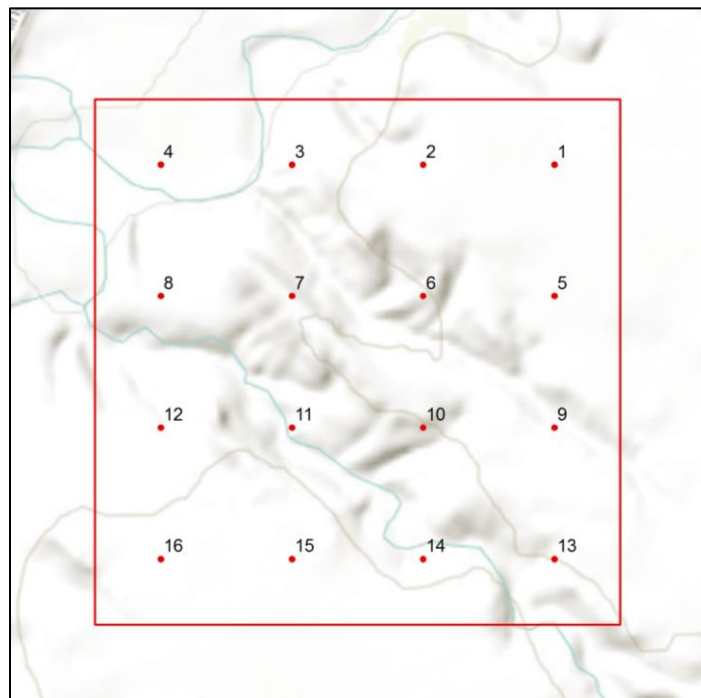


Figure 3. Example 1 km² sampling unit in the IMBCR design.

Sample Selection

Within each stratum, the IMBCR design uses generalized random-tessellation stratification (GRTS), a spatially balanced sampling algorithm, to select sampling units (Stevens Jr. & Olsen, 2004). The GRTS design has some 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 Jr. & Olsen, 2004). Incorporating information about spatial autocorrelation in the data can increase precision in density estimates; and
- all sampling units in the sampling frame are ordered, such that any set of consecutively numbered units is a spatially well-balanced sample (Stevens Jr. & 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 within each stratum are required to estimate the variances of population parameters. However, reliable stratum-level occupancy estimates require larger sample sizes, with a minimum of approximately 8-10 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. After the initial two sampling units were selected, the remaining allocation of sampling effort among strata was based on the priorities of the funding partners.

Sampling Methods

IMBCR observers with excellent aural and visual bird-identification skills conducted field work in 2019. Prior to conducting surveys, observers 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 observers 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.

Observers conducted point counts (Buckland et al., 2001) following protocols established by IMBCR partners (Hanni, White, Birek, Van Lanen, & McLaren, 2012). Observers conducted surveys in the morning, beginning one-half hour before sunrise and concluding no later than five hours after sunrise. Observers 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 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, 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 squirrel (*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 purposes only.

Observers 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. Observers navigated to each point using hand-held Global Positioning System units. Before beginning each six-minute count, surveyors recorded vegetation data within a 50m

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, grass height, and ground cover. Observers 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.org/v3/avian/DataCollection.aspx>. There you will find links to past and current protocols and data sheets.

Data Analysis

Distance Analysis Assumptions

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, Marsden, & Green, 2008).

Density Estimation

We developed a Bayesian, zero-inflated N-mixture model (Royle 2004, Sillett et al. 2011) to estimate density and abundance for all strata and superstrata across all species with sufficient data. We used distance sampling to estimate detection probabilities and adjust counts accordingly. For a detailed description of statistical analyses performed, see ([Appendix D](#)).

Bayesian approaches to density estimation provide several benefits over traditional distance sampling analyses, while providing similar and unbiased estimates of density and abundance. First, with the nested design of IMBCR, point count locations within a 1-km² grid cell are not independent. Therefore, with traditional methods, it is necessary to treat each point as a spatial replicate within the grid cell (i.e., average counts across points). However, it is unlikely that bird densities are uniform within a grid cell, and a better solution would be to estimate density at the point count location. Bayesian models provide the flexibility to do this, while correctly accounting for the lack of independence among points. The second benefit, also provided by this flexibility, is the ability to include covariates to explain changes in density. This allows us to explicitly estimate the response of bird density to variables, such as habitat variables, management actions, or time (i.e., trend). Finally, Bayesian approaches allow for sharing of information across parameters. This can assist in obtaining estimates at sites with little data or provide measures of uncertainty when no birds were detected, such as at low densities and/or small sample sizes.

We fit a series of models to the data from each species that had the same model structure describing density estimation but varied in detection structure (see *Observation process* section below). We used zero-inflation to account for excess zeros in the data, where abundance at a point count location (N) is conditional on the point's true occupancy state (z) of a species at the point count location, and the mean abundance within a 1-km² grid cell was modeled as a function of year to estimate stratum-specific trends.

All points within a grid cell shared a mean abundance to account for the lack of independence of those points, but abundance was allowed to vary spatially within a grid cell (i.e., by point) through Poisson variation. To avoid predicting species occurrence outside of observed ranges, we fixed occupancy probabilities to 0 for all strata in which the species was never observed and used a prior informed by the observed proportion of grid-year combinations in a stratum in which the species was detected.

We derived density at the point count location by dividing the estimated abundance by the area of the point count circle (see *Observation process* section below) and multiplying by cluster size. We derived stratum-level density estimates by averaging all point-level density estimates within each stratum, and we took the area-weighted average of strata estimates to obtain superstratum estimates.

Observation process

We estimated the probability of detecting an independent cluster of individuals by fitting distance functions to the distance data collected during surveys (Buckland et al. 2001). We fit four detection models including: 1) half-normal constant (HN(.)), 2) hazard rate constant (Haz(.)), 3) half-normal year (HN(t)), and 4) hazard rate year (Haz(t)).

We removed the furthest 10% of observed detection distances from the data set and binned the remaining detections into 10 evenly-spaced distance classes. The furthest remaining detection distance became the radius of the point count circle with which we estimated density.

Detection model selection

To minimize computing time but find the most parsimonious detection function, we fit detection-only models to the distance data, using the four model structures described above. We used the Watanabe-Akaike Information Criterion (WAIC; Watanabe 2010, Hooten and Hobbs 2015) to select the most parsimonious detection structure and then used that structure for detection probabilities in the full model to estimate density and abundance.

Superstratum trends

We developed a post-hoc approach to estimate trends for superstrata. Using the rolled-up estimates of density for a superstratum, we fit a general linear model (GLM) to the samples from each Bayesian iteration.

Fitting a GLM across iterations allowed us to incorporate uncertainty in trends due to uncertainty around density estimates, but it did not account for temporal variation. To incorporate this second form of variation, we sampled a random intercept and slope for each iteration using the mean and standard error estimated using the GLM and made inference on the distribution of the resampled values.

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 Bayesian, multi-scale occupancy model (Nichols et al. 2008, Mordecai et al. 2011, Green et al. 2019) 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 <125 m from the sample points, except for Accipitriformes, Anseriformes, Falconiformes, Galliformes, Gruiformes, Pelecaniformes, Podicipediformes, and Suliformes for which we used the maximum observed distance for each species. Truncating the data 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 θ (the proportion of points occupied within each sampling unit) (Pavlacky Jr., Blakesley, White, Hanni, & Lukacs, 2012). The interpretation of θ for species for which we used maximum distances changes from occupancy to use because point count buffers overlap, but we chose this approach to provide estimates for a larger number of species.

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 (ψ) for each stratum by estimating BCR-by-year specific estimates of detection (p) and point-level occupancy (θ). We fixed p and θ to 0 for BCRs in which a particular species was never detected.

We fixed ψ to 0 for all strata in which the species was never detected. As with density, we took an area-weighted mean of stratum-level occupancy estimates (i.e., ψ) to estimate superstratum-level occupancy probabilities. The true point-level occupancy state was conditional on the grid-cell-level occupancy state (i.e., occupied or unoccupied), such that a point could only be occupied if the grid cell was occupied. Finally, we modeled the observation process conditional on the point being occupied using removal modeling.

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 θ (Nichols et al., 2008; Pavlacky Jr. et al., 2012). We considered both p and θ to be nuisance variables that were important for generating unbiased estimates of ψ . θ 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 Jr. et al., 2012).

Automated Analysis

We recently updated our analytical methods and are using Bayesian hierarchical models specifically designed for analysis of IMBCR data. We perform all data and output manipulation in R (R Core Team, 2019) and model fitting in JAGS (Plummer 2003, 2017) using the R package jagsUI (Kellner 2018). The R code called the raw data from the IMBCR Structured Query Language (SQL) server database and reformatted the data into a form usable with the JAGS code. 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 R code provided an automated framework for combining stratum-level estimates of population density and site occupancy at multiple spatial scales, as well as estimating the standard deviations and credible intervals for the combined estimates.

We fit initial models to all species with at least 30 detections for density estimation and 10 detections for occupancy estimation. For density estimation, we fit the full model after determining whether there

were enough detections based on results from the detection-only model fits. In some cases for both density and occupancy estimation, it was necessary to use a less parsimonious detection structure or simplified model structure to facilitate model convergence. We currently maintain version control of the automated analysis code in the Bird Conservancy repository (Atlassian Stash, version 3.6.1).

Results

I. Summary

In 2019, field observers completed 1,546 of 1,564 (98.8%) planned surveys throughout all or portions of BCRs 9, 10, 11, 15, 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. Observers conducted 17,880 point counts within the 1,546 surveyed sampling units between April 22 and August 15, 2019. They detected 225,814 individual birds representing 357 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 website (hover over the “Explore the Data” tab for tutorials). 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 58th supplement to the American Ornithologists’ Union Check-list of North and Middle American Birds (Chesser et al., 2017).

II. Trend Estimates

We estimated species population trends for data collected through 2019. Results can be found [here](#). Individual stratum estimates are compiled by state. To find superstratum estimates, select a spreadsheet for any state included in the superstratum. For example, to find estimates for the Badlands and Prairies Bird Conservation Region (BCR 17), select the spreadsheet for Montana, Wyoming, Nebraska, North Dakota, or South Dakota. We do not include trend estimates for species with zero detections in a given stratum. Be cautious when interpreting trends for low-density species at the superstratum (regional) level when there were zero detections in a given year. In these cases, we add a very small number to the estimate (i.e., half the minimum non-zero estimate) in order to take the log of the estimate. This increases uncertainty around the trend estimates.

Explanation of the columns in the trend estimates spreadsheets are as follows:

Stratum: the abbreviated code for an individual stratum or the name of a superstratum (i.e., contains 2 or more individual strata)

Stratum Name: full name for an individual stratum (note, this column will contain NA for superstrata as the name is contained in the “stratum” column for superstrata)

Species: full name of bird species. Note that we record a few mammals detected on surveys, such as red and Abert’s squirrels and pika

ScientificName: scientific name for each species

Mean: mean trend estimate based on all years a stratum was surveyed. A value of 1 indicates the population is stable, <1 indicates the population is declining and >1 is an increasing population

SD: standard deviation or amount of variation in the data

CV: coefficient of variation or ratio of the standard deviation to the mean (lower is better!)

LCI 95: lower 95% credible interval; the true estimate lies within the lower and upper 95% credible intervals with 95% probability

UCI 95: upper 95% credible interval; the true estimate lies within the lower and upper 95% credible intervals with 95% probability

LCI 90: same interpretation as 95% LCI but with 90% probability

UCI 90: same interpretation as 95% UCI but with 90% probability

Median: value that represents the midpoint of the distribution. We recommend reporting the median rather than the mean because some credible intervals have long tails so the means can be quite a bit higher than the medians, especially for estimates near zero. Medians are also more representative of the distributions

f: the probability the trend is in the direction of the mean. This is our confidence in the direction of the trend (not necessarily the magnitude). As 'f' approaches 1, our confidence increases (e.g., if the trend estimate is 1.16 and 'f' is 0.88, then we are 88% sure the population is increasing)

N. Detect: the number of detections used to estimate trend for each species-stratum combination

N.Strata.Det: the number of strata with a detection used to estimate regional (superstrata) trends. This column will contain an "NA" for individual strata.

N.Strata: the number of strata contained in a superstratum (minimum number of strata within a superstratum is 2). This column will contain an "NA" for individual strata.

III. Number of Species with Estimates

The way we present density and occupancy estimates in the final report has changed from years prior to 2018. In the past, if a species had been detected in a stratum in a previous year, but was not detected in the current year, we did not provide density or occupancy estimates for that species in that stratum. We now included estimates for these species. In these cases the estimate is zero or very close to zero. We consider these to be legitimate estimates of zero occupancy or density because the species occurs in the area of interest, but was not detected in a particular year.

This change means that the number of species with either density or occupancy estimates for a given stratum or superstratum in a given year is not comparable to the number of species with estimates for that stratum or superstratum and year in reports prior to 2018. The number of species in the current report will include species with zero, or near zero estimates if that species has been detected in previous years, whereas reports before 2018 will not. Therefore, there may be more species with estimates for a given stratum in a final report for 2018 and later.

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Table 1. Planned and completed surveys by stratum, 2019.

BCR = Bird Conservancy of the Rockies; DoD = Department of Defense; GBBO = Great Basin Bird Observatory; IBO = Intermountain Bird Observatory; KBO = Klamath Bird Observatory; UDWR = Utah Division of Wildlife Resources; WYNDD = Wyoming Natural Diversity Database.

State	BCR	Stratum	Stratum Description	Collected By	Area (km ²)	Planned	Completed	Percent Completed
AZ	34	AZ-BCR34-EH	AZ-BCR34-EH: Arizona BCR 34 SE Region - 55-100% Grassland	GBBO	2,031	30	30	100%
AZ	34	AZ-BCR34-EL	AZ-BCR34-EL: Arizona BCR 34 SE Region - 9-25% Grassland	GBBO	11,259	10	10	100%
AZ	34	AZ-BCR34-EM	AZ-BCR34-EM: Arizona BCR 34 SE Region - 26-54% Grassland	GBBO	13,426	10	10	100%
AZ	34	AZ-BCR34-SH	AZ-BCR34-SH: Arizona BCR 34 Other - 55-100% Grassland	GBBO	868	10	10	100%
AZ	34	AZ-BCR34-SL	AZ-BCR34-SL: Arizona BCR 34 Other - 9-25% Grassland	GBBO	8,269	5	5	100%
AZ	34	AZ-BCR34-SM	AZ-BCR34-SM: Arizona BCR 34 Other - 26-54% Grassland	GBBO	3,628	5	5	100%
CA	15	CA-BCR15-HT	CA-BCR15-HT: Humboldt-Toiyabe National Forest	GBBO	1,635	2	2	100%
CA	9	CA-BCR9-CC	CA-BCR9-CC: Bureau of Land Management - Carson City District	GBBO	118	3	3	100%
CA	9	CA-BCR9-CD	CA-BCR9-CD: Bureau of Land Management - California Desert District	GBBO	1,039	3	3	100%
CA	9	CA-BCR9-CN	CA-BCR9-CN: Bureau of Land Management - Central California District	GBBO	2,668	4	3	75%
CA	9	CA-BCR9-HT	CA-BCR9-HT: Humboldt-Toiyabe National Forest	GBBO	1,174	2	2	100%
CA	9	CA-BCR9-NC	CA-BCR9-NC: Bureau of Land Management - Northern California District	GBBO	5,468	4	4	100%
CO	10	CO-BCR10-AO	CO-BCR10-AO: All Other Lands	BCR	5,060	5	5	100%
CO	10	CO-BCR10-BL	CO-BCR10-BL: Bureau of Land Management	BCR	4,288	8	8	100%
CO	16	CO-BCR16-AO	CO-BCR16-AO: All Other Lands	BCR	51,214	18	18	100%
CO	16	CO-BCR16-BL	CO-BCR16-BL: Bureau of Land Management	BCR	27,825	24	24	100%
CO	16	CO-BCR16-GM	CO-BCR16-GM: Grand Mesa; Uncompahgre and Gunnison National Forests	BCR	13,630	6	6	100%
CO	16	CO-BCR16-MA	CO-BCR16-MA: Manti-La Sal National Forest	BCR	131	2	2	100%
CO	16	CO-BCR16-NC	CO-BCR16-NC: National Park Service - Northern Colorado Plateau Network	BCR	807	2	2	100%
CO	16	CO-BCR16-PC	CO-BCR16-PC: Pike and San Isabel National Forests Control	BCR	1,300	3	3	100%
CO	16	CO-BCR16-PO	CO-BCR16-PO: Pike and San Isabel National Forests All Other	BCR	9,650	4	4	100%
CO	16	CO-BCR16-RA	CO-BCR16-RA: Rio Grande National Forest - High Elevation	BCR	866	4	3	75%
CO	16	CO-BCR16-RC	CO-BCR16-RC: Arapaho and Roosevelt National Forests Control	BCR	780	3	3	100%
CO	16	CO-BCR16-RM	CO-BCR16-RM: National Park Service - Rocky Mountain Network	BCR	1,644	2	2	100%
CO	16	CO-BCR16-RO	CO-BCR16-RO: Routt National Forest	BCR	5,734	6	6	100%
CO	16	CO-BCR16-RP	CO-BCR16-RP: Rio Grande National Forest - Middle Elevation	BCR	5,410	3	3	100%
CO	16	CO-BCR16-RS	CO-BCR16-RS: Rio Grande National Forest - Low Elevation	BCR	1,896	3	3	100%

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State	BCR	Stratum	Stratum Description	Collected By	Area (km ²)	Planned	Completed	Percent Completed
CO	16	CO-BCR16-SA	CO-BCR16-SA: San Juan National Forest	BCR	8,794	6	6	100%
CO	16	CO-BCR16-SC	CO-BCR16-SC: National Park Service - Southern Colorado Plateau Network	BCR	214	2	2	100%
CO	16	CO-BCR16-VO	CO-BCR16-VO: Arapaho and Roosevelt National Forests All Other	BCR	6,152	4	4	100%
CO	16	CO-BCR16-WA	CO-BCR16-WA: White River National Forest - High Elevation	BCR	2,138	4	4	100%
CO	16	CO-BCR16-WF	CO-BCR16-WF: USFS - Williams Fork Management Unit	BCR	551	3	3	100%
CO	16	CO-BCR16-WP	CO-BCR16-WP: White River National Forest - Middle Elevation	BCR	5,443	3	3	100%
CO	16	CO-BCR16-WS	CO-BCR16-WS: White River National Forest - Low Elevation	BCR	2,786	3	3	100%
CO	18	CO-BCR18-AR	CO-BCR18-AR: Arkansas River and Tributaries	BCR	1,127	6	6	100%
CO	18	CO-BCR18-CO	CO-BCR18-CO: Comanche National Grassland	BCR	4,836	5	5	100%
CO	18	CO-BCR18-DO	CO-BCR18-DO: Department of Defense	BCR	1,647	2	2	100%
CO	18	CO-BCR18-IA	CO-BCR18-IA: Area between I-70 and the Arkansas River	BCR	34,755	10	10	100%
CO	18	CO-BCR18-NP	CO-BCR18-NP: Area North of the Platte River	BCR	11,457	7	7	100%
CO	18	CO-BCR18-PC	CO-BCR18-PC: Pawnee National Grassland - Private Lands	BCR	2,458	2	2	100%
CO	18	CO-BCR18-PG	CO-BCR18-PG: Pawnee National Grassland - Public Lands	BCR	810	4	4	100%
CO	18	CO-BCR18-PI	CO-BCR18-PI: Area between the Platte River and I-70	BCR	30,365	10	10	100%
CO	18	CO-BCR18-PT	CO-BCR18-PT: Platte River and Tributaries	BCR	970	6	6	100%
CO	18	CO-BCR18-SA	CO-BCR18-SA: Area South of the Arkansas River	BCR	24,985	10	9	90%
ID	10	ID-BCR10-BI	ID-BCR10-BI: Bitterroot National Forest	IBO	1,916	2	2	100%
ID	10	ID-BCR10-BO	ID-BCR10-BO: Boise National Forest	IBO	8,778	8	8	100%
ID	10	ID-BCR10-CA	ID-BCR10-CA: Bureau of Land Management - Coeur d'Alene Field Office	IBO	287	7	7	100%
ID	10	ID-BCR10-CH	ID-BCR10-CH: Bureau of Land Management - Challis Field Office	IBO	1,350	5	5	100%
ID	10	ID-BCR10-CL	ID-BCR10-CL: Clearwater National Forest - Roaded/Managed	IBO	1,946	7	7	100%
ID	10	ID-BCR10-CO	ID-BCR10-CO: Bureau of Land Management - Cottonwood Field Office	IBO	222	3	3	100%
ID	10	ID-BCR10-CR	ID-BCR10-CR: Clearwater National Forest - Roadless/Wilderness	IBO	5,036	2	2	100%
ID	10	ID-BCR10-CT	ID-BCR10-CT: Caribou-Targhee National Forest	BCR	7,752	3	3	100%
ID	10	ID-BCR10-FR	ID-BCR10-FR: Bureau of Land Management - Four Rivers Field Office	IBO	1,269	5	5	100%
ID	10	ID-BCR10-IP	ID-BCR10-IP: Idaho Panhandle National Forest - Roaded/Managed	IBO	8,660	24	24	100%
ID	10	ID-BCR10-IR	ID-BCR10-IR: Idaho Panhandle National Forest - Roadless/Wilderness	IBO	3,155	7	7	100%
ID	10	ID-BCR10-KO	ID-BCR10-KO: Kootenai National Forest	IBO	169	2	2	100%
ID	10	ID-BCR10-NP	ID-BCR10-NP: Nez Perce National Forest - Roaded/Managed	IBO	2,864	7	7	100%
ID	10	ID-BCR10-NR	ID-BCR10-NR: Nez Perce National Forest - Roadless/Wilderness	IBO	6,370	2	2	100%

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State	BCR	Stratum	Stratum Description	Collected By	Area (km ²)	Planned	Completed	Percent Completed
ID	10	ID-BCR10-PA	ID-BCR10-PA: Payette National Forest	IBO	9,857	10	10	100%
ID	10	ID-BCR10-PO	ID-BCR10-PO: Bureau of Land Management - Pocatello Field Office	IBO	227	2	2	100%
ID	10	ID-BCR10-SA	ID-BCR10-SA: Salmon-Challis National Forest	IBO	13,563	8	8	100%
ID	10	ID-BCR10-SH	ID-BCR10-SH: Bureau of Land Management - Shoshone Field Office	IBO	507	3	3	100%
ID	10	ID-BCR10-SM	ID-BCR10-SM: Bureau of Land Management - Salmon Field Office	IBO	637	4	4	100%
ID	10	ID-BCR10-SW	ID-BCR10-SW: Sawtooth National Forest	IBO	6,302	5	5	100%
ID	10	ID-BCR10-US	ID-BCR10-US: Bureau of Land Management - Upper Snake Field Office	IBO	652	4	4	100%
ID	16	ID-BCR16-CT	ID-BCR16-CT: Caribou-Targhee National Forest	BCR	909	2	2	100%
ID	16	ID-BCR16-PO	ID-BCR16-PO: Bureau of Land Management - Pocatello Field Office	IBO	10	2	2	100%
ID	9	ID-BCR9-BO	ID-BCR9-BO: Boise National Forest	IBO	1,710	2	2	100%
ID	9	ID-BCR9-BR	ID-BCR9-BR: Bureau of Land Management - Bruneau Field Office	IBO	5,953	10	10	100%
ID	9	ID-BCR9-BU	ID-BCR9-BU: Bureau of Land Management - Burley Field Office	IBO	3,334	10	10	100%
ID	9	ID-BCR9-CH	ID-BCR9-CH: Bureau of Land Management - Challis Field Office	IBO	1,862	7	7	100%
ID	9	ID-BCR9-CO	ID-BCR9-CO: Bureau of Land Management - Cottonwood Field Office	IBO	138	3	3	100%
ID	9	ID-BCR9-CT	ID-BCR9-CT: Caribou-Targhee National Forest	BCR	1,940	2	2	100%
ID	9	ID-BCR9-CU	ID-BCR9-CU: Curlew National Grassland	BCR	300	5	5	100%
ID	9	ID-BCR9-FO	ID-BCR9-FO: Bureau of Land Management - Four Rivers Field Office	IBO	1,720	5	5	100%
ID	9	ID-BCR9-JA	ID-BCR9-JA: Bureau of Land Management - Jarbidge Field Office	IBO	5,386	10	10	100%
ID	9	ID-BCR9-MN	ID-BCR9-MN: Morley Nelson Birds of Prey National Conservation Area	IBO	1,904	8	8	100%
ID	9	ID-BCR9-OW	ID-BCR9-OW: Bureau of Land Management - Owyhee Field Office	IBO	5,066	10	10	100%
ID	9	ID-BCR9-PO	ID-BCR9-PO: Bureau of Land Management - Pocatello Field Office	IBO	1,723	6	6	100%
ID	9	ID-BCR9-SA	ID-BCR9-SA: Salmon-Challis National Forest	IBO	3,857	2	2	100%
ID	9	ID-BCR9-SH	ID-BCR9-SH: Bureau of Land Management - Shoshone Field Office	IBO	5,288	9	9	100%
ID	9	ID-BCR9-SM	ID-BCR9-SM: Bureau of Land Management - Salmon Field Office	IBO	1,340	8	8	100%
ID	9	ID-BCR9-SW	ID-BCR9-SW: Sawtooth National Forest	IBO	2,175	3	3	100%
ID	9	ID-BCR9-US	ID-BCR9-US: Bureau of Land Management - Upper Snake Field Office	IBO	6,473	9	9	100%
KS	18	KS-BCR18-AO	KS-BCR18-AO: All Other Lands	BCR	34,794	11	11	100%
KS	18	KS-BCR18-CM	KS-BCR18-CM: Cimarron National Grassland	BCR	430	3	3	100%
KS	18	KS-BCR18-PL	KS-BCR18-PL: Playas	BCR	370	11	11	100%
KS	18	KS-BCR18-RV	KS-BCR18-RV: Rivers	BCR	1,409	11	11	100%
KS	19	KS-BCR19-AO	KS-BCR19-AO: All Other Lands	BCR	98,649	11	11	100%

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KS	19	KS-BCR19-PL	KS-BCR19-PL: Playas	BCR	176	11	11	100%
KS	19	KS-BCR19-RV	KS-BCR19-RV: Rivers	BCR	10,523	11	11	100%
NE/SD	11	MR-NGPIM-FM	MR-NGPIM-FM: Missouri National Recreational River - 59 Mile District	BCR	243	4	4	100%
NE/SD	11	MR-NGPIM-TM	MR-NGPIM-TM: Missouri National Recreational River - 39 Mile District	BCR	248	4	4	100%
MT	10	MT-BCR10-BE	MT-BCR10-BE: Beaverhead-Deerlodge National Forest - Roaded/Managed	IBO	7,697	8	8	100%
MT	10	MT-BCR10-BI	MT-BCR10-BI: Bitterroot National Forest - Roaded/Managed	IBO	2,324	6	6	100%
MT	10	MT-BCR10-BM	MT-BCR10-BM: Bureau of Land Management - Missoula/Butte	IBO	1,356	3	3	100%
MT	10	MT-BCR10-BR	MT-BCR10-BR: Beaverhead-Deerlodge National Forest - Roadless/Wilderness	IBO	8,236	2	2	100%
MT	10	MT-BCR10-BS	MT-BCR10-BS: Bureau of Land Management - southwestern Montana	IBO	3,447	3	3	100%
MT	10	MT-BCR10-BW	MT-BCR10-BW: Bitterroot National Forest - Roadless/Wilderness	IBO	2,763	2	2	100%
MT	10	MT-BCR10-CR	MT-BCR10-CR: Custer National Forest - Roadless/Wilderness	IBO	1,783	2	2	100%
MT	10	MT-BCR10-CU	MT-BCR10-CU: Custer National Forest - Roaded/Managed	IBO	779	2	2	100%
MT	10	MT-BCR10-FL	MT-BCR10-FL: Flathead National Forest - Roaded/Managed	IBO	4,945	8	8	100%
MT	10	MT-BCR10-FR	MT-BCR10-FR: Flathead National Forest - Roadless/Wilderness	IBO	6,410	2	2	100%
MT	10	MT-BCR10-GA	MT-BCR10-GA: Gallatin National Forest - Roaded/Managed	IBO	3,479	7	7	100%
MT	10	MT-BCR10-GR	MT-BCR10-GR: Gallatin National Forest - Roadless/Wilderness	IBO	5,787	2	2	100%
MT	10	MT-BCR10-HE	MT-BCR10-HE: Helena National Forest - Roaded/Managed	IBO	3,024	7	7	100%
MT	10	MT-BCR10-HR	MT-BCR10-HR: Helena National Forest - Roadless/Wilderness	IBO	2,248	2	2	100%
MT	10	MT-BCR10-KO	MT-BCR10-KO: Kootenai National Forest - Roaded/Managed	IBO	7,239	24	24	100%
MT	10	MT-BCR10-KR	MT-BCR10-KR: Kootenai National Forest - Roadless/Wilderness	IBO	1,887	7	7	100%
MT	10	MT-BCR10-LC	MT-BCR10-LC: Lewis and Clark National Forest - Roaded/Managed	IBO	2,778	6	6	100%
MT	10	MT-BCR10-LO	MT-BCR10-LO: Lolo National Forest - Roaded/Managed	IBO	7,742	8	8	100%
MT	10	MT-BCR10-LR	MT-BCR10-LR: Lewis and Clark National Forest - Roadless/Wilderness	IBO	5,007	2	2	100%
MT	10	MT-BCR10-LW	MT-BCR10-LW: Lolo National Forest - Roadless/Wilderness	IBO	3,859	2	2	100%
MT	10	MT-BCR10-ON	MT-BCR10-ON: All Other Lands	IBO	75,417	4	4	100%
MT	11	MT-BCR11-AO	MT-BCR11-AO: All Other Lands	IBO	62,631	5	5	100%
MT	11	MT-BCR11-BN	MT-BCR11-BN: Bureau of Land Management - North Valley	IBO	1,588	10	10	100%
MT	11	MT-BCR11-BO	MT-BCR11-BO: Bureau of Land Management - Other	IBO	6,826	10	10	100%
MT	11	MT-BCR11-FT	Mt-BCR11-FT: USFWS and Tribal Lands in BCR11	IBO	12,370	3	2	67%
MT	17	MT-BCR17-AO	MT-BCR17-AO: All Other Lands	IBO	102,779	7	7	100%
MT	17	MT-BCR17-BL	MT-BCR17-BL: Bureau of Land Management	IBO	25,013	10	10	100%

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MT	17	MT-BCR17-CU	MT-BCR17-CU: Custer National Forest	IBO	2,649	3	3	100%
MT	17	MT-BCR17-LC	MT-BCR17-LC: Lewis and Clark National Forest	IBO	867	2	2	100%
MT	17	MT-BCR17-RF	MT-BCR17-RF: USFWS and River Lands in BCR17	IBO	8,610	3	3	100%
ND	17	ND-BCR17-BM	ND-BCR17-BM: Bureau of Land Management	BCR	165	7	7	100%
ND	17	ND-BCR17-KR	ND-BCR17-KR: Knife River Indian Villages National Historic Site	BCR	5	5	5	100%
ND	17	ND-BCR17-MG	ND-BCR17-MG: Little Missouri National Grassland	BCR	4,133	3	3	100%
ND	17	ND-BCR17-ON	ND-BCR17-ON: All Other Lands	BCR	45,456	5	5	100%
ND	17	ND-BCR17-RG	ND-BCR17-RG: Cedar River National Grassland	BCR	20	3	3	100%
ND	17	ND-BCR17-TI	ND-BCR17-TI: Tribal Lands	BCR	4,780	4	3	75%
ND	17	ND-BCR17-TN	ND-BCR17-TN: Theodore Roosevelt National Park - North Unit	BCR	100	4	4	100%
ND	17	ND-BCR17-TS	ND-BCR17-TS: Theodore Roosevelt National Park - South Unit	BCR	193	4	3	75%
NE	17	NE-BCR17-LG	NE-BCR17-LG: Oglala National Grassland	BCR	350	3	1	33%
NE	17	NE-BCR17-ON	NE-BCR17-ON: All Other Lands	BCR	4,553	2	2	100%
NE	18	NE-BCR18-AF	NE-BCR18-AF: Agate Fossil Beds National Monument	BCR	12	7	7	100%
NE	18	NE-BCR18-AO	NE-BCR18-AO: All Other Lands	BCR	28,452	5	5	100%
NE	18	NE-BCR18-GG	NE-BCR18-GG: Oglala National Grassland	BCR	31	3	3	100%
NE	18	NE-BCR18-PR	NE-BCR18-PR: Pineridge Biologically Unique Landscape	BCR	1,885	2	2	100%
NE	18	NE-BCR18-RD	NE-BCR18-RD: Nebraska National Forest - Pine Ridge	BCR	200	3	1	33%
NE	18	NE-BCR18-SA	NE-BCR18-SA: Sandsage Prairie Biologically Unique Landscape	BCR	2,894	2	2	100%
NE	18	NE-BCR18-SB	NE-BCR18-SB: Scotts Bluff National Monument	BCR	13	5	5	100%
NE	18	NE-BCR18-WH	NE-BCR18-WH: Wildcat Hills Biologically Unique Landscape	BCR	1,665	2	2	100%
NE	19	NE-BCR19-BE	NE-BCR19-BE: Nebraska National Forest - Bessey District	BCR	361	3	4	133%
NE	19	NE-BCR19-SG	NE-BCR19-SG: Samuel R. McKelvie National Forest	BCR	468	3	3	100%
NE	17	NE-NGPIM-NI	NE-NGPIM-NI: Niobrara National Scenic River	BCR	64	8	8	100%
NM	18	NM-BCR18-AO	NM-BCR18-AO: All Other Lands	BCR	65,011	6	6	100%
NM	18	NM-BCR18-KW	NM-BCR18-KW: Kiowa National Grassland	BCR	553	2	2	100%
NM	18	NM-BCR18-PL	NM-BCR18-PL: Playas	BCR	244	3	3	100%
NM	18	NM-BCR18-RV	NM-BCR18-RV: Rivers	BCR	2,206	3	3	100%
NV	15	NV-BCR15-HT	NV-BCR15-HT: Humboldt-Toiyabe National Forest	GBBO	616	2	2	100%
NV	33	NV-BCR33-HT	NV-BCR33-HT: Humboldt-Toiyabe National Forest	GBBO	1,313	2	2	100%
NV	9	NV-BCR9-BM	NV-BCR9-BM: Bureau of Land Management - Battle Mountain District	GBBO	35,811	15	14	93%

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State	BCR	Stratum	Stratum Description	Collected By	Area (km ²)	Planned	Completed	Percent Completed
NV	9	NV-BCR9-CC	NV-BCR9-CC: Bureau of Land Management - Carson City District	GBBO	19,269	8	8	100%
NV	9	NV-BCR9-EK	NV-BCR9-EK: Bureau of Land Management - Elko, Twin Falls, and Boise Districts	GBBO	30,072	14	13	93%
NV	9	NV-BCR9-EY	NV-BCR9-EY: Bureau of Land Management - Ely District	GBBO	45,375	15	14	93%
NV	9	NV-BCR9-HT	NV-BCR9-HT: Humboldt-Toiyabe National Forest	GBBO	22,324	7	7	100%
NV	9	NV-BCR9-NC	NV-BCR9-NC: Bureau of Land Management - Northern California District	GBBO	5,566	4	4	100%
NV	9	NV-BCR9-SN	NV-BCR9-SN: Bureau of Land Management - Southern Nevada District	GBBO	659	3	3	100%
NV	9	NV-BCR9-WI	NV-BCR9-WI: Bureau of Land Management - Winnemucca District	GBBO	33,881	15	13	87%
OK	18	OK-BCR18-AO	OK-BCR18-AO: All Other Lands	BCR	10,556	3	3	100%
OK	18	OK-BCR18-PL	OK-BCR18-PL: Playas	BCR	105	2	2	100%
OK	18	OK-BCR18-RB	OK-BCR18-RB: Rita Blanca National Grassland	BCR	57	2	2	100%
OK	18	OK-BCR18-RV	OK-BCR18-RV: Rivers	BCR	533	3	3	100%
OK	19	OK-BCR19-AO	OK-BCR19-AO: All Other Lands	BCR	68,616	3	3	100%
OK	19	OK-BCR19-PL	OK-BCR19-PL: Playas	BCR	14	3	3	100%
OK	19	OK-BCR19-RV	OK-BCR19-RV: Rivers	BCR	6,531	3	3	100%
OR	9	OR-BCR9-BU	OR-BCR9-BU: Bureau of Land Management - Burns District	KBO	12,137	8	8	100%
OR	9	OR-BCR9-LA	OR-BCR9-LA: Bureau of Land Management - Lakeview and Medford Districts	KBO	13,783	8	8	100%
OR	9	OR-BCR9-PR	OR-BCR9-PR: Bureau of Land Management - Prineville District	KBO	3,617	8	8	100%
OR	9	OR-BCR9-VA	OR-BCR9-VA: Bureau of Land Management - Vale District	KBO	18,002	8	8	100%
SD	17	SD-BCR17-BF	SD-BCR17-BF: Black Hills National Forest - All other Watersheds	BCR	5,009	7	7	100%
SD	17	SD-BCR17-BM	SD-BCR17-BM: Bureau of Land Management	BCR	831	7	7	100%
SD	17	SD-BCR17-BN	SD-BCR17-BN: Badlands National Park - North Unit	BCR	399	8	7	88%
SD	17	SD-BCR17-GG	SD-BCR17-GG: Buffalo Gap National Grassland	BCR	2,346	4	4	100%
SD	17	SD-BCR17-HU	SD-BCR17-HU: Black Hills National Forest - Hydrologic Code 7 Watersheds	BCR	376	4	4	100%
SD	17	SD-BCR17-JC	SD-BCR17-JC: Jewel Cave National Monument	BCR	5	4	4	100%
SD	17	SD-BCR17-MR	SD-BCR17-MR: Mount Rushmore National Monument	BCR	6	6	6	100%
SD	17	SD-BCR17-ON	SD-BCR17-ON: All Other Lands	BCR	64,642	5	5	100%
SD	17	SD-BCR17-PG	SD-BCR17-PG: Fort Pierre National Grassland	BCR	482	3	3	100%
SD	17	SD-BCR17-RG	SD-BCR17-RG: Grand River National Grassland	BCR	613	3	3	100%
SD	17	SD-BCR17-TR	SD-BCR17-TR: Tribal Lands in SD BCR17	BCR	28,128	4	4	100%
SD	17	SD-BCR17-UF	SD-BCR17-UF: Custer National Forest	BCR	326	2	2	100%
SD	17	SD-BCR17-WC	SD-BCR17-WC: Wind Cave National Park	BCR	136	8	6	75%

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State	BCR	Stratum	Stratum Description	Collected By	Area (km ²)	Planned	Completed	Percent Completed
SD	18	SD-BCR18-AO	SD-BCR18-AO: All Other Lands	BCR	2,415	2	2	100%
TX	18	TX-BCR18-AO	TX-BCR18-AO: All Other Lands	BCR	98,186	8	8	100%
TX	18	TX-BCR18-PL	TX-BCR18-PL: Playas	BCR	4,507	6	6	100%
TX	18	TX-BCR18-RB	TX-BCR18-RB: Rita Blanca National Grassland	BCR	305	2	2	100%
TX	18	TX-BCR18-RV	TX-BCR18-RV: Rivers	BCR	1,200	6	6	100%
TX	19	TX-BCR19-AO	TX-BCR19-AO: All Other Lands	BCR	84,131	6	6	100%
TX	19	TX-BCR19-PL	TX-BCR19-PL: Playas	BCR	327	6	6	100%
TX	19	TX-BCR19-RV	TX-BCR19-RV: Rivers	BCR	4,787	6	6	100%
UT	10	UT-BCR10-AO	UT-BCR10-AO: All Other Lands	UDWR	1,968	14	14	100%
UT	10	UT-BCR10-AS	UT-BCR10-AS: Ashley National Forest	BCR	96	3	3	100%
UT	10	UT-BCR10-SL	UT-BCR10-SL: Bureau of Land Management - Salt Lake Field Office	BCR	642	3	3	100%
UT	10	UT-BCR10-VE	UT-BCR10-VE: Bureau of Land Management - Vernal Field Office	BCR	268	3	3	100%
UT	10	UT-BCR10-WA	UT-BCR10-WA: Uinta-Wasatch-Cache National Forest	BCR	49	3	3	100%
UT	16	UT-BCR16-AH	UT-BCR16-AH: Ashley National Forest	BCR	5,166	5	5	100%
UT	16	UT-BCR16-AO	UT-BCR16-AO: All Other Lands	UDWR	48,838	44	44	100%
UT	16	UT-BCR16-CC	UT-BCR16-CC: Bureau of Land Management - Cedar City Field Office	IBO	450	3	3	100%
UT	16	UT-BCR16-DI	UT-BCR16-DI: Dixie National Forest	IBO	5,934	8	8	100%
UT	16	UT-BCR16-FI	UT-BCR16-FI: Bureau of Land Management - Fillmore Field Office	BCR	40	2	2	100%
UT	16	UT-BCR16-FL	UT-BCR16-FL: Fishlake National Forest	IBO	6,670	8	8	100%
UT	16	UT-BCR16-GS	UT-BCR16-GS: Bureau of Land Management - Grand Staircase-Escalante National Monument	IBO	7,564	7	7	100%
UT	16	UT-BCR16-KA	UT-BCR16-KA: Bureau of Land Management - Kanab Field Office	IBO	2,267	5	5	100%
UT	16	UT-BCR16-MA	UT-BCR16-MA: Manti-La Sal National Forest	IBO	5,280	8	8	100%
UT	16	UT-BCR16-MN	UT-BCR16-MN: Bureau of Land Management - Monticello Field Office	IBO	7,321	7	7	100%
UT	16	UT-BCR16-MO	UT-BCR16-MO: Bureau of Land Management - Moab Field Office	BCR	7,725	7	7	100%
UT	16	UT-BCR16-PR	UT-BCR16-PR: Bureau of Land Management - Price Field Office	IBO	10,216	8	8	100%
UT	16	UT-BCR16-RI	UT-BCR16-RI: Bureau of Land Management - Richfield Field Office	IBO	8,068	8	8	100%
UT	16	UT-BCR16-SA	UT-BCR16-SA: Manti-La Sal National Forest - Sanpitch	IBO	307	2	2	100%
UT	16	UT-BCR16-SG	UT-BCR16-SG: Bureau of Land Management - Saint George Field Office	IBO	1,904	4	4	100%
UT	16	UT-BCR16-SL	UT-BCR16-SL: Bureau of Land Management - Salt Lake Field Office	BCR	87	2	2	100%
UT	16	UT-BCR16-VE	UT-BCR16-VE: Bureau of Land Management - Vernal Field Office	BCR	6,704	6	6	100%
UT	16	UT-BCR16-WA	UT-BCR16-WA: Uinta-Wasatch-Cache National Forest	BCR	9,913	3	3	100%

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State	BCR	Stratum	Stratum Description	Collected By	Area (km ²)	Planned	Completed	Percent Completed
UT	33	UT-BCR33-AO	UT-BCR33-AO: All Other Lands	UDWR	65	15	15	100%
UT	33	UT-BCR33-SG	UT-BCR33-SG: Bureau of Land Management - Saint George Field Office	IBO	388	3	3	100%
UT	9	UT-BCR9-AO	UT-BCR9-AO: All Other Lands	UDWR	34,636	41	41	100%
UT	9	UT-BCR9-AP	UT-BCR9-AP: Department of Defense - APG Impact Area	DOD	70	6	6	100%
UT	9	UT-BCR9-CC	UT-BCR9-CC: Bureau of Land Management - Cedar City Field Office	IBO	8,046	6	6	100%
UT	9	UT-BCR9-CT	UT-BCR9-CT: Caribou-Targhee National Forest	BCR	54	2	2	100%
UT	9	UT-BCR9-DD	UT-BCR9-DD: Department of Defense - Other Lands	DOD	1,986	9	9	100%
UT	9	UT-BCR9-DI	UT-BCR9-DI: Dixie National Forest	IBO	1,008	2	2	100%
UT	9	UT-BCR9-FI	UT-BCR9-FI: Bureau of Land Management - Fillmore Field Office	BCR	18,326	12	12	100%
UT	9	UT-BCR9-FL	UT-BCR9-FL: Fishlake National Forest	IBO	590	2	2	100%
UT	9	UT-BCR9-MU	UT-BCR9-MU: Department of Defense - Mudflats	BCR	1,162	3	3	100%
UT	9	UT-BCR9-RI	UT-BCR9-RI: Bureau of Land Management - Richfield Field Office	IBO	617	2	2	100%
UT	9	UT-BCR9-SG	UT-BCR9-SG: Bureau of Land Management - Saint George Field Office	IBO	232	2	2	100%
UT	9	UT-BCR9-SL	UT-BCR9-SL: Bureau of Land Management - Salt Lake Field Office	BCR	12,340	10	10	100%
UT	9	UT-BCR9-SW	UT-BCR9-SW: Sawtooth National Forest	IBO	364	2	2	100%
UT	9	UT-BCR9-TS	UT-BCR9-TS: Department of Defense - Target S Impact Area	DOD	128	6	6	100%
UT	9	UT-BCR9-UR	UT-BCR9-UR: Department of Defense - UTG Impact Area	DOD	126	6	6	100%
UT	9	UT-BCR9-UT	UT-BCR9-UT: Department of Defense - UTTR Impact Areas	DOD	522	3	3	100%
UT	9	UT-BCR9-WA	UT-BCR9-WA: Uinta-Wasatch-Cache National Forest	BCR	1,648	3	3	100%
WY	10	WY-BCR10-AO	WY-BCR10-AO: All Other Lands	BCR	52,161	15	15	100%
WY	10	WY-BCR10-AS	WY-BCR10-AS: Ashley National Forest	BCR	540	2	2	100%
WY	10	WY-BCR10-BE	WY-BCR10-BE: Bridger-Teton National Forest - Roaded/Managed	BCR	3,034	8	8	100%
WY	10	WY-BCR10-BH	WY-BCR10-BH: Bighorn Canyon National Recreation Area	BCR	57	2	2	100%
WY	10	WY-BCR10-BI	WY-BCR10-BI: Bighorn National Forest	WYNDD	4,712	10	10	100%
WY	10	WY-BCR10-BR	WY-BCR10-BR: Bridger-Teton National Forest - Roadless/Wilderness	BCR	11,364	2	2	100%
WY	10	WY-BCR10-BU	WY-BCR10-BU: Bureau of Land Management - Buffalo Field Office	BCR	547	2	2	100%
WY	10	WY-BCR10-CA	WY-BCR10-CA: Bureau of Land Management - Casper Field Office	BCR	2,509	2	2	100%
WY	10	WY-BCR10-CO	WY-BCR10-CO: Bureau of Land Management - Cody Field Office	BCR	4,704	2	2	100%
WY	10	WY-BCR10-CT	WY-BCR10-CT: Caribou-Targhee National Forest	BCR	1,397	2	2	100%
WY	10	WY-BCR10-GR	WY-BCR10-GR: Grand Teton National Park	BCR	856	2	2	100%
WY	10	WY-BCR10-KE	WY-BCR10-KE: Bureau of Land Management - Kemmerer Field Office	BCR	5,733	2	2	100%

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State	BCR	Stratum	Stratum Description	Collected By	Area (km ²)	Planned	Completed	Percent Completed
WY	10	WY-BCR10-LA	WY-BCR10-LA: Bureau of Land Management - Lander Field Office	BCR	9,829	6	6	100%
WY	10	WY-BCR10-MB	WY-BCR10-MB: Medicine Bow National Forest	WYNDD	773	4	4	100%
WY	10	WY-BCR10-PI	WY-BCR10-PI: Bureau of Land Management - Pinedale Field Office	BCR	3,687	8	8	100%
WY	10	WY-BCR10-RA	WY-BCR10-RA: Bureau of Land Management - Rawlins Field Office	BCR	13,954	8	8	100%
WY	10	WY-BCR10-RO	WY-BCR10-RO: Bureau of Land Management - Rock Springs Field Office	BCR	15,152	8	8	100%
WY	10	WY-BCR10-SE	WY-BCR10-SE: Shoshone National Forest - Roaded/Managed	BCR	2,101	3	3	100%
WY	10	WY-BCR10-SR	WY-BCR10-SR: Shoshone National Forest - Roadless/Wilderness	BCR	8,311	5	5	100%
WY	10	WY-BCR10-WA	WY-BCR10-WA: Wasatch National Forest	BCR	33	3	3	100%
WY	10	WY-BCR10-WO	WY-BCR10-WO: Bureau of Land Management - Worland Field Office	BCR	8,467	6	6	100%
WY	10	WY-BCR10-WR	WY-BCR10-WR: Wind River Reservation	BCR	7,819	4	4	100%
WY	10	WY-BCR10-YE	WY-BCR10-YE: Yellowstone National Park	BCR	7,592	4	4	100%
WY	16	WY-BCR16-AO	WY-BCR16-AO: All Other Lands	BCR	5,438	5	4	80%
WY	16	WY-BCR16-BL	WY-BCR16-BL: Bureau of Land Management	BCR	647	2	2	100%
WY	16	WY-BCR16-MB	WY-BCR16-MB: Medicine Bow National Forest	WYNDD	5,329	15	15	100%
WY	16	WY-BCR16-WA	WY-BCR16-WA: Wasatch National Forest	BCR	180	3	3	100%
WY	17	WY-BCR17-AO	WY-BCR17-AO: All Other Lands	BCR	52,186	12	12	100%
WY	17	WY-BCR17-BH	WY-BCR17-BH: Black Hills National Forest	BCR	1,085	4	4	100%
WY	17	WY-BCR17-BU	WY-BCR17-BU: Bureau of Land Management - Buffalo Field Office	BCR	2,653	2	2	100%
WY	17	WY-BCR17-CA	WY-BCR17-CA: Bureau of Land Management - Casper Field Office	BCR	2,695	2	2	100%
WY	17	WY-BCR17-NE	WY-BCR17-NE: Bureau of Land Management - Newcastle Field Office	BCR	1,025	2	2	100%
WY	17	WY-BCR17-TB	WY-BCR17-TB: Thunder Basin National Grassland	WYNDD	4,520	11	11	100%
WY	18	WY-BCR18-AO	WY-BCR18-AO: All Other Lands	BCR	12,064	12	12	100%
WY	18	WY-BCR18-BL	WY-BCR18-BL: Bureau of Land Management	BCR	171	2	2	100%
WY	18	WY-BCR18-DO	WY-BCR18-DO: Department of Defense	BCR	23	2	2	100%
WY	9	WY-BCR9-WY	WY-BCR9-WY: Caribou-Targhee National Forest	BCR	119	2	2	100%

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Table 2. Reasons planned surveys were not completed, 2019

Stratum	# Not Completed	Reason
CA-BCR9-CN	1	Planning error
CO-BCR16-RA	1	High Snowpack and not enough time to complete a backup
CO-BCR18-SA	1	Unable to secure permission to survey on time
MT-BCR11-FT	1	wet impassable roads throughout the season
ND-BCR17-TI	1	Unable to secure permission to survey on time
ND-BCR17-TS	1	Inaccessible terrain - landslides in the park
NE-BCR17-LG	2	Miscommunication with technician
NE-BCR18-RD	2	Miscommunication with technician
NV-BCR9-BM	1	Problems accessing sites during first year of study
NV-BCR9-EK	1	Problems accessing sites during first year of study
NV-BCR9-EY	1	Planning error
NV-BCR9-WI	2	Problems accessing sites during first year of study
SD-BCR17-BN	1	Miscommunication with technician
SD-BCR17-WC	2	Miscommunication with technician
WY-BCR16-AO	1	Unable to secure permission to survey on time

IV. Land Ownership

A. US Forest Service

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1. Region 1

a) Region 1 National Forests

Within this sampling design each national forest in Region 1 was 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 USFS-Region 1 National Forests by compiling and jointly analyzing data from 29 strata in three states (Idaho, Montana and South Dakota).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 1,590 point counts within the 159 surveyed grid cells between June 1 and July 11. They detected 167 bird species, including seven priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 193 species that were detected in any year during which surveys were conducted, nine of which are priority species. The data yielded robust density estimates (CV < 50%) for 88 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout USFS-Region 1 National Forests for 200 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 134 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within USFS-Region 1 National Forests across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[USFS-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 because of field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit.

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Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 95 point counts within the ten surveyed grid cells between June 10 and July 3. They detected 60 bird species, including zero priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 113 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust density estimates (CV < 50%) for 37 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Ψ_i) throughout Beaverhead-Deerlodge National Forest for 109 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 42 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 because of 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.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 108 point counts within the ten surveyed grid cells between June 4 and July 9. They detected 71 bird species, including one priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 98 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust density estimates (CV < 50%) for 38 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Ψ_i) throughout Bitterroot National Forest for 112 species that were detected in any year during which surveys were conducted, one of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 53 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 because of 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 planned surveys (100%) in 2019. Technicians conducted 89 point counts within the nine surveyed grid cells between June 2 and June 28. They detected 66 bird species, including one priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 104 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust density estimates (CV < 50%) for 36 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Clearwater National Forest for 103 species that were detected in any year during which surveys were conducted, one of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 48 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 because of 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

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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 planned surveys (100%) in 2019. Technicians conducted 101 point counts within the nine surveyed grid cells between June 10 and July 8. They detected 85 bird species, including nine priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 143 species that were detected in any year during which surveys were conducted, 14 of which are priority species. The data yielded robust density estimates (CV < 50%) for 38 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Custer National Forest for 146 species that were detected in any year during which surveys were conducted, nine of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 62 of the species for which we estimated occupancies.

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. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 because of 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 planned surveys (100%) in 2019. Technicians conducted 97 point counts within the ten surveyed grid cells between June 3 and July 10. They detected 68 bird species, including two priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 109 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust density estimates (CV < 50%) for 32 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Flathead National Forest for 109 species that were detected in any year during which surveys were conducted, one of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 50 of the species for which we estimated occupancies.

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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. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 because of 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 planned surveys (100%) in 2019. Technicians conducted 74 point counts within the nine surveyed grid cells between June 24 and July 5. They detected 56 bird species, including zero priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 118 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust density estimates (CV < 50%) for 28 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Gallatin National Forest for 117 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 37 of the species for which we estimated occupancies.

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. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 because of field implementation cost considerations and the desire to focus monitoring on the more highly managed areas while maintaining inference to the entire management unit.

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Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 92 point counts within the nine surveyed grid cells between June 3 and July 8. They detected 69 bird species, including three priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 122 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust density estimates (CV < 50%) for 38 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Helena National Forest for 121 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 49 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 because of 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 planned surveys (100%) in 2019. Technicians conducted 311 point counts within the 31 surveyed grid cells between June 1 and July 8. They detected 96 bird species, including six priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 116 species that were detected in any year during which surveys were conducted, eight of which are priority species. The data yielded robust density estimates (CV < 50%) for 56 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Idaho Panhandle National Forest for 115 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 68 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of

interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 because of 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.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 339 point counts within the 33 surveyed grid cells between June 1 and July 11. They detected 105 bird species, including eight priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 121 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 57 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Kootenai National Forest for 130 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 64 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 because of 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.

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Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 96 point counts within the ten surveyed grid cells between June 17 and July 9. They detected 60 bird species, including one priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 119 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust density estimates (CV < 50%) for 31 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Lewis and Clark National Forest for 122 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 37 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 because of 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 planned surveys (100%) in 2019. Technicians conducted 87 point counts within the ten surveyed grid cells between June 1 and June 22. They detected 77 bird species, including one priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 127 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust density estimates (CV < 50%) for 44 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Lolo National Forest for 126 species that were detected in any year during which surveys were conducted, one of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 53 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view

occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 because of 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 planned surveys (100%) in 2019. Technicians conducted 101 point counts within the nine surveyed grid cells between June 16 and July 6. They detected 56 bird species, including two priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 109 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for 34 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Nez Perce National Forest for 108 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 43 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 North Dakota and South Dakota: 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 Grasslands administrative unit. We did not survey one national grassland within Region 1 – Sheyenne National Grassland. We have collected 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 & Hanni, 2013).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 118 point counts within the nine surveyed grid cells between May 30 and June 20. They detected 83 bird species, including six priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 121 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 24 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout USFS-Region 1 National Grasslands for 123 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 52 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within USFS-Region 1 National Grasslands across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[USFS-Region 1 National Grasslands Results](#)

(1) Little Missouri National Grassland

We obtained results for Little Missouri National Grassland by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 36 point counts within the three surveyed grid cells between June 10 and June 20. They detected 66 bird species, including four priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 90 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 22 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ND-BCR17-MG for 83 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 31 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ND-BCR17-MG across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[ND-BCR17-MG Results](#)

(2) Cedar River National Grassland

We obtained results for Cedar River National Grassland by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 38 point counts within the three surveyed grid cells between June 2 and June 13. They detected 37 bird species, including two priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 61 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust density estimates (CV < 50%) for nine of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ND-BCR17-RG for 62 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 25 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ND-BCR17-RG across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[ND-BCR17-RG Results](#)

(3) Grand River National Grassland

We obtained results for Grand River National Grassland by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 44 point counts within the three surveyed grid cells between May 30 and June 16. They detected 35 bird species, including four priority species ([Appendix H](#)).

Bird Conservancy estimated densities and population sizes for 66 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust density estimates (CV < 50%) for 11 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout SD-BCR17-RG for 61 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 19 of the species for which we estimated occupancies.

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To view a map of survey locations, density and occupancy results and species counts within SD-BCR17-RG across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[SD-BCR17-RG 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 114 of 116 planned surveys (98.3%) in 2019. Technicians conducted 1372 point counts within the 114 surveyed grid cells between May 26 and July 19. They detected 172 bird species, including 14 priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 207 species that were detected in any year during which surveys were conducted, 17 of which are priority species. The data yielded robust density estimates (CV < 50%) for 86 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout USFS-Region 2 National Forests for 213 species that were detected in any year during which surveys were conducted, 11 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 127 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within USFS-Region 2 National Forests across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[USFS-Region 2 National Forests Results](#)

(2) Arapaho and Roosevelt National Forests

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 88 point counts within the seven surveyed grid cells between June 16 and July 8. They detected 51 bird species, including six priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 115 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 26 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Arapaho and Roosevelt National Forests for 116 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 84 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 planned surveys (100%) in 2019. Technicians conducted 124 point counts within the ten surveyed grid cells between June 26 and July 8. They detected 61 bird species, including two priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 96 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust density estimates (CV < 50%) for 30 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR10-BI for 96 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 34 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR10-BI across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density,

or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR10-BI 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 planned surveys (100%) in 2019. Technicians conducted 172 point counts within the 15 surveyed grid cells between May 26 and July 16. They detected 89 bird species, including eight priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 137 species that were detected in any year during which surveys were conducted, ten of which are priority species. The data yielded robust density estimates (CV < 50%) for 44 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Black Hills National Forest for 135 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 55 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 planned surveys (100%) in 2019. Technicians conducted 75 point counts within the six surveyed grid cells between June 18 and July 10. They detected 58 bird species, including two priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 103 species that were detected in any year during which surveys were conducted, seven of which are priority

species. The data yielded robust density estimates (CV < 50%) for 34 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CO-BCR16-GM for 104 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 40 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CO-BCR16-GM across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[CO-BCR16-GM 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 all planned surveys (100%) in 2019. Technicians conducted 232 point counts within the 19 surveyed grid cells between June 11 and July 19. They detected 104 bird species, including six priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 132 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for 49 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Medicine Bow National Forest for 134 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 68 of the species for which we estimated occupancies.

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. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 eight of nine planned surveys (88.9%) in 2019. Technicians conducted 90 point counts within the eight surveyed grid cells between May 30 and June 22. They detected 77 bird species, including three priority species ([Appendix I](#))

Bird Conservancy estimated densities and population sizes for 120 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust density estimates (CV < 50%) for 31 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Nebraska National Forests for 114 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 53 of the species for which we estimated occupancies.

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. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[Nebraska National Forests 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.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 84 point counts within the seven surveyed grid cells between June 10 and July 9. They detected 60 bird species, including zero priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 128 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 30 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Pike and San Isabel National Forests for 127 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 44 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 re-stratification 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.

Field technicians completed nine of ten planned surveys (90%) in 2019. Technicians conducted 118 point counts within the nine surveyed grid cells between June 18 and July 15. They detected 69 bird species, including four priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 127 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for 41 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Rio Grande National Forest for 125 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 58 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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

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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 planned surveys (100%) in 2019. Technicians conducted 100 point counts within the nine surveyed grid cells between June 17 and July 9. They detected 67 bird species, including three priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 115 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust density estimates (CV < 50%) for 37 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Routt National Forest for 115 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 48 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 planned surveys (100%) in 2019. Technicians conducted 75 point counts within the six surveyed grid cells between June 17 and July 12. They detected 59 bird species, including three priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 120 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for 36 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CO-BCR16-SA for 119 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 39 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CO-BCR16-SA across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red

located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BCR16-SA 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 because of 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 planned surveys (100%) in 2019. Technicians conducted 109 point counts within the eight surveyed grid cells between June 20 and July 13. They detected 60 bird species, including three priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 138 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for 34 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Shoshone National Forest for 140 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 37 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 us to adjust sampling intensity to target Management Indicator Species on the Forest.

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Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 105 point counts within the ten surveyed grid cells between June 15 and July 15. They detected 64 bird species, including three priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 118 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust density estimates (CV < 50%) for 40 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout White River National Forest for 115 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 57 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 34 of 36 planned surveys (94.4%) in 2019. Technicians conducted 424 point counts within the 34 surveyed grid cells between May 19 and July 6. They detected 131 bird species, including 13 priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 165 species that were detected in any year during which surveys were conducted, 19 of which are priority species. The data yielded robust density estimates (CV < 50%) for 48 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout USFS-Region 2 National Grasslands for 176 species that were detected in any year during which surveys were conducted, 10 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 65 of the species for which we estimated occupancies.

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To view a map of survey locations, density and occupancy results and species counts within USFS-Region 2 National Grasslands across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[USFS-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 11 of 13 planned surveys (84.6%) in 2019. Technicians conducted 128 point counts within the 11 surveyed grid cells between May 27 and July 6. They detected 89 bird species, including two priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 130 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust density estimates (CV < 50%) for 24 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Nebraska National Grasslands for 128 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 48 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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.

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Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 48 point counts within the three surveyed grid cells between May 31 and June 15. They detected 25 bird species, including two priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 36 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust density estimates (CV < 50%) for ten of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout KS-BCR18-CM for 33 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 12 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within KS-BCR18-CM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[KS-BCR18-CM Results](#)

(4) Comanche National Grassland

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 58 point counts within the five surveyed grid cells between May 19 and June 2. They detected 43 bird species, including zero priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 94 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust density estimates (CV < 50%) for 18 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CO-BCR18-CO for 92 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 14 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CO-BCR18-CO across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BCR18-CO 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 – because 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 planned surveys (100%) in 2019. Technicians conducted 42 point counts within the four surveyed grid cells between May 23 and June 8. They detected 16 bird species, including one priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 35 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust density estimates (CV < 50%) for five of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CO-BCR18-PG for 33 species that were detected in any year during which surveys were conducted, one of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for eight of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CO-BCR18-PG across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BCR18-PG Results](#)

(6) Thunder Basin National Grassland

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 148 point counts within the 11 surveyed grid cells between May 23 and June 7. They detected 71 bird species, including zero priority species ([Appendix I](#)).

Bird Conservancy estimated densities and population sizes for 99 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust density estimates (CV < 50%) for 27 of the species for which we estimated densities.

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Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR17-TB for 103 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 25 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR17-TB across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR17-TB Results](#)

3. Region 3

In this section, we summarize results for two national grasslands in Region 3: Kiowa National Grassland and Rita Blanca National Grassland.

a) Kiowa National Grassland

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

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 22 point counts within the two surveyed grid cells between May 11 and May 29. They detected 20 bird species, including zero priority species ([Appendix J](#)).

We 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 see species detected within Kiowa National Grassland across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[NM-BCR18-KW Results](#)

b) 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 to allow for the summation of the data for individual states.

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Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 55 point counts within the four surveyed grid cells between May 13 and May 28. They detected 28 bird species, including zero priority species ([Appendix J](#)).

Bird Conservancy estimated densities and population sizes for 53 species that were detected in any year during which surveys were conducted, one of which are priority species. The data yielded robust density estimates (CV < 50%) for nine of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Rita Blanca National Grassland for 52 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 32 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[Rita Blanca National Grassland Results](#)

4. Region 4

In this section, we summarize results for all 12 national forests and Curlew National Grassland in Region 4. In 2010, the USFS Region 4 stratum in Wyoming BCR 10 was re-stratified 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 re-stratification 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 re-stratified by forest (Caribou-Targhee, Ashley, and Wasatch National Forests), allowing for forest-wide estimates within Caribou-Targhee National Forest. 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 re-stratifying so that estimates could be generated at the USFS Region level. The new USFS Region 4 strata created in Idaho BCR 10 included Boise National Forest, Payette National Forest, Salmon-Challis National Forest, and Sawtooth National Forest. The Utah portion of Manti-La Sal National Forest was stratified in 2015 to provide forest-wide estimates and the BCR 16 portion of Ashley National Forest in Utah was added to the sampling frame in 2016. In 2017, we obtained region-wide estimates by completely stratifying Ashley, Boise, Dixie, Fishlake, Humboldt-Toiyabe, Salmon-Challis, Sawtooth, and Uinta-Wasatch-Cache National Forests.

a) Region 4 National Forests: Total

We obtained results for USFS-Region 4 National Forests by compiling and jointly analyzing data from 36 strata in six states.

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Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 1606 point counts within the 135 surveyed grid cells between May 6 and July 14. They detected 170 bird species, including eight priority species ([Appendix K](#)).

Bird Conservancy estimated densities and population sizes for 182 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 94 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout USFS-Region 4 National Forests for 196 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 134 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within USFS-Region 4 National Forests across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[USFS-Region 4 National Forests Results](#)

b) Ashley National Forest

We obtained results for Ashley National Forest from three strata in two states. 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. In 2017, the BCR 16 portion of Ashley National Forest in Utah was restratified to include private inholdings and maintain consistency with other forests in the state.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 151 point counts within the ten surveyed grid cells between June 2 and July 11. They detected 61 bird species, including three priority species ([Appendix K](#)).

Bird Conservancy estimated densities and population sizes for 98 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust density estimates (CV < 50%) for 30 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Ashley National Forest for 100 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 35 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within Ashley National Forest across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, after you

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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 2019, hit “Add Filter”, then “Run Query”.

[Ashley National Forest Results](#)

c) Boise National Forest

We obtained results for Boise National Forest by compiling and jointly analyzing data from two strata.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 119 point counts within the ten surveyed grid cells between June 14 and June 30. They detected 73 bird species, including seven priority species ([Appendix K](#)).

Bird Conservancy estimated densities and population sizes for 95 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 34 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Boise National Forest for 93 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 46 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[Boise National Forest Results](#)

d) Bridger-Teton National Forest

In 2010, the USFS Region 4 stratum in Wyoming was re-stratified 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 because of 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 planned surveys (100%) in 2019. Technicians conducted 137 point counts within the ten surveyed grid cells between June 26 and July 12. They detected 78 bird species, including one priority species ([Appendix K](#)).

Bird Conservancy estimated densities and population sizes for 123 species that were detected in any year during which surveys were conducted, one of which is a priority

species. The data yielded robust density estimates ($CV < 50\%$) for 36 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Bridger-Teton National Forest for 121 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust occupancy estimates ($CV < 50\%$) for 41 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[Bridger-Teton National Forest Results](#)

e) Caribou-Targhee National Forest

We obtained results for Caribou-Targhee National Forest by compiling and jointly analyzing data from six strata in three states. 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 planned surveys (100%) in 2019. Technicians conducted 154 point counts within the 13 surveyed grid cells between May 28 and July 4. They detected 89 bird species, including zero priority species ([Appendix K](#)).

Bird Conservancy estimated densities and population sizes for 146 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust density estimates ($CV < 50\%$) for 39 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Caribou-Targhee National Forest for 146 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates ($CV < 50\%$) for 57 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[Caribou-Targhee National Forest Results](#)

f) Dixie National Forest

We obtained results for Dixie National Forest by compiling and jointly analyzing data from two strata.

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Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 109 point counts within the ten surveyed grid cells between May 6 and June 30. They detected 83 bird species, including zero priority species ([Appendix K](#)).

Bird Conservancy estimated densities and population sizes for 93 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 44 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Dixie National Forest for 91 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 50 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within Dixie National Forest across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[Dixie National Forest Results](#)

g) Fishlake National Forest

We obtained results for Fishlake National Forest by compiling and jointly analyzing data from two strata.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 120 point counts within the ten surveyed grid cells between May 7 and June 28. They detected 67 bird species, including zero priority species ([Appendix K](#)).

Bird Conservancy estimated densities and population sizes for 79 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 35 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Fishlake National Forest for 77 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 33 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within Fishlake National Forest across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[Fishlake National Forest Results](#)

h) Humboldt-Toiyabe National Forest

We obtained results for Humboldt-Toiyabe National Forest by compiling and jointly analyzing data from five strata in two states.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 158 point counts within the 15 surveyed grid cells between May 11 and July 13. They detected 88 bird species, including four priority species ([Appendix K](#)).

Bird Conservancy estimated densities and population sizes for 116 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for 50 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Humboldt-Toiyabe National Forest for 117 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 53 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within Humboldt-Toiyabe National Forest across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[Humboldt-Toiyabe National Forest Results](#)

i) 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 planned surveys (100%) in 2019. Technicians conducted 132 point counts within the 12 surveyed grid cells between May 20 and July 1. They detected 80 bird species, including two priority species ([Appendix K](#)).

Bird Conservancy estimated densities and population sizes for 134 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust density estimates (CV < 50%) for 42 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Manti-La Sal National Forest for 135 species that were detected in any year during which surveys were conducted, one of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 45 of the species for which we estimated occupancies.

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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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[Manti-La Sal National Forest Results](#)

j) Payette National Forest

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 109 point counts within the ten surveyed grid cells between June 20 and July 6. They detected 74 bird species, including six priority species ([Appendix K](#)).

Bird Conservancy estimated densities and population sizes for 95 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 41 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ID-BCR10-PA for 92 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 37 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ID-BCR10-PA across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[ID-BCR10-PA Results](#)

k) Salmon-Challis National Forest

We obtained results for Salmon-Challis National Forest by compiling and jointly analyzing data from two strata.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 120 point counts within the ten surveyed grid cells between June 18 and July 5. They detected 74 bird species, including five priority species ([Appendix K](#)).

Bird Conservancy estimated densities and population sizes for 109 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 37 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Salmon-Challis National Forest for 103 species that were detected in any year during which

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surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 41 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[Salmon-Challis National Forest Results](#)

l) Sawtooth National Forest

We obtained results for Sawtooth National Forest by compiling and jointly analyzing data from three strata in two states.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 112 point counts within the ten surveyed grid cells between May 30 and July 4. They detected 95 bird species, including two priority species ([Appendix K](#)).

Bird Conservancy estimated densities and population sizes for 105 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust density estimates (CV < 50%) for 49 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Sawtooth National Forest for 104 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 51 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[Sawtooth National Forest Results](#)

m) Uinta-Wasatch-Cache National Forest

We obtained results for Uinta-Wasatch-Cache National Forest from five strata in two states. 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 planned surveys (100%) in 2019. Technicians conducted 185 point counts within the 15 surveyed grid cells between May 26 and July 14. They detected 82 bird species, including one priority species ([Appendix K](#)).

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Bird Conservancy estimated densities and population sizes for 102 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust density estimates (CV < 50%) for 29 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Uinta-Wasatch-Cache National Forest for 103 species that were detected in any year during which surveys were conducted, one of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 37 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within Uinta-Wasatch-Cache National Forest across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[Uinta-Wasatch-Cache National Forest Results](#)

n) Curlew National Grassland

We obtained results for Curlew National Grassland BCR 17 by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 52 point counts within the five surveyed grid cells between May 27 and May 31. They detected 39 bird species, including zero priority species ([Appendix K](#)).

Bird Conservancy estimated densities and population sizes for 70 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for nine of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ID-BCR9-CU for 69 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 17 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ID-BCR9-CU across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[ID-BCR9-CU Results](#)

B. Bureau of Land Management

Jump to:

BLM in California	Error! Reference source not found.	BLM in Idaho	BLM in Montana
BLM in Oregon	Error! Reference source not found.	BLM in North Dakota	BLM in South Dakota
BLM in Utah	BLM in Wyoming		

1. BLM in California BCR 9

a) California BCR9 BLM

We obtained results for CA-BCR9 BLM by compiling and jointly analyzing data from four strata.

Field technicians completed 13 of 14 planned surveys (92.9%) in 2019. Technicians conducted 167 point counts within the 13 surveyed grid cells between May 20 and June 20. They detected 72 bird species, including two priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 63 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust density estimates (CV < 50%) for 216 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CA-BCR9 BLM for 59 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 31 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CA-BCR9 BLM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CA-BCR9 BLM Results](#)

b) Carson City District

We obtained results for BLM Carson City District by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 38 point counts within the three surveyed grid cells between June 4 and June 18. They detected 39 bird species, including zero priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 35 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 16 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CA-BCR9-CC for 33 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 21 of the species for which we estimated occupancies.

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To view a map of survey locations, density and occupancy results and species counts within CA-BCR9-CC across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CA-BCR9-CC Results](#)

c) California Desert District

We obtained results for BLM California Desert District by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 41 point counts within the three surveyed grid cells between May 22 and May 24. They detected 25 bird species, including zero priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 23 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for seven of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CA-BCR9-CD for 22 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for five of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CA-BCR9-CD across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CA-BCR9-CD Results](#)

d) Central California District

We obtained results for BLM Central California District by analyzing data from one stratum.

Field technicians completed three of four planned surveys (75%) in 2019. Technicians conducted 37 point counts within the three surveyed grid cells between May 20 and June 20. They detected 30 bird species, including one priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 23 species that were detected in any year during which surveys were conducted, one of which is a priority species. The data yielded robust density estimates (CV < 50%) for eight of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CA-BCR9-CN for 23 species that were detected in any year during which surveys were

conducted, one of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for eight of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CA-BCR9-CN across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CA-BCR9-CN Results](#)

e) Northern California District

We obtained results for BLM Northern California by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 51 point counts within the four surveyed grid cells between June 2 and June 17. They detected 50 bird species, including one priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 41 species that were detected in any year during which surveys were conducted, one of which is a priority species. The data yielded robust density estimates (CV < 50%) for 21 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CA-BCR9-NC for 38 species that were detected in any year during which surveys were conducted, one of which is a priority species. The data yielded robust occupancy estimates (CV < 50%) for 12 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CA-BCR9-NC across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CA-BCR9-NC Results](#)

2. BLM in Colorado

a) BLM in Colorado: Total

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 425 point counts within the 32 surveyed grid cells between May 18 and July 1. They detected 102 bird species, including two priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 146 species that were detected in any year during which surveys were conducted, six of which are priority species.

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The data yielded robust density estimates (CV < 50%) for 60 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CO-BLM for 160 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 70 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CO-BLM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BLM Results](#)

b) BLM in Colorado BCR 10

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 108 point counts within the eight surveyed grid cells between May 28 and June 14. They detected 40 bird species, including one priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 100 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust density estimates (CV < 50%) for 21 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CO-BCR10-BL for 96 species that were detected in any year during which surveys were conducted, one of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 24 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CO-BCR10-BL across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BCR10-BL Results](#)

c) BLM in Colorado BCR 16

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 317 point counts within the 24 surveyed grid cells between May 18 and July 1. They detected 99 bird species, including two priority species ([Appendix G](#)).

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Bird Conservancy estimated densities and population sizes for 154 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for 59 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CO-BCR16-BL for 152 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 68 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CO-BCR16-BL across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BCR16-BL Results](#)

3. BLM in Idaho

a) Challis Field Office

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 169 point counts within the 12 surveyed grid cells between May 26 and June 26. They detected 81 bird species, including eight priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 82 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 31 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ID-BLM - Challis Field Office for 80 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 36 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ID-BLM - Challis Field Office across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[ID-BLM - Challis Field Office Results](#)

b) Cottonwood Field Office

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 56 point counts within the six surveyed grid cells between June 25 and July 7. They detected 61 bird species, including one priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 67 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust density estimates (CV < 50%) for 30 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ID-BLM - Cottonwood Field Office for 64 species that were detected in any year during which surveys were conducted, one of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 43 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ID-BLM - Cottonwood Field Office across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[ID-BLM - Cottonwood Field Office Results](#)

c) **Coeur d'Alene Field Office**

We obtained results for ID-BCR10-CA by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 55 point counts within the seven surveyed grid cells between June 1 and July 7. They detected 74 bird species, including five priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 71 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust density estimates (CV < 50%) for 34 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ID-BCR10-CA for 72 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 48 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ID-BCR10-CA across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[ID-BCR10-CA Results](#)

d) Four Rivers Field Office

We obtained results for ID-BCR9-FO by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 71 point counts within the five surveyed grid cells between May 26 and June 11. They detected 49 bird species, including three priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 54 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust density estimates (CV < 50%) for 12 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ID-BCR9-FO for 53 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 15 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ID-BCR9-FO across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[ID-BCR9-FO Results](#)

e) Pocatello Field Office

We obtained results for BLM Pocatello Field Office by compiling and jointly analyzing data from three strata.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 110 point counts within the ten surveyed grid cells between May 29 and July 6. They detected 86 bird species, including nine priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 90 species that were detected in any year during which surveys were conducted, nine of which are priority species. The data yielded robust density estimates (CV < 50%) for 40 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ID-BLM - Pocatello Field Office for 87 species that were detected in any year during which surveys were conducted, nine of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 42 of the species for which we estimated occupancies.

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To view a map of survey locations, density and occupancy results and species counts within ID-BLM - Pocatello Field Office across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[ID-BLM - Pocatello Field Office Results](#)

f) Salmon Field Office

We obtained results for BLM Salmon Field Office lands by compiling and jointly analyzing data from two strata.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 168 point counts within the 12 surveyed grid cells between June 3 and July 3. They detected 77 bird species, including seven priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 84 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for 33 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ID-BLM - Salmon Field Office for 80 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 39 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ID-BLM - Salmon Field Office across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[ID-BLM - Salmon Field Office Results](#)

g) Upper Snake Field Office

We obtained results for BLM Upper Snake Field Office lands by compiling and jointly analyzing data from two strata.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 186 point counts within the 13 surveyed grid cells between May 25 and June 21. They detected 63 bird species, including nine priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 69 species that were detected in any year during which surveys were conducted, ten of which are priority species. The data yielded robust density estimates (CV < 50%) for 26 of the species for which we estimated densities.

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Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ID-BLM - Upper Snake Field Office for 71 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 14 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ID-BLM - Upper Snake Field Office across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[ID-BLM - Upper Snake Field Office Results](#)

h) Bruneau Field Office

We obtained results for BLM Bruneau Field Office by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 142 point counts within the ten surveyed grid cells between May 27 and June 9. They detected 54 bird species, including five priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 78 species that were detected in any year during which surveys were conducted, eight of which are priority species. The data yielded robust density estimates (CV < 50%) for 18 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ID-BCR9-BR for 73 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 14 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ID-BCR9-BR across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[ID-BCR9-BR Results](#)

i) Burley Field Office

We obtained results for BLM Burley Field Office by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 132 point counts within the ten surveyed grid cells between May 27 and June 14. They detected 48 bird species, including ten priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 60 species that were detected in any year during which surveys were conducted, 14 of which are priority species. The data

yielded robust density estimates (CV < 50%) for 15 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ID-BCR9-BU for 60 species that were detected in any year during which surveys were conducted, ten of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 22 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ID-BCR9-BU across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[ID-BCR9-BU Results](#)

j) Jarbidge Field Office

We obtained results for BLM Jarbidge Field Office by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 148 point counts within the ten surveyed grid cells between May 26 and June 4. They detected 24 bird species, including seven priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 32 species that were detected in any year during which surveys were conducted, eight of which are priority species. The data yielded robust density estimates (CV < 50%) for 11 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ID-BCR9-JA for 32 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for ten of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ID-BCR9-JA across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[ID-BCR9-JA Results](#)

k) Owyhee Field Office

We obtained results for BLM Owyhee Field Office by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 145 point counts within the ten surveyed grid cells between May 26 and June 18. They detected 50 bird species, including six priority species ([Appendix G](#)).

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Bird Conservancy estimated densities and population sizes for 73 species that were detected in any year during which surveys were conducted, 10 of which are priority species. The data yielded robust density estimates (CV < 50%) for 24 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ID-BCR9-OW for 74 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 19 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ID-BCR9-OW across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[ID-BCR9-OW Results](#)

4. BLM in Montana

a) BLM in Montana: Total

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 458 point counts within the 36 surveyed grid cells between May 24 and July 6. They detected 131 bird species, including 12 priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 171 species that were detected in any year during which surveys were conducted, 16 of which are priority species. The data yielded robust density estimates (CV < 50%) for 47 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout MT-BLM for 172 species that were detected in any year during which surveys were conducted, 11 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 90 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within MT-BLM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[MT-BLM Results](#)

b) BLM in Montana BCR 10

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 75 point counts within the six surveyed grid cells between June 3 and July 6. They detected 69 bird species, including three priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 123 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust density estimates (CV < 50%) for 27 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout MT-BCR10-BLM for 121 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 34 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within MT-BCR10-BLM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[MT-BCR10-BLM Results](#)

c) BLM in Montana BCR 11

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 223 point counts within the 20 surveyed grid cells between May 24 and June 15. They detected 89 bird species, including 11 priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 102 species that were detected in any year during which surveys were conducted, 13 of which are priority species. The data yielded robust density estimates (CV < 50%) for 24 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout MT-BCR11-BLM for 103 species that were detected in any year during which surveys were conducted, ten of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 43 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within MT-BCR11-BLM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[MT-BCR11-BLM Results](#)

d) BLM in Montana BCR 17

We obtained results for BLM lands in Montana BCR 17 by analyzing data from one stratum. Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 160 point counts within the ten surveyed grid cells between June 6 and June 29. They detected 57 bird species, including six priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 100 species that were detected in any year during which surveys were conducted, 12 of which are priority species. The data yielded robust density estimates (CV < 50%) for 18 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout MT-BCR17-BL for 98 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 22 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within MT-BCR17-BL across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[MT-BCR17-BL Results](#)

5. BLM Nevada BCR 9

a) Nevada BCR9 BLM

We obtained results for NV-BCR9 BLM by compiling and jointly analyzing data from seven strata.

Field technicians completed 68 of 74 planned surveys (91.9%) in 2019. Technicians conducted 894 point counts within the 68 surveyed grid cells between May 11 and July 6. They detected 101 bird species, including 13 priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 87 species that were detected in any year during which surveys were conducted, 11 of which are priority species. The data yielded robust density estimates (CV < 50%) for 42 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout NV-BCR9 BLM for 82 species that were detected in any year during which surveys were conducted, 11 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 48 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within NV-BCR9 BLM across all years of the project, follow the web link below. Hit “Ok” on the

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Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

NV-BCR9 BLM Results

b) Battle Mountain District

We obtained results for BLM Battle Mountain District by analyzing data from one stratum.

Field technicians completed 13 of 15 planned surveys (86.7%) in 2019. Technicians conducted 180 point counts within the 13 surveyed grid cells between June 4 and June 25. They detected 40 bird species, including eight priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 37 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 16 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout NV-BCR9-BM for 34 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for nine of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within NV-BCR9-BM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

NV-BCR9-BM Results

c) Carson City District

We obtained results for BLM Carson City District Office by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 99 point counts within the eight surveyed grid cells between May 26 and June 28. They detected 48 bird species, including five priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 40 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust density estimates (CV < 50%) for ten of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout NV-BCR9-CC for 33 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for nine of the species for which we estimated occupancies.

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To view a map of survey locations, density and occupancy results and species counts within NV-BCR9-CC across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[NV-BCR9-CC Results](#)

d) Elko, Twin Falls, and Boise Districts

We obtained results for BLM Elko, Twin Falls, and Boise District Offices by analyzing data from one stratum.

Field technicians completed 13 of 14 planned surveys (92.9%) in 2019. Technicians conducted 162 point counts within the 13 surveyed grid cells between June 21 and July 5. They detected 36 bird species, including four priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 34 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust density estimates (CV < 50%) for 14 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout NV-BCR9-EK for 33 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for seven of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within NV-BCR9-EK across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[NV-BCR9-EK Results](#)

e) Ely District

We obtained results for BLM Ely District by analyzing data from one stratum.

Field technicians completed 14 of 15 planned surveys (93.3%) in 2019. Technicians conducted 177 point counts within the 14 surveyed grid cells between May 26 and June 25. They detected 51 bird species, including five priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 46 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust density estimates (CV < 50%) for 24 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout NV-BCR9-EY for 44 species that were detected in any year during which surveys were

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conducted, four of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 18 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within NV-BCR9-EY across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[NV-BCR9-EY Results](#)

f) Northern California District

We obtained results for BLM Northern California by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 60 point counts within the four surveyed grid cells between June 5 and July 3. They detected 39 bird species, including four priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 31 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust density estimates (CV < 50%) for 12 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout NV-BCR9-NC for 29 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 14 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within NV-BCR9-NC across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[NV-BCR9-NC Results](#)

g) Southern Nevada District

We obtained results for BLM Southern Nevada District by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 35 point counts within the three surveyed grid cells between May 11 and May 27. They detected 27 bird species, including two priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 18 species that were detected in any year during which surveys were conducted, one of which are priority species. The data yielded robust density estimates (CV < 50%) for six of the species for which we estimated densities.

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Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout NV-BCR9-SN for 13 species that were detected in any year during which surveys were conducted, one of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for nine of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within NV-BCR9-SN across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[NV-BCR9-SN Results](#)

h) Winnemucca District

We obtained results for BLM Winnemucca District by analyzing data from one stratum.

Field technicians completed 13 of 15 planned surveys (86.7%) in 2019. Technicians conducted 181 point counts within the 13 surveyed grid cells between June 8 and July 6. They detected 48 bird species, including eight priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 41 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for 19 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout NV-BCR9-WI for 40 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 13 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within NV-BCR9-WI across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[NV-BCR9-WI Results](#)

6. BLM in Oregon BCR 9

a) OR-BCR9 BLM

We obtained results for OR-BCR9 BLM by compiling and jointly analyzing data from four strata.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 392 point counts within the 32 surveyed grid cells between May 21 and June 29. They detected 101 bird species, including ten priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 83 species that were detected in this first year during which surveys were conducted, nine of which are priority species. The data yielded robust density estimates (CV < 50%) for 35 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout OR-BCR9 BLM for 86 species that were detected this first year during which surveys were conducted, nine of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 42 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within OR-BCR9 BLM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map.

[OR-BCR9 BLM Results](#)

b) Burns District

We obtained results for BLM Burns District by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 124 point counts within the eight surveyed grid cells between June 5 and June 12. They detected 61 bird species, including seven priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 51 species that were detected this first year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 16 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout OR-BCR9-BU for 50 species that were detected in this first during which surveys were conducted, seven of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 17 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within OR-BCR9-BU across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map.

[OR-BCR9-BU Results](#)

c) Lakeview and Medford Districts

We obtained results for BLM Lakeview and Medford Districts by analyzing data from one stratum.

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Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 82 point counts within the eight surveyed grid cells between May 21 and June 29. They detected 50 bird species, including six priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 44 species that were detected this first year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for ten of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout OR-BCR9-LA for 43 species that were detected this first year during which surveys were conducted, six of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 13 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within OR-BCR9-LA across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map.

[OR-BCR9-LA Results](#)

d) Prineville District

We obtained results for BLM Prineville District by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 117 point counts within the eight surveyed grid cells between May 24 and June 3. They detected 61 bird species, including five priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 55 species that were detected this first year during which surveys were conducted, five of which are priority species. The data yielded robust density estimates (CV < 50%) for 25 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout OR-BCR9-PR for 54 species that were detected in this first during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 28 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within OR-BCR9-PR across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map.

[OR-BCR9-PR Results](#)

e) Vale District

We obtained results for BLM Vale District by analyzing data from one stratum.

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Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 69 point counts within the eight surveyed grid cells between June 11 and June 28. They detected 27 bird species, including six priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 22 species that were detected this first year during which surveys were conducted, five of which are priority species. The data yielded robust density estimates (CV < 50%) for eight of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout OR-BCR9-VA for 20 species that were detected this first year during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 12 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within OR-BCR9-VA across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map.

[OR-BCR9-VA Results](#)

7. BLM in North Dakota BCR 17

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 88 point counts within the seven surveyed grid cells between June 13 and July 9. They detected 71 bird species, including four priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 100 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust density estimates (CV < 50%) for 32 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ND-BCR17-BM for 93 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 29 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ND-BCR17-BM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[ND-BCR17-BM Results](#)

8. BLM in South Dakota BCR 17

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

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Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 87 point counts within the seven surveyed grid cells between June 10 and July 1. They detected 63 bird species, including five priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 126 species that were detected in any year during which surveys were conducted, 13 of which are priority species. The data yielded robust density estimates (CV < 50%) for 18 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout SD-BCR17-BM for 121 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 25 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within SD-BCR17-BM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[SD-BCR17-BM Results](#)

9. BLM in Utah

a) BLM in Utah: Total

We obtained results for all BLM lands in Utah by compiling and jointly analyzing data from 19 strata.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 1290 point counts within the 100 surveyed grid cells between May 3 and June 24. They detected 128 bird species, including 23 priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 140 species that were detected in any year during which surveys were conducted, 23 of which are priority species. The data yielded robust density estimates (CV < 50%) for 64 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BLM for 144 species that were detected in any year during which surveys were conducted, 21 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 82 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BLM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

UT-BLM Results

b) BLM in Utah BCR 9

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 441 point counts within the 32 surveyed grid cells between May 3 and June 5. They detected 103 bird species, including 20 priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 122 species that were detected in any year during which surveys were conducted, 22 of which are priority species. The data yielded robust density estimates (CV < 50%) for 47 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR9 BLM for 116 species that were detected in any year during which surveys were conducted, 17 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 43 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR9 BLM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

UT-BCR9 BLM Results

c) BLM in Utah BCR 10

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 93 point counts within the six surveyed grid cells between June 4 and June 18. They detected 52 bird species, including seven priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 54 species that were detected in any year during which surveys were conducted, eight of which are priority species. The data yielded robust density estimates (CV < 50%) for 22 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR10 BLM for 69 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 25 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR10 BLM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in

the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR10 BLM Results](#)

d) BLM in Utah BCR 16

We obtained results for BLM lands in Utah BCR 16 by compiling and jointly analyzing data from 11 strata.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 734 point counts within the 59 surveyed grid cells between May 5 and June 24. They detected 111 bird species, including 18 priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 122 species that were detected in any year during which surveys were conducted, 17 of which are priority species. The data yielded robust density estimates (CV < 50%) for 52 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR16 BLM for 119 species that were detected in any year during which surveys were conducted, 15 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 64 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR16 BLM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR16 BLM Results](#)

e) Cedar City Field Office

We obtained results for BLM Cedar City Field Office lands by compiling and jointly analyzing data from two strata.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 136 point counts within the nine surveyed grid cells between May 3 and May 16. They detected 72 bird species, including 11 priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 77 species that were detected in any year during which surveys were conducted, 11 of which are priority species. The data yielded robust density estimates (CV < 50%) for 33 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BLM - Cedar City Field Office for 85 species that were detected in any year during which surveys were conducted, 11 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 27 of the species for which we estimated occupancies.

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To view a map of survey locations, density and occupancy results and species counts within UT-BLM - Cedar City Field Office across all years of the project, follow the web link below. Hit "OK" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[UT-BLM - Cedar City Field Office Results](#)

f) Fillmore Field Office

We obtained results for BLM Fillmore Field Office lands by compiling and jointly analyzing data from two strata.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 196 point counts within the 14 surveyed grid cells between May 6 and May 27. They detected 46 bird species, including ten priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 65 species that were detected in any year during which surveys were conducted, 12 of which are priority species. The data yielded robust density estimates (CV < 50%) for 16 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BLM - Fillmore Field Office for 64 species that were detected in any year during which surveys were conducted, nine of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 17 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BLM - Fillmore Field Office across all years of the project, follow the web link below. Hit "OK" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[UT-BLM - Fillmore Field Office Results](#)

g) Kanab Field Office

We obtained results for BLM Kanab Field Office lands by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 78 point counts within the five surveyed grid cells between May 6 and May 16. They detected 55 bird species, including seven priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 58 species that were detected in any year during which surveys were conducted, eight of which are priority species. The data yielded robust density estimates (CV < 50%) for 23 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR16-KA for 57 species that were detected in any year during which surveys were

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conducted, seven of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 18 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR16-KA across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR16-KA Results](#)

h) Moab Field Office

We obtained results for BLM Moab Field Office lands by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 68 point counts within the seven surveyed grid cells between May 7 and June 2. They detected 60 bird species, including eight priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 56 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 23 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR16-MO for 52 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 19 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR16-MO across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR16-MO Results](#)

i) Monticello Field Office

We obtained results for BLM Monticello Field Office lands by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 99 point counts within the seven surveyed grid cells between May 19 and June 13. They detected 44 bird species, including six priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 48 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for 20 of the species for which we estimated densities.

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Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR16-MN for 46 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 17 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR16-MN across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR16-MN Results](#)

j) Price Field Office

We obtained results for BLM Price Field Office lands by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 96 point counts within the eight surveyed grid cells between May 25 and June 20. They detected 61 bird species, including six priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 77 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 27 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR16-PR for 72 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for eight of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR16-PR across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR16-PR Results](#)

k) Richfield Field Office

We obtained results for BLM Richfield Field Office lands by compiling and jointly analyzing data from two strata.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 136 point counts within the ten surveyed grid cells between May 23 and June 22. They detected 56 bird species, including 12 priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 60 species that were detected in any year during which surveys were conducted, 12 of which are priority species. The data

yielded robust density estimates (CV < 50%) for 24 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BLM - Richfield Field Office for 73 species that were detected in any year during which surveys were conducted, 12 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 18 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BLM - Richfield Field Office across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[UT-BLM - Richfield Field Office Results](#)

l) Saint George Field Office

We obtained results for BLM Saint George Field Office lands by compiling and jointly analyzing data from three strata.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 64 point counts within the nine surveyed grid cells between May 6 and May 21. They detected 55 bird species, including 11 priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 75 species that were detected in any year during which surveys were conducted, 12 of which are priority species. The data yielded robust density estimates (CV < 50%) for 22 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BLM - Saint George Field Office for 80 species that were detected in any year during which surveys were conducted, ten of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 25 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BLM - Saint George Field Office across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[UT-BLM - Saint George Field Office Results](#)

m) Salt Lake Field Office

We obtained results for BLM Salt Lake Field Office lands by compiling and jointly analyzing data from three strata.

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Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 205 point counts within the 15 surveyed grid cells between May 7 and June 24. They detected 84 bird species, including 12 priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 101 species that were detected in any year during which surveys were conducted, 19 of which are priority species. The data yielded robust density estimates (CV < 50%) for 33 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BLM - Salt Lake Field Office for 97 species that were detected in any year during which surveys were conducted, ten of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 16 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BLM - Salt Lake Field Office across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[UT-BLM - Salt Lake Field Office Results](#)

n) Vernal Field Office

We obtained results for BLM Vernal Field Office lands by compiling and jointly analyzing data from two strata.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 125 point counts within the nine surveyed grid cells between May 7 and June 14. They detected 56 bird species, including 11 priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 78 species that were detected in any year during which surveys were conducted, ten of which are priority species. The data yielded robust density estimates (CV < 50%) for 24 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BLM - Vernal Field Office for 77 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 14 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BLM - Vernal Field Office across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[UT-BLM - Vernal Field Office Results](#)

10. BLM in Wyoming

a) BLM in Wyoming: Total

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 712 point counts within the 54 surveyed grid cells between May 23 and July 18. They detected 128 bird species, including eight priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 171 species that were detected in any year during which surveys were conducted, 12 of which are priority species. The data yielded robust density estimates (CV < 50%) for 49 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BLM for 168 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 71 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BLM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BLM Results](#)

b) BLM in Wyoming BCR 16

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

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 25 point counts within the two surveyed grid cells between June 2 and July 2. They detected 34 bird species, including zero priority species ([Appendix G](#)).

We 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 this stratum across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR16-BL Results](#)

c) BLM in Wyoming BCR 18

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We obtained results for BLM lands in Wyoming BCR 18 by analyzing data from one stratum.

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 18 point counts within the two surveyed grid cells between May 27 and June 3. They detected 16 bird species, including one priority species ([Appendix G](#)).

We 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 this stratum across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR18-BL Results](#)

d) Buffalo Field Office

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 52 point counts within the four surveyed grid cells between May 30 and July 18. They detected 56 bird species, including two priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 104 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for 21 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BLM-Buffero for 96 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 27 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BLM-Buffero across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BLM-Buffero Results](#)

e) Casper Field Office

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

Integrated Monitoring in Bird Conservation Regions: 2019 Annual Report

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 55 point counts within the four surveyed grid cells between May 23 and June 19. They detected 43 bird species, including three priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 88 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust density estimates (CV < 50%) for 15 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BLM-Casper for 83 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 17 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BLM-Casper across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BLM-Casper Results](#)

f) Cody Field Office

We obtained results for BLM Cody Field Office lands by analyzing data from one stratum.

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 20 point counts within the two surveyed grid cells between May 29 and June 6. They detected 16 bird species, including one priority species ([Appendix G](#)).

We 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 the Cody Field Office across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR10-CO Results](#)

g) Kemmerer Field Office

We obtained results for BLM Kemmerer Field Office lands by analyzing data from one stratum.

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 28 point counts within the two surveyed grid cells between June 1 and June 3. They detected 25 bird species, including two priority species ([Appendix G](#)).

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We 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 the Kemmerer Field Office across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR10-KE Results](#)

h) Lander Field Office

We obtained results for BLM Lander Field Office lands by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 78 point counts within the six surveyed grid cells between May 28 and June 16. They detected 49 bird species, including four priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 82 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for 19 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR10-LA for 80 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 20 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR10-LA across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR10-LA Results](#)

i) Newcastle Field Office

We obtained results for BLM Newcastle Field Office lands by analyzing data from one stratum.

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 27 point counts within the two surveyed grid cells between May 23 and May 24. They detected 15 bird species, including two priority species ([Appendix G](#)).

We 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.

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To view a map of survey locations and species counts within the Newcastle Field Office across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR17-NE Results](#)

j) Pinedale Field Office

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 113 point counts within the eight surveyed grid cells between May 30 and June 30. They detected 63 bird species, including four priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 88 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust density estimates (CV < 50%) for 17 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR10-PI for 89 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 12 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR10-PI across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR10-PI Results](#)

k) Rawlins Field Office

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 111 point counts within the eight surveyed grid cells between May 30 and June 30. They detected 41 bird species, including five priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 66 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 14 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR10-RA for 63 species that were detected in any year during which surveys were

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conducted, four of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 12 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR10-RA across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR10-RA Results](#)

l) Rock Springs Field Office

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 110 point counts within the eight surveyed grid cells between June 1 and July 1. They detected 46 bird species, including four priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 80 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust density estimates (CV < 50%) for 14 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR10-RO for 78 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 14 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR10-RO across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR10-RO Results](#)

m) Worland Field Office

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 75 point counts within the six surveyed grid cells between May 24 and June 27. They detected 50 bird species, including two priority species ([Appendix G](#)).

Bird Conservancy estimated densities and population sizes for 66 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for 13 of the species for which we estimated densities.

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Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR10-WO for 64 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates ($CV < 50\%$) for 17 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR10-WO across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR10-WO Results](#)

C. Department of Defense

Jump to:

[DOD Lands in Colorado BCR 18](#)

[DOD Lands in Utah BCR 9](#)

[DOD Lands in Wyoming BCR 18](#)

1. DOD Lands in Colorado BCR 18

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

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 23 point counts within the two surveyed grid cells between May 28 and June 10. They detected 34 bird species, including six priority species ([Appendix E](#)).

We 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 this stratum across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BCR18-DO Results](#)

2. DOD Lands in Utah BCR 9

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

Field technicians completed 32 of 33 planned surveys (97%) in 2019. Technicians conducted 392 point counts within the 32 surveyed grid cells between May 9 and June 12. They detected 40 bird species, including 21 priority species ([Appendix E](#)).

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Bird Conservancy estimated densities and population sizes for 45 species that were detected in any year during which surveys were conducted, 11 of which are priority species. The data yielded robust density estimates (CV < 50%) for 17 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR9 Department of Defense lands for 41 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 11 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR9 Department of Defense lands across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[UT-BCR9 Department of Defense lands Results](#)

3. All Other DOD Lands in Utah BCR 9

We obtained results for all other DOD lands in Utah BCR 9 by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 122 point counts within the nine surveyed grid cells between May 9 and June 10. They detected 36 bird species, including eight priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for 36 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 15 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR9-DD for 36 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for seven of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR9-DD across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[UT-BCR9-DD Results](#)

4. DOD Lands in Utah BCR 9 - Mudflats

We obtained results for mudflats in DOD lands of Utah BCR 9 by analyzing data from one stratum.

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Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 36 point counts within the three surveyed grid cells between June 4 and June 12. They detected three bird species, including zero priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for two species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for zero of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR9-MU for one species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for one of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR9-MU across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR9-MU Results](#)

5. DOD Lands in Utah BCR 9 – APG Impact Areas

We obtained results for AGP Impact Areas in DOD lands of Utah BCR 9 by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 60 point counts within the six surveyed grid cells between May 21 and May 23. They detected 13 bird species, including two priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for 13 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust density estimates (CV < 50%) for four of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR9-AP for 11 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for four of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR9-AP across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR9-AP Results](#)

6. DOD Lands in Utah BCR 9 – Target S Impact Areas

We obtained results for Target S Impact Areas in DOD lands of Utah BCR 9 by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 74 point counts within the six surveyed grid cells between May 14 and May 20. They detected 12 bird species, including three priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for 13 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust density estimates (CV < 50%) for five of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR9-TS for 11 species that were detected in any year during which surveys were conducted, two of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for six of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR9-TS across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR9-TS Results](#)

7. DOD Lands in Utah BCR 9 – UTG Impact Areas

We obtained results for UTG Impact Areas in DOD lands of Utah BCR 9 by analyzing data from one stratum.

Field technicians completed five of six planned surveys (83.3%) in 2019. Technicians conducted 66 point counts within the five surveyed grid cells between May 28 and June 10. They detected four bird species, including one priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for three species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for zero of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR9-UR for two species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for one of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR9-UR across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR9-UR Results](#)

8. DOD Lands in Utah BCR 9 – UTTR Impact Areas

We obtained results for UTTR Impact Areas in DOD lands of Utah BCR 9 by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 34 point counts within the three surveyed grid cells between May 14 and June 12. They detected 15 bird species, including four priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for 18 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for seven of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR9-UT for 17 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for six of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR9-UT across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR9-UT Results](#)

9. DOD Lands in Wyoming BCR 18

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

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 22 point counts within the two surveyed grid cells between May 29 and May 30. They detected 29 bird species, including six priority species ([Appendix E](#)).

We 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 this stratum across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR18-DO Results](#)

D. National Park Service

Jump to:

[Greater Yellowstone Network](#)

[Northern Colorado Plateau Network in Colorado](#)

[Northern Great Plains Network](#)

[Rocky Mountain Network in Colorado](#)

[Southern Colorado Plateau Network in Colorado](#)

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 planned surveys (100%) in 2019. Technicians conducted 118 point counts within the eight surveyed grid cells between May 29 and July 7. They detected 89 bird species, including zero priority species.

Bird Conservancy estimated densities and population sizes for 125 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 35 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout NPS-Greater Yellowstone Network for 123 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 40 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within NPS-Greater Yellowstone Network across all years of the project, follow the web link below. Hit "OK" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[NPS-Greater Yellowstone Network Results](#)

b) Bighorn Canyon National Recreation Area

We obtained results for Bighorn Canyon National Recreation Area by analyzing data from one stratum.

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 24 point counts within the two surveyed grid cells between May 29 and May 30. They detected 33 bird species, including zero priority species.

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We 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 Bighorn Canyon National Recreation Area across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR10-BH Results](#)

c) Grand Teton National Park

We obtained results for Grand Teton National Park by analyzing data from one stratum.

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 32 point counts within the two surveyed grid cells between May 29 and June 28. They detected 42 bird species, including zero priority species.

We 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 Grand Teton National Park across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR10-GR Results](#)

d) Yellowstone National Park

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 62 point counts within the four surveyed grid cells between July 4 and July 7. They detected 52 bird species, including zero priority species.

Bird Conservancy estimated densities and population sizes for 83 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates ($CV < 50\%$) for 29 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR10-YE for 82 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates ($CV < 50\%$) for 30 of the species for which we estimated occupancies.

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To view a map of survey locations, density and occupancy results and species counts within WY-BCR10-YE across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR10-YE Results](#)

2. Northern Colorado Plateau Network in Colorado

We obtained results for the Northern Colorado Plateau Network by analyzing data from one stratum.

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 21 point counts within the two surveyed grid cells between June 4 and June 13. They detected 30 bird species, including zero priority species.

We 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 Northern Colorado Plateau Network across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BCR16-NC 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 planned surveys (100%) in 2019. Technicians conducted 89 point counts within the seven surveyed grid cells between June 16 and June 21. They detected 50 bird species, including zero priority species.

Bird Conservancy estimated densities and population sizes for 84 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 15 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout NE-BCR18-AF for 76 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 29 of the species for which we estimated occupancies.

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To view a map of survey locations, density and occupancy results and species counts within NE-BCR18-AF across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[NE-BCR18-AF Results](#)

b) Badlands National Park - North Unit

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

Field technicians completed seven of eight planned surveys (87.5%) in 2019. Technicians conducted 67 point counts within the seven surveyed grid cells between May 26 and June 11. They detected 65 bird species, including zero priority species.

Bird Conservancy estimated densities and population sizes for 96 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 15 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout SD-BCR17-BN for 94 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 22 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within SD-BCR17-BN across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[SD-BCR17-BN Results](#)

c) Jewel Cave National Monument

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 36 point counts within the four surveyed grid cells between July 8 and July 12. They detected 55 bird species, including zero priority species.

Bird Conservancy estimated densities and population sizes for 80 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 23 of the species for which we estimated densities.

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Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout SD-BCR17-JC for 74 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 32 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within SD-BCR17-JC across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[SD-BCR17-JC 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 planned surveys (100%) in 2019. Technicians conducted 58 point counts within the five surveyed grid cells between June 26 and July 1. They detected 78 bird species, including zero priority species.

Bird Conservancy estimated densities and population sizes for 105 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 35 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ND-BCR17-KR for 101 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 55 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ND-BCR17-KR across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[ND-BCR17-KR Results](#)

e) Missouri National Recreational River

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 55 point counts within the eight surveyed grid cells between June 2 and June 10. They detected 88 bird species, including zero priority species.

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Bird Conservancy estimated densities and population sizes for 110 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 40 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Missouri National Recreational River for 110 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 70 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 in two states.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 30 point counts within the four surveyed grid cells between June 3 and June 10. They detected 65 bird species, including zero priority species.

Bird Conservancy estimated densities and population sizes for 94 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 30 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout MR-NGPIM-FM for 90 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 51 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within MR-NGPIM-FM across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[MR-NGPIM-FM 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 in two states.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 25 point counts within the four surveyed grid cells between June 2 and June 7. They detected 80 bird species, including zero priority species.

Bird Conservancy estimated densities and population sizes for 105 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 39 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Ψ_i) throughout MR-NGPIM-TM for 106 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 53 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within MR-NGPIM-TM across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[MR-NGPIM-TM Results](#)

f) Mount Rushmore National Monument

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 46 point counts within the six surveyed grid cells between July 8 and July 12. They detected 49 bird species, including zero priority species.

Bird Conservancy estimated densities and population sizes for 76 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 26 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Ψ_i) throughout SD-BCR17-MR for 71 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 30 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within SD-BCR17-MR across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density,

or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[SD-BCR17-MR Results](#)

g) Niobrara National Scenic River

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 66 point counts within the eight surveyed grid cells between June 1 and June 8. They detected 97 bird species, including zero priority species.

Bird Conservancy estimated densities and population sizes for 108 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 49 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout NE-NGPIM-NI for 103 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 60 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within NE-NGPIM-NI across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[NE-NGPIM-NI Results](#)

h) Scotts Bluff National Monument

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 53 point counts within the five surveyed grid cells between June 12 and June 14. They detected 63 bird species, including zero priority species.

Bird Conservancy estimated densities and population sizes for 71 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 17 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout NE-BCR18-SB for 70 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 25 of the species for which we estimated occupancies.

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To view a map of survey locations, density and occupancy results and species counts within NE-BCR18-SB across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[NE-BCR18-SB Results](#)

i) Theodore Roosevelt National Park

We obtained results for Theodore Roosevelt National Park by compiling and jointly analyzing data from two strata: the North Unit and the South Unit.

Field technicians completed seven of eight planned surveys (87.5%) in 2019. Technicians conducted 67 point counts within the seven surveyed grid cells between June 12 and July 15. They detected 69 bird species, including zero priority species.

Bird Conservancy estimated densities and population sizes for 111 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 28 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Theodore Roosevelt National Park for 107 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 40 of the species for which we estimated occupancies.

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. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, 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 six of eight planned surveys (75%) in 2019. Technicians conducted 76 point counts within the six surveyed grid cells between June 3 and July 2. They detected 62 bird species, including zero priority species.

Bird Conservancy estimated densities and population sizes for 115 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 30 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout SD-BCR17-WC for 112 species that were detected in any year during which surveys were

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conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 34 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within SD-BCR17-WC across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[SD-BCR17-WC Results](#)

4. Rocky Mountain Network in Colorado

We obtained results for the Rocky Mountain Network in Colorado by analyzing data from one stratum.

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 19 point counts within the two surveyed grid cells between July 8 and July 9. They detected 37 bird species, including zero priority species.

We 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 the Rocky Mountain Network in Colorado across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BCR16-RM Results](#)

5. Southern Colorado Plateau Network in Colorado

We obtained results for the Southern Colorado Plateau Network by analyzing data from one stratum.

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 24 point counts within the two surveyed grid cells between June 14 and June 21. They detected 32 bird species, including zero priority species.

We 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 the Southern Colorado Plateau Network across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above

the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BCR16-SC Results](#)

E. Tribal Lands

Jump to:

[Tribal Lands in North Dakota BCR 17](#)

[Tribal Lands in South Dakota BCR 17](#)

[Wind River Tribal Lands in Wyoming BCR 10](#)

1. Tribal Lands in North Dakota BCR 17

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

Field technicians completed three of four planned surveys (75%) in 2019. Technicians conducted 36 point counts within the three surveyed grid cells between June 3 and June 14. They detected 54 bird species, including 11 priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for 72 species that were detected in any year during which surveys were conducted, 14 of which are priority species. The data yielded robust density estimates (CV < 50%) for 25 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ND-BCR17-TI for 68 species that were detected in any year during which surveys were conducted, 10 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 22 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ND-BCR17-TI across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[ND-BCR17-TI Results](#)

2. Tribal Lands in South Dakota BCR 17

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 39 point counts within the four surveyed grid cells between June 1 and July 2. They detected 49 bird species, including six priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for 48 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data

yielded robust density estimates (CV < 50%) for 13 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout SD-BCR17-TR for 41 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 13 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within SD-BCR17-TR across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[SD-BCR17-TR Results](#)

3. 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 planned surveys (100%) in 2019. Technicians conducted 54 point counts within the four surveyed grid cells between May 30 and June 5. They detected 43 bird species, including eight priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for 82 species that were detected in any year during which surveys were conducted, 13 of which are priority species. The data yielded robust density estimates (CV < 50%) for 23 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR10-WR for 77 species that were detected in any year during which surveys were conducted, eight of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 29 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR10-WR across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR10-WR Results](#)

F. 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, Montana, and Wyoming are reported in Section II: States.

[Jump to: All Other Lands in Nebraska BCR 17](#)

[All Other Lands in Nebraska BCR 18](#)

[All Other Lands in North Dakota BCR17](#)

[All Other Lands in South Dakota BCR 17](#)

All Other Lands in South Dakota BCR 18

1. All Other Lands in Nebraska BCR 17

We obtained results for all other lands in Nebraska BCR 17 by analyzing data from one stratum.

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 18 point counts within the two surveyed grid cells between June 2 and June 4. They detected 56 bird species, including zero priority species ([Appendix F](#)).

We 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 Nebraska BCR 17 across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

[NE-BCR17-ON Results](#)

2. All Other Lands in Nebraska BCR 18

We obtained results for all other lands in Nebraska BCR 18 by analyzing data from one stratum.

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 46 point counts within the five surveyed grid cells between June 11 and July 1. They detected 31 bird species, including three priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 58 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust density estimates (CV < 50%) for eight of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout NE-BCR18-AO for 53 species that were detected in any year during which surveys were conducted, three of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 14 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within NE-BCR18-AO across all years of the project, follow the web link below. Hit "Ok" on the Avian Data Center Disclaimer and hit the "Run Query" button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit "Add Filter", then "Run Query".

NE-BCR18-AO Results

3. 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 eight of nine planned surveys (88.9%) in 2019. Technicians conducted 86 point counts within the eight surveyed grid cells between June 3 and July 8. They detected 79 bird species, including 15 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 112 species that were detected in any year during which surveys were conducted, 25 of which are priority species. The data yielded robust density estimates (CV < 50%) for 30 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout ND-All Other for 118 species that were detected in any year during which surveys were conducted, 14 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 56 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within ND-All Other across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

ND-All Other Results

4. 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 planned surveys (100%) in 2019. Technicians conducted 84 point counts within the nine surveyed grid cells between June 1 and July 2. They detected 69 bird species, including five priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 122 species that were detected in any year during which surveys were conducted, 11 of which are priority species. The data yielded robust density estimates (CV < 50%) for 15 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout SD-All Other for 126 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 68 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within SD-All Other across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above

the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[SD-All Other Results](#)

5. All Other Lands in South Dakota BCR 18

We obtained results for all other lands in South Dakota BCR 18 by analyzing data from one stratum.

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 21 point counts within the two surveyed grid cells between July 8 and July 9. They detected 43 bird species, including zero priority species ([Appendix F](#)).

We 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 South Dakota BCR 18 across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[SD-BCR18-AO Results](#)

V. Joint Ventures

Playa Lakes Joint Venture

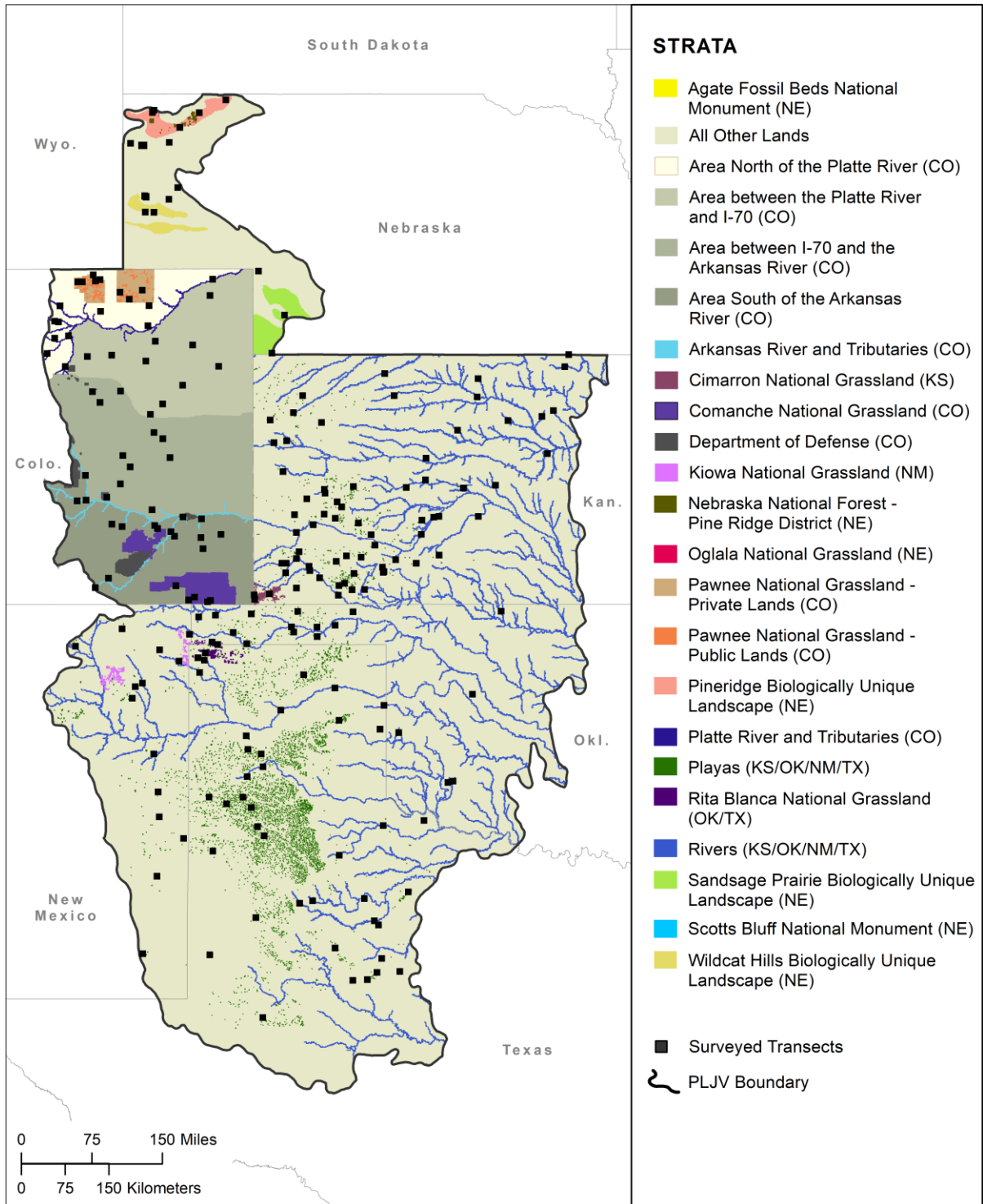


Figure 4. Survey locations in the Playa Lakes Joint Venture area in 2019.

1. Playa Lakes Joint Venture Total

We obtained results for the Playa Lakes Joint Venture area by compiling and jointly analyzing data from 43 strata in six states (Figure 4).

Field technicians completed 230 of 233 planned surveys (98.7%) in 2019. Technicians conducted 2,155 point counts within the 230 surveyed grid cells between April 22 and July 6. They detected 210 bird species, including zero priority species.

Bird Conservancy estimated densities and population sizes for 210 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 84 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout the PLJV area for 233 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 120 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within the PLJV area across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[PLJV area 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 (Figure 4).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 165 point counts within the 22 surveyed grid cells between April 25 and June 26. They detected 60 bird species, including ten priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for 98 species that were detected in any year during which surveys were conducted, 16 of which are priority species. The data yielded robust density estimates (CV < 50%) for 11 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout PLJV BCR18-Playas for 93 species that were detected in any year during which surveys were conducted, 9 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 24 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within PLJV BCR18-Playas across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in

the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[PLJV BCR18-Playas 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 (Figure 4).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 146 point counts within the 20 surveyed grid cells between April 22 and June 28. They detected 72 bird species, including 15 priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for 74 species that were detected in any year during which surveys were conducted, 19 of which are priority species. The data yielded robust density estimates (CV < 50%) for 16 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout PLJV BCR19-Playas for 70 species that were detected in any year during which surveys were conducted, 10 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 27 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within PLJV BCR19-Playas across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[PLJV BCR19-Playas 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 (Figure 4).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 331 point counts within the 35 surveyed grid cells between April 26 and June 30. They detected 136 bird species, including ten priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for 164 species that were detected in any year during which surveys were conducted, 12 of which are priority species. The data yielded robust density estimates (CV < 50%) for 53 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout PLJV BCR18-Rivers for 191 species that were detected in any year during which surveys were conducted, nine of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 91 of the species for which we estimated occupancies.

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To view a map of survey locations, density and occupancy results and species counts within PLJV BCR18-Rivers across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[PLJV BCR18-Rivers 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 (Figure 4).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 131 point counts within the 20 surveyed grid cells between April 23 and June 30. They detected 101 bird species, including 20 priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for 118 species that were detected in any year during which surveys were conducted, 24 of which are priority species. The data yielded robust density estimates (CV < 50%) for 52 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout PLJV BCR19-Rivers for 119 species that were detected in any year during which surveys were conducted, 19 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 75 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within PLJV BCR19-Rivers across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[PLJV BCR19-Rivers 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 (Figure 4).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 256 point counts within the 28 surveyed grid cells between April 25 and June 25. They detected 101 bird species, including 14 priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for 113 species that were detected in any year during which surveys were conducted, 14 of which are priority species.

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The data yielded robust density estimates (CV < 50%) for 32 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout PLJV BCR18-All Other Lands for 109 species that were detected in any year during which surveys were conducted, nine of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 38 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within PLJV BCR18-All Other Lands across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[PLJV BCR18-All Other Lands Results](#)

b) Pineridge Biologically Unique Landscape in Nebraska BCR 18

We obtained results for the Pineridge Biologically Unique Landscape by analyzing data from one stratum (Figure 4).

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 28 point counts within the two surveyed grid cells between June 12 and June 12. They detected 45 bird species, including five priority species ([Appendix E](#)).

We 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 the Pineridge Biologically Unique Landscape across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[NE-BCR18-PR Results](#)

c) Sandsage Prairie Biologically Unique Landscape in Nebraska BCR 18

We obtained results for the Sandsage Prairie Biologically Unique Landscape by analyzing data from one stratum (Figure 4).

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 21 point counts within the two surveyed grid cells between June 11 and June 26. They detected 32 bird species, including five priority species ([Appendix E](#)).

We 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.

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To view a map of survey locations and species counts within the Sandsage Prairie Biologically Unique Landscape across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[NE-BCR18-SA Results](#)

d) Wildcat Hills Biologically Unique Landscape in Nebraska BCR 18

We obtained results for the Wildcat Hills Biologically Unique Landscape by analyzing data from one stratum (Figure 4).

Field technicians completed both planned surveys (100%) in 2019. Technicians conducted 16 point counts within the two surveyed grid cells between June 17 and June 18. They detected 32 bird species, including four priority species ([Appendix E](#)).

We 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 the Wildcat Hills Biologically Unique Landscape across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[NE-BCR18-WH Results](#)

e) All Other Lands in BCR 19

We obtained results for PLJV All Other Lands in BCR 19 by compiling and jointly analyzing data from three strata in three states (Figure 4).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 142 point counts within the 20 surveyed grid cells between April 22 and June 26. They detected 98 bird species, including 20 priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for 110 species that were detected in any year during which surveys were conducted, 26 of which are priority species. The data yielded robust density estimates (CV < 50%) for 36 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout PLJV BCR19-All Other Lands for 106 species that were detected in any year during which surveys were conducted, 18 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 50 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within PLJV BCR19-All Other Lands across all years of the project, follow the web link below. Hit

Integrated Monitoring in Bird Conservation Regions: 2019 Annual Report

“Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[PLJV BCR19-All Other Lands Results](#)

VI. States

Jump to: [Colorado](#) [Montana](#) [Utah](#) [Wyoming](#)

A. Colorado

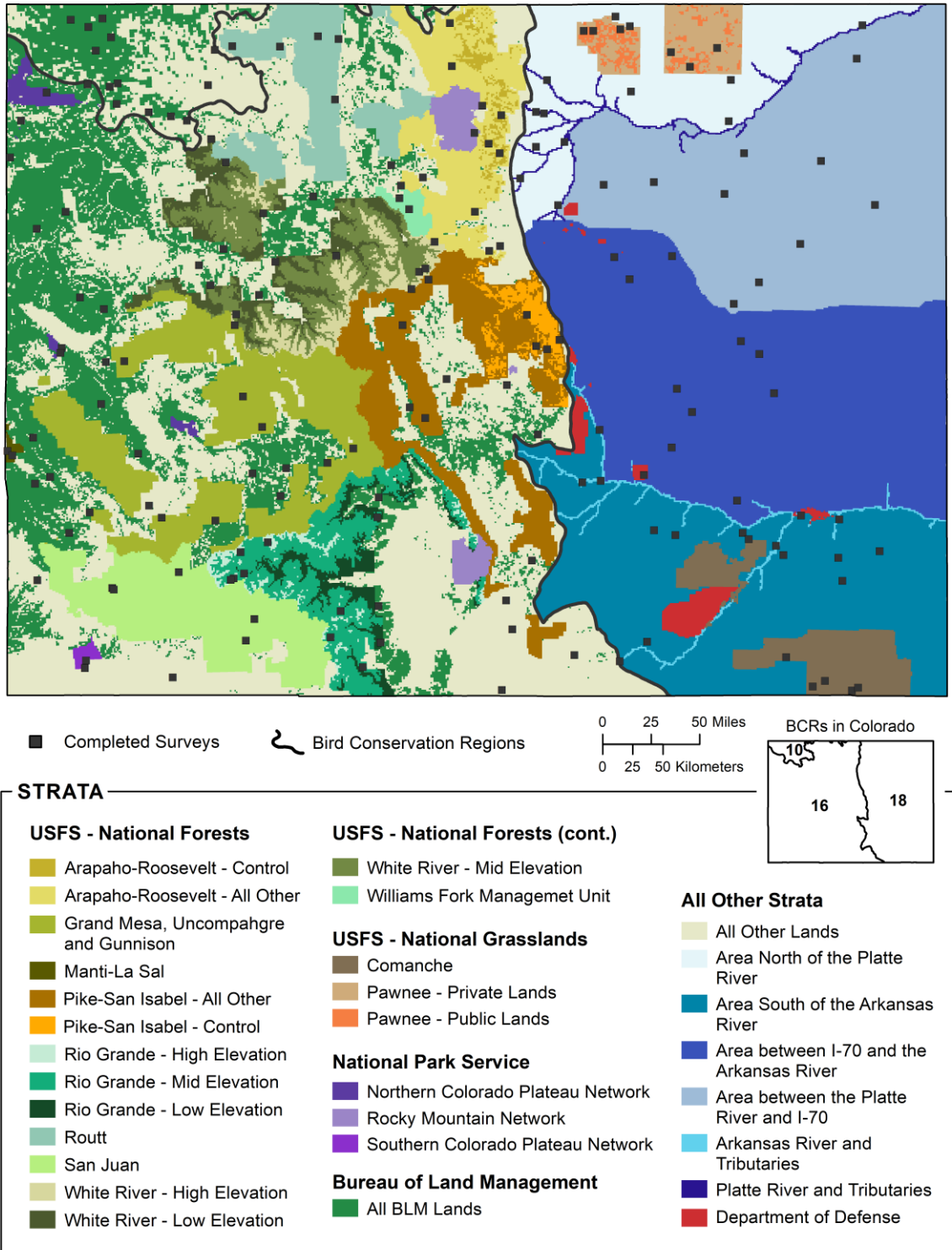


Figure 5. Survey locations in Colorado, 2019.

1. Colorado Statewide

a) Colorado Statewide: Total

We obtained results for Colorado by compiling and jointly analyzing data from 32 strata (Figure 5). For results on specific lands within Colorado, refer to section IV: Land Ownership.

Field technicians completed 178 of 180 planned surveys (98.9%) in 2019. Technicians conducted 2094 point counts within the 178 surveyed grid cells between May 18 and July 15. They detected 188 bird species, including 35 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 233 species that were detected in any year during which surveys were conducted, 45 of which are priority species. The data yielded robust density estimates (CV < 50%) for 105 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Colorado for 238 species that were detected in any year during which surveys were conducted, 30 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 154 of the species for which we estimated occupancies.

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. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO 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 5).

Field technicians completed 61 of 62 planned surveys (98.4%) in 2019. Technicians conducted 682 point counts within the 61 surveyed grid cells between May 18 and July 8. They detected 147 bird species, including 23 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 198 species that were detected in any year during which surveys were conducted, 38 of which are priority species. The data yielded robust density estimates (CV < 50%) for 79 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CO-All Other for 199 species that were detected in any year during which surveys were conducted, 22 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 113 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CO-All Other across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the

upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-All Other 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 5).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 174 point counts within the 13 surveyed grid cells between May 28 and June 14. They detected 77 bird species, including ten priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 121 species that were detected in any year during which surveys were conducted, 23 of which are priority species. The data yielded robust density estimates (CV < 50%) for 36 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CO-BCR10 for 121 species that were detected in any year during which surveys were conducted, 8 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 47 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CO-BCR10 across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BCR10 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 5).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 66 point counts within the five surveyed grid cells between May 29 and June 11. They detected 70 bird species, including nine priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 99 species that were detected in any year during which surveys were conducted, 16 of which are priority species. The data yielded robust density estimates (CV < 50%) for 30 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CO-BCR10-AO for 103 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 38 of the species for which we estimated occupancies.

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To view a map of survey locations, density and occupancy results and species counts within CO-BCR10-AO across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BCR10-AO 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 5).

Field technicians completed 104 of 105 planned surveys (99%) in 2019. Technicians conducted 1217 point counts within the 104 surveyed grid cells between May 18 and July 15. They detected 145 bird species, including 22 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 193 species that were detected in any year during which surveys were conducted, 34 of which are priority species. The data yielded robust density estimates (CV < 50%) for 87 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CO-BCR16 for 195 species that were detected in any year during which surveys were conducted, 17 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 118 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CO-BCR16 across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BCR16 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 5).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 173 point counts within the 18 surveyed grid cells between May 21 and July 8. They detected 112 bird species, including ten priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 176 species that were detected in any year during which surveys were conducted, 32 of which are priority species.

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The data yielded robust density estimates (CV < 50%) for 65 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CO-BCR16-AO for 172 species that were detected in any year during which surveys were conducted, eight of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 78 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CO-BCR16-AO across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BCR16-AO 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 5).

Field technicians completed 61 of 62 planned surveys (98.4%) in 2019. Technicians conducted 703 point counts within the 61 surveyed grid cells between May 18 and June 10. They detected 128 bird species, including 20 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 198 species that were detected in any year during which surveys were conducted, 34 of which are priority species. The data yielded robust density estimates (CV < 50%) for 45 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CO-BCR18 for 200 species that were detected in any year during which surveys were conducted, 18 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 83 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CO-BCR18 across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BCR18 Results](#)

b) Colorado BCR 18 Rivers

We obtained results for Colorado BCR 18 Rivers by compiling and jointly analyzing data from two strata (Figure 5).

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Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 137 point counts within the 12 surveyed grid cells between May 18 and June 4. They detected 104 bird species, including ten priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 169 species that were detected in any year during which surveys were conducted, 22 of which are priority species. The data yielded robust density estimates (CV < 50%) for 38 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CO-Rivers for 169 species that were detected in any year during which surveys were conducted, eight of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 69 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CO-Rivers across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-Rivers Results](#)

c) Non-river Lands in Colorado BCR 18

We obtained results for Non-river Lands in Colorado BCR 18 by compiling and jointly analyzing data from eight strata (Figure 5).

Field technicians completed 49 of 50 planned surveys (98%) in 2019. Technicians conducted 566 point counts within the 49 surveyed grid cells between May 18 and June 10. They detected 90 bird species, including 16 priority species ([Appendix F](#)).

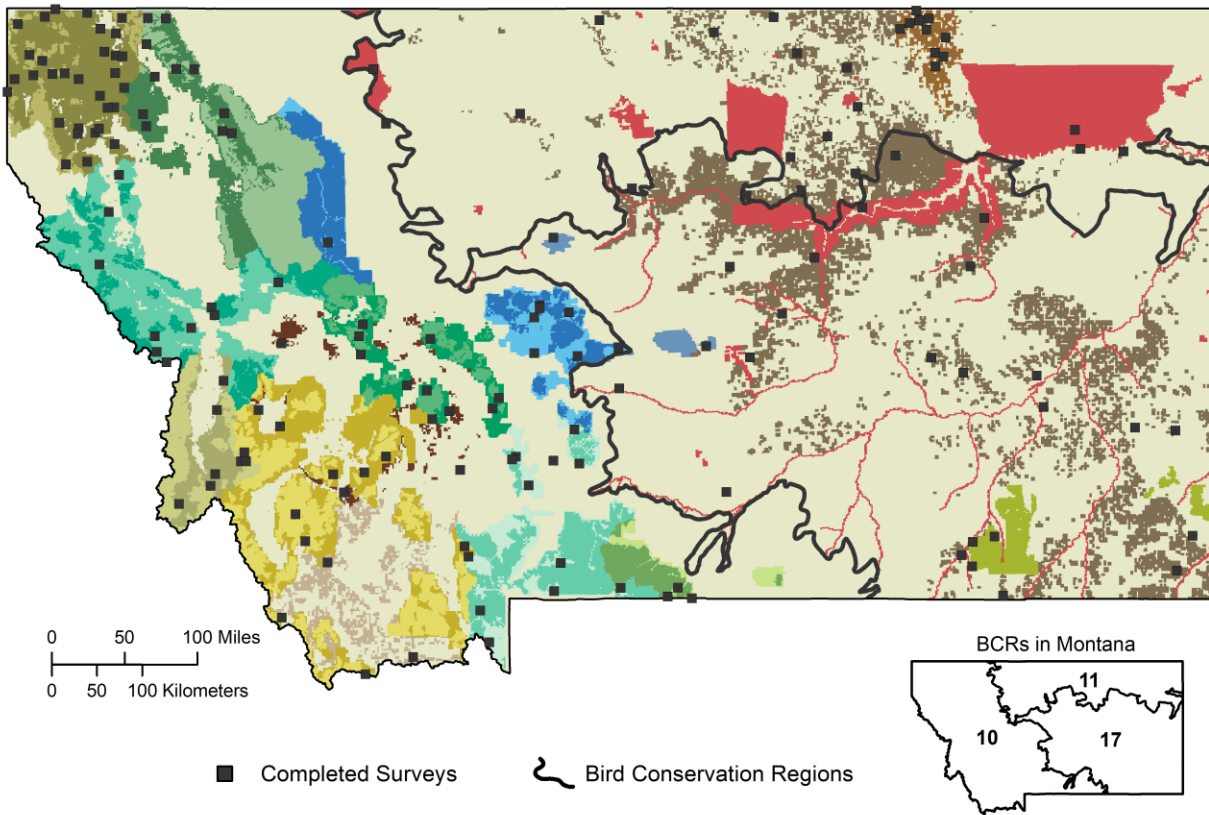
Bird Conservancy estimated densities and population sizes for 160 species that were detected in any year during which surveys were conducted, 27 of which are priority species. The data yielded robust density estimates (CV < 50%) for 39 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout CO-BCR18-Nonrivers for 159 species that were detected in any year during which surveys were conducted, 15 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 55 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within CO-BCR18-Nonrivers across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[CO-BCR18-Nonrivers Results](#)

B. Montana



STRATA

USFS - National Forests	USFS - National Forests (cont.)	All Other Strata
Beaverhead-Deerlodge - Roded/Managed	Kootenai - Roded/Managed	All Other Lands
Beaverhead-Deerlodge - Roadless/Wilderness	Kootenai - Roadless/Wilderness	US Fish & Wildlife Service Lands, Rivers, & Tribal Lands
Bitterroot - Roded/Managed	Lewis and Clark - Roded/Managed	
Bitterroot - Roadless/Wilderness	Lewis and Clark - Roadless/Wilderness	
Custer (BCR17)	Lewis and Clark (BCR 17)	
Custer - Roded/Managed	Lolo - Roded/Managed	
Custer - Roadless/Wilderness	Lolo - Roadless/Wilderness	
Flathead - Roded/Managed		
Flathead - Roadless/Wilderness		
Gallatin - Roded/Managed		
Gallatin - Roadless/Wilderness		
Helena - Roded/Managed		
Helena - Roadless/Wilderness		
	Bureau of Land Management	
	All Other BLM	
	Missoula-Butte	
	North Valley	
	Southwestern Montana	

Figure 6. Survey locations in Montana, 2019

1. Montana Statewide

a) Montana Statewide: Total

We obtained results for Montana by compiling and jointly analyzing data from 30 strata (Figure 6). For results on specific lands within Montana, refer to section IV: Land Ownership.

Field technicians completed 161 of 162 planned surveys (99.4%) in 2019. Technicians conducted 1,768 point counts within the 161 surveyed grid cells between May 24 and July 11. They detected 204 bird species, including 35 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 216 species that were detected in any year during which surveys were conducted, 39 of which are priority species. The data yielded robust density estimates (CV < 50%) for 89 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Montana for 225 species that were detected in any year during which surveys were conducted, 33 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 163 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within Montana across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[MT Results](#)

b) All Other Lands in Montana

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 215 point counts within the 16 surveyed grid cells between May 29 and July 10. They detected 111 bird species, including 15 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 177 species that were detected in any year during which surveys were conducted, 27 of which are priority species. The data yielded robust density estimates (CV < 50%) for 42 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout MT-All Other for 186 species that were detected in any year during which surveys were conducted, 13 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 101 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within MT-All Other across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the

top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[MT-All Other Results](#)

2. **Montana BCR 10**

a) Montana BCR 10: Total

We obtained results for Montana BCR 10 by compiling and jointly analyzing data from 21 strata (Figure 6).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 1098 point counts within the 109 surveyed grid cells between May 31 and July 11. They detected 160 bird species, including 23 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 197 species that were detected in any year during which surveys were conducted, 33 of which are priority species. The data yielded robust density estimates (CV < 50%) for 65 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout MT-BCR10 for 204 species that were detected in any year during which surveys were conducted, 21 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 138 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within MT-BCR10 across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[MT-BCR10 Results](#)

b) All Other Lands in Montana BCR 10

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

Field observers completed both planned surveys (100%) in 2019. Observers conducted 44 point counts within the four surveyed grid cells between May 31 and June 27. They detected 62 bird species, including seven priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 81 species that have been detected in any year, nine of which are priority species. The data yielded robust density estimates (CV < 50%) for 12 species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout All Other Lands in Montana BCR 10 for 56 species that have been detected in any year, six of

which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 24 species for which we estimated occupancy.

To view a map of survey locations, density and occupancy results and species counts within All Other Lands in Montana BCR 10 across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[MT-BCR10 - All Other Lands Results](#)

3. **Montana BCR 11**

a) Montana BCR 11: Total

We obtained results for Montana BCR 11 by compiling and jointly analyzing data from four strata (Figure 6).

Field technicians completed 27 of 28 planned surveys (96.4%) in 2019. Technicians conducted 308 point counts within the 27 surveyed grid cells between May 24 and June 30. They detected 103 bird species, including 15 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 138 species that were detected in any year during which surveys were conducted, 21 of which are priority species. The data yielded robust density estimates (CV < 50%) for 29 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout MT-BCR11 for 141 species that were detected in any year during which surveys were conducted, 14 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 63 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within MT-BCR11 across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[MT-BCR11 Results](#)

b) All Other Lands in Montana BCR 11

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 63 point counts within the five surveyed grid cells between May 29 and June 30. They detected 67 bird species, including eight priority species ([Appendix F](#)).

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Bird Conservancy estimated densities and population sizes for 112 species that were detected in any year during which surveys were conducted, 15 of which are priority species. The data yielded robust density estimates (CV < 50%) for 19 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout MT-BCR11-AO for 111 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 37 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within MT-BCR11-AO across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[MT-BCR11-AO Results](#)

4. **Montana BCR 17**

a) Montana BCR 17: Total

We obtained results for Montana BCR 17 by compiling and jointly analyzing data from five strata (Figure 6).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 361 point counts within the 25 surveyed grid cells between June 5 and July 10. They detected 116 bird species, including 15 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 189 species that were detected in any year during which surveys were conducted, 31 of which are priority species. The data yielded robust density estimates (CV < 50%) for 44 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout MT-BCR17 for 191 species that were detected in any year during which surveys were conducted, 14 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 87 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within MT-BCR17 across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[MT-BCR17 Results](#)

b) All Other Lands in Montana BCR 17

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 108 point counts within the seven surveyed grid cells between June 5 and July 10. They detected 65 bird species, including six priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 129 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates ($CV < 50\%$) for 24 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout MT-BCR17-AO for 125 species that were detected in any year during which surveys were conducted, 17 of which are priority species. The data yielded robust occupancy estimates ($CV < 50\%$) for 32 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within MT-BCR17-AO across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[MT-BCR17-AO Results](#)

C. Utah

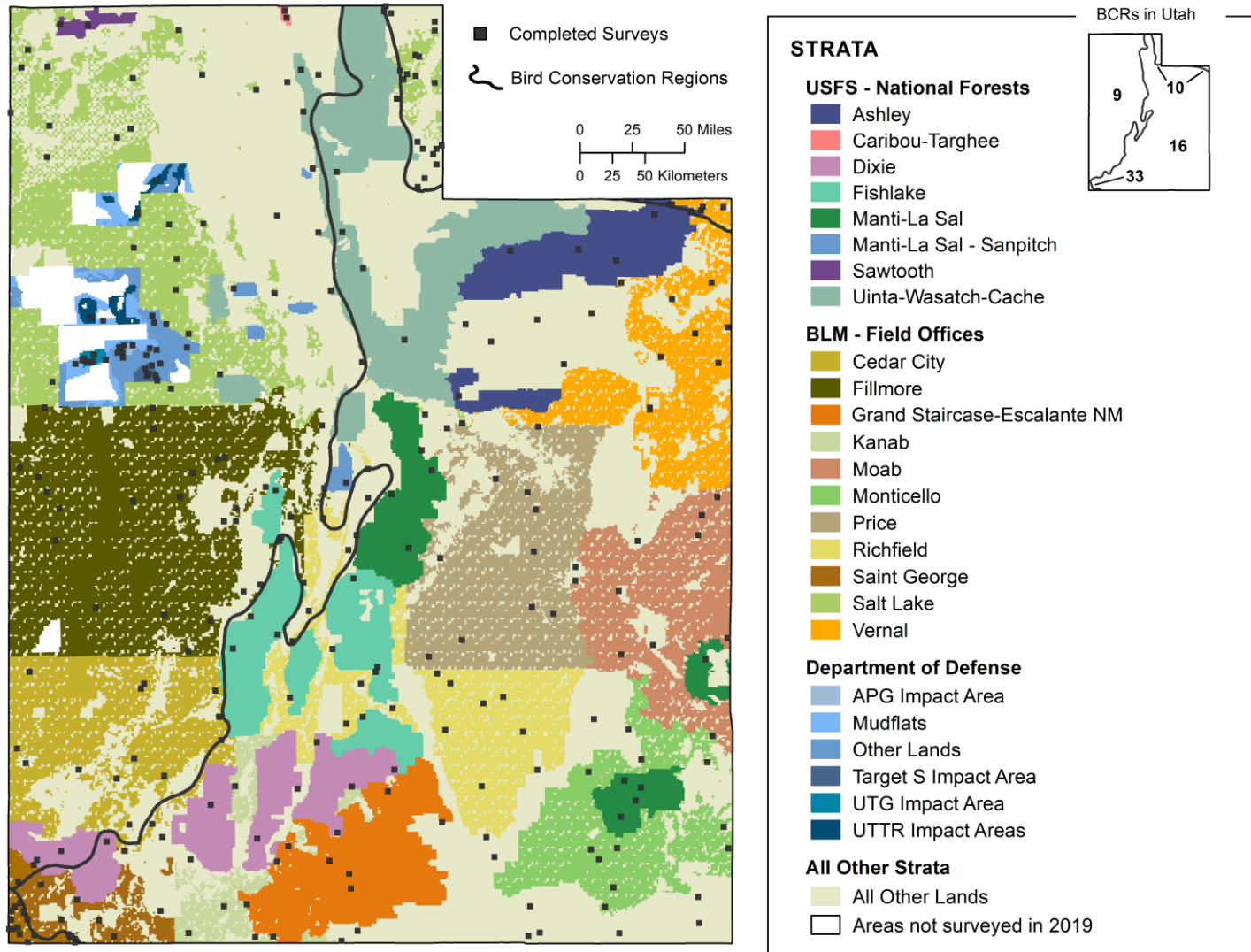


Figure 7. Survey locations in Utah, 2019.

1. Utah Statewide

a) Utah Statewide: Total

We obtained results for Utah by compiling and jointly analyzing data from 42 strata (Figure 7). For results on specific lands within Utah, refer to section IV: Land Ownership.

Field technicians completed 297 of 298 planned surveys (99.7%) in 2019. Technicians conducted 3,693 point counts within the 298 surveyed grid cells between May 3 and July 16. They detected 188 bird species, including nine priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 195 species that were detected in any year during which surveys were conducted, ten of which are priority species. The data yielded robust density estimates (CV < 50%) for 101 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Utah for 201 species that were detected in any year during which surveys were conducted, eight of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 132 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within Utah across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT Results](#)

b) All Other Lands in Utah

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 1399 point counts within the 114 surveyed grid cells between May 9 and July 16. They detected 163 bird species, including eight priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 178 species that were detected in any year during which surveys were conducted, nine of which are priority species. The data yielded robust density estimates (CV < 50%) for 87 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-All Other Lands for 178 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 89 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-All Other Lands across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy,

density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-All Other Lands Results](#)

2. **Utah BCR 9**

a) Utah BCR 9: Total

We obtained results for Utah BCR 9 by compiling and jointly analyzing data from 17 strata (Figure 7).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 1417 point counts within the 117 surveyed grid cells between May 3 and June 28. They detected 147 bird species, including six priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 143 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 69 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR9 for 152 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 85 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR9 across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR9 Results](#)

b) All Other Lands in Utah BCR 9

We obtained results for All Other Lands in Utah BCR 9 by analyzing data from one stratum (Figure 7).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 466 point counts within the 41 surveyed grid cells between May 9 and June 21. They detected 106 bird species, including five priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 119 species that were detected in any year during which surveys were conducted, five of which are priority species. The data yielded robust density estimates (CV < 50%) for 54 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR9-AO for 117 species that were detected in any year during which surveys were

conducted, four of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 46 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR9-AO across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR9-AO Results](#)

3. **Utah BCR 10**

a) Utah BCR 10: Total

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 358 point counts within the 26 surveyed grid cells between May 16 and June 26. They detected 96 bird species, including one priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 106 species that were detected in any year during which surveys were conducted, one of which are priority species. The data yielded robust density estimates (CV < 50%) for 43 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR10 for 109 species that were detected in any year during which surveys were conducted, one of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 49 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR10 across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR10 Results](#)

b) All Other Lands in Utah BCR 10

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 177 point counts within the 14 surveyed grid cells between May 16 and June 26. They detected 60 bird species, including one priority species ([Appendix F](#)).

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Bird Conservancy estimated densities and population sizes for 72 species that were detected in any year during which surveys were conducted, one of which are priority species. The data yielded robust density estimates (CV < 50%) for 20 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR10-AO for 69 species that were detected in any year during which surveys were conducted, one of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 20 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR10-AO across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR10-AO Results](#)

4. Utah BCR 16

c) Utah BCR 16: Total

We obtained results for Utah BCR 16 by compiling and jointly analyzing data from 18 strata (Figure 7).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 1673 point counts within the 137 surveyed grid cells between May 5 and July 16. They detected 162 bird species, including seven priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 176 species that were detected in any year during which surveys were conducted, eight of which are priority species. The data yielded robust density estimates (CV < 50%) for 88 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR16 for 173 species that were detected in any year during which surveys were conducted, six of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 113 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR16 across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR16 Results](#)

d) All Other Lands in Utah BCR 16

Integrated Monitoring in Bird Conservation Regions: 2019 Annual Report

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

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 533 point counts within the 44 surveyed grid cells between May 11 and July 16. They detected 128 bird species, including five priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 153 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust density estimates (CV < 50%) for 72 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR16-AO for 148 species that were detected in any year during which surveys were conducted, four of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 64 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR16-AO across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR16-AO Results](#)

5. Utah BCR 33

a) Utah BCR 33: Total

We obtained results for Utah BCR 33 by compiling and jointly analyzing data from two strata (Figure 7).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 245 point counts within the 18 surveyed grid cells between May 7 and May 22. They detected 90 bird species, including two priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 96 species that were detected in any year during which surveys were conducted, one of which are priority species. The data yielded robust density estimates (CV < 50%) for 15 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR33 for 98 species that were detected in any year during which surveys were conducted, one of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 26 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR33 across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR33 Results](#)

b) All Other Lands in Utah BCR 33

We obtained results for All Other Lands in Utah BCR 33 by analyzing data from one stratum (Figure 7).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 223 point counts within the 15 surveyed grid cells between May 9 and May 22. They detected 80 bird species, including one priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 91 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust density estimates (CV < 50%) for 23 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout UT-BCR33-AO for 90 species that were detected in any year during which surveys were conducted, zero of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 25 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within UT-BCR33-AO across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[UT-BCR33-AO Results](#)

D. Wyoming

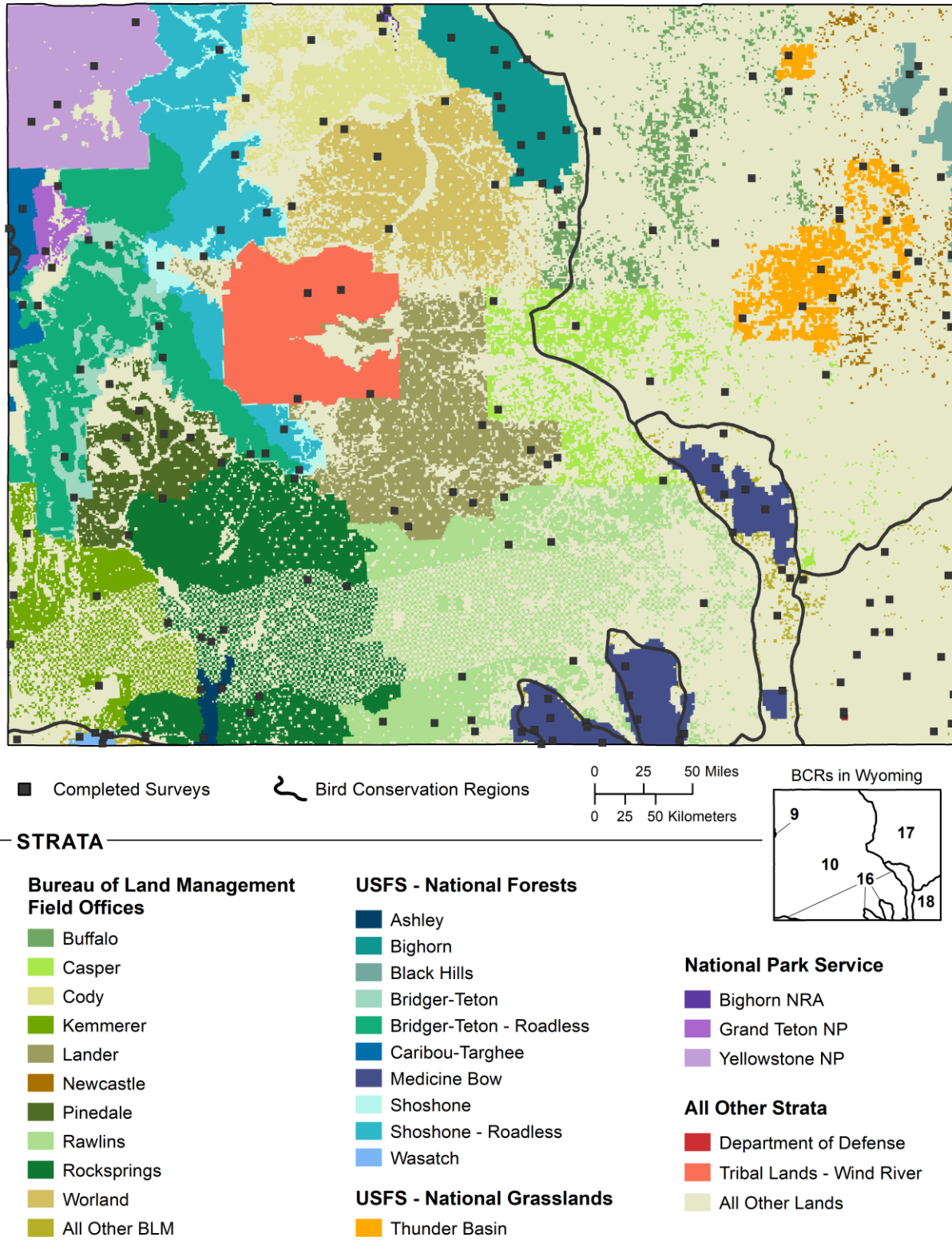


Figure 8. Survey locations in Wyoming, 2019.

1. Wyoming Statewide

a) Wyoming Statewide: Total

We obtained results for Wyoming by compiling and jointly analyzing data from 37 strata (Figure 8). For results on specific lands within Wyoming, see section IV. Land Ownership.

Field technicians completed 185 of 186 planned surveys (99.5%) in 2019. Technicians conducted 2,424 point counts within the 185 surveyed grid cells between May 23 and July 19. They detected 196 bird species, including 46 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 210 species that were detected in any year during which surveys were conducted, 55 of which are priority species. The data yielded robust density estimates (CV < 50%) for 100 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout Wyoming for 218 species that were detected in any year during which surveys were conducted, 39 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 133 of the species for which we estimated occupancies.

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. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY 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 8).

Field technicians completed 43 of 44 planned surveys (97.7%) in 2019. Technicians conducted 551 point counts within the 43 surveyed grid cells between May 23 and June 27. They detected 147 bird species, including 29 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 185 species that were detected in any year during which surveys were conducted, 45 of which are priority species. The data yielded robust density estimates (CV < 50%) for 60 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-All Other for 185 species that were detected in any year during which surveys were conducted, 24 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 80 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-All Other across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or

species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-All Other 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 8).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 1,467 point counts within the 110 surveyed grid cells between May 23 and July 18. They detected 171 bird species, including 38 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 194 species that were detected in any year during which surveys were conducted, 51 of which are priority species. The data yielded robust density estimates (CV < 50%) for 86 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR10 for 195 species that were detected in any year during which surveys were conducted, 32 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 123 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR10 across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR10 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 8).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 185 point counts within the 15 surveyed grid cells between May 23 and June 26. They detected 113 bird species, including 19 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 157 species that were detected in any year during which surveys were conducted, 31 of which are priority species. The data yielded robust density estimates (CV < 50%) for 43 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR10-AO for 155 species that were detected in any year during which surveys were

conducted, 14 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 56 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR10-AO across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR10-AO 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 8).

Field technicians completed 24 of 25 planned surveys (96%) in 2019. Technicians conducted 292 point counts within the 24 surveyed grid cells between May 27 and July 19. They detected 110 bird species, including 19 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 160 species that were detected in any year during which surveys were conducted, 34 of which are priority species. The data yielded robust density estimates (CV < 50%) for 53 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR16 for 156 species that were detected in any year during which surveys were conducted, 15 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 71 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR16 across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR16 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 8).

Field technicians completed four of five planned surveys (80%) in 2019. Technicians conducted 47 point counts within the four surveyed grid cells between May 27 and June 27. They detected 38 bird species, including eight priority species ([Appendix F](#)).

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Bird Conservancy estimated densities and population sizes for 108 species that were detected in any year during which surveys were conducted, 20 of which are priority species. The data yielded robust density estimates (CV < 50%) for 12 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR16-AO for 104 species that were detected in any year during which surveys were conducted, seven of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 18 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR16-AO across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR16-AO 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 8).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 448 point counts within the 33 surveyed grid cells between May 23 and June 10. They detected 131 bird species, including 24 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 167 species that were detected in any year during which surveys were conducted, 38 of which are priority species. The data yielded robust density estimates (CV < 50%) for 45 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR17 for 171 species that were detected in any year during which surveys were conducted, 20 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 54 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR17 across all years of the project, follow the web link below. Hit “OK” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR17 Results](#)

b) All Other Lands in Wyoming BCR 17

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We obtained results for All Other Lands in Wyoming BCR 17 by analyzing data from one stratum (Figure 8).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 169 point counts within the 12 surveyed grid cells between May 23 and June 10. They detected 107 bird species, including 16 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 137 species that were detected in any year during which surveys were conducted, 29 of which are priority species. The data yielded robust density estimates (CV < 50%) for 27 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR17-AO for 135 species that were detected in any year during which surveys were conducted, 13 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 36 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR17-AO across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR17-AO 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 8).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 190 point counts within the 16 surveyed grid cells between May 25 and June 3. They detected 71 bird species, including 13 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 101 species that were detected in any year during which surveys were conducted, 26 of which are priority species. The data yielded robust density estimates (CV < 50%) for 23 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR18 for 98 species that were detected in any year during which surveys were conducted, 11 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 24 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR18 across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR18 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 8).

Field technicians completed all planned surveys (100%) in 2019. Technicians conducted 150 point counts within the 12 surveyed grid cells between May 25 and June 3. They detected 64 bird species, including 11 priority species ([Appendix F](#)).

Bird Conservancy estimated densities and population sizes for 96 species that were detected in any year during which surveys were conducted, 24 of which are priority species. The data yielded robust density estimates (CV < 50%) for 23 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout WY-BCR18-AO for 89 species that were detected in any year during which surveys were conducted, nine of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 23 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within WY-BCR18-AO across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[WY-BCR18-AO Results](#)

VII. Bird Conservation Regions

Jump to: [Bird Conservation Region 17](#)

[Bird Conservation Region 18](#)

A. Bird Conservation Region 17

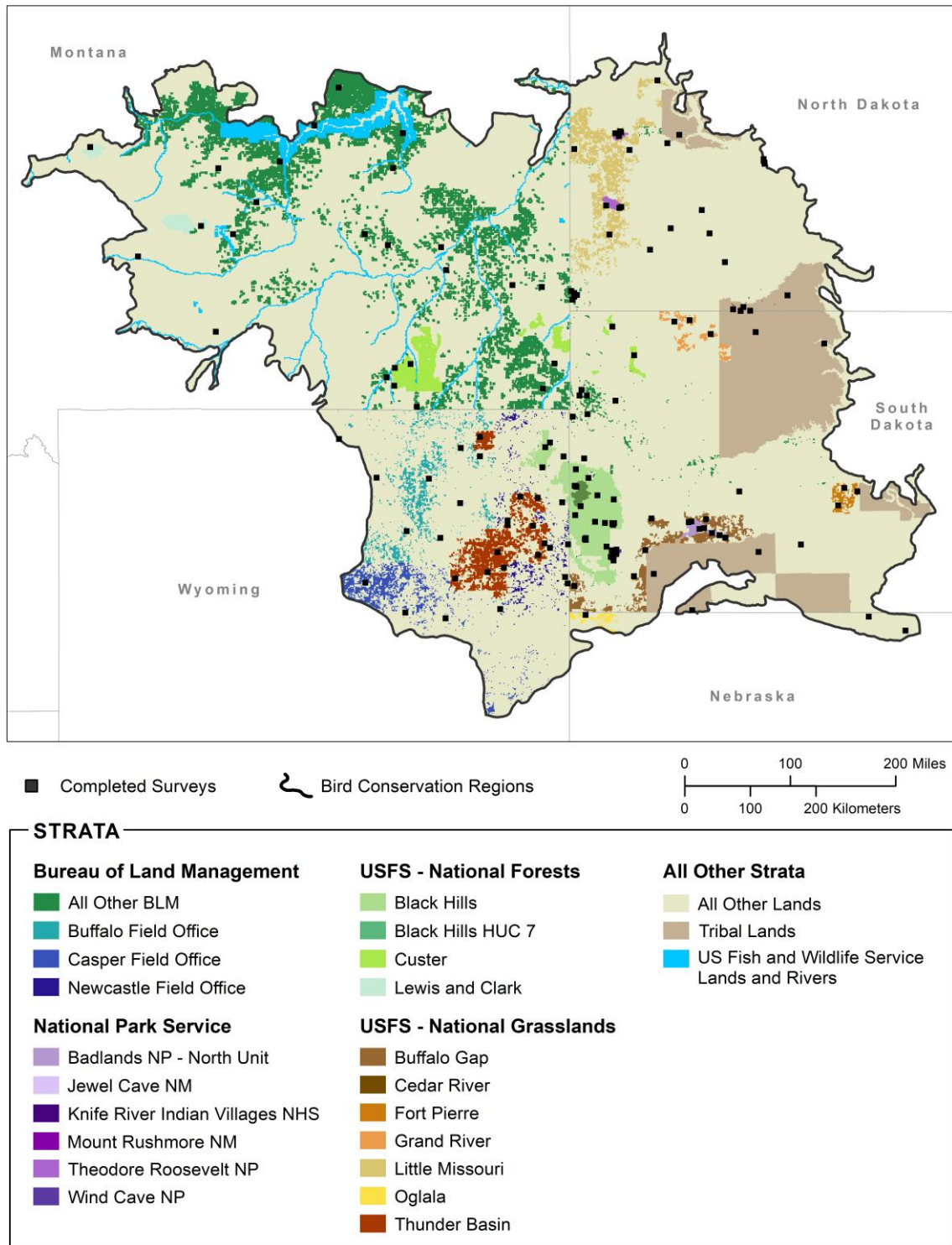


Figure 9. Survey locations in the Badlands and Prairies Bird Conservation Region (BCR 17), 2019.

BCR 17: Total

We obtained results for BCR 17 by compiling and jointly analyzing data from 33 strata in five states (Figure 9).

Field technicians completed 156 of 163 planned surveys (95.7%) in 2019. Technicians conducted 1,876 point counts within the 156 surveyed grid cells between May 23 and July 16. They detected 199 bird species, including 26 priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for 223 species that were detected in any year during which surveys were conducted, 23 of which are priority species. The data yielded robust density estimates (CV < 50%) for 80 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout BCR17 for 225 species that were detected in any year during which surveys were conducted, 23 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 119 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within BCR17 across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[BCR17 Results](#)

B. Bird Conservation Region 18

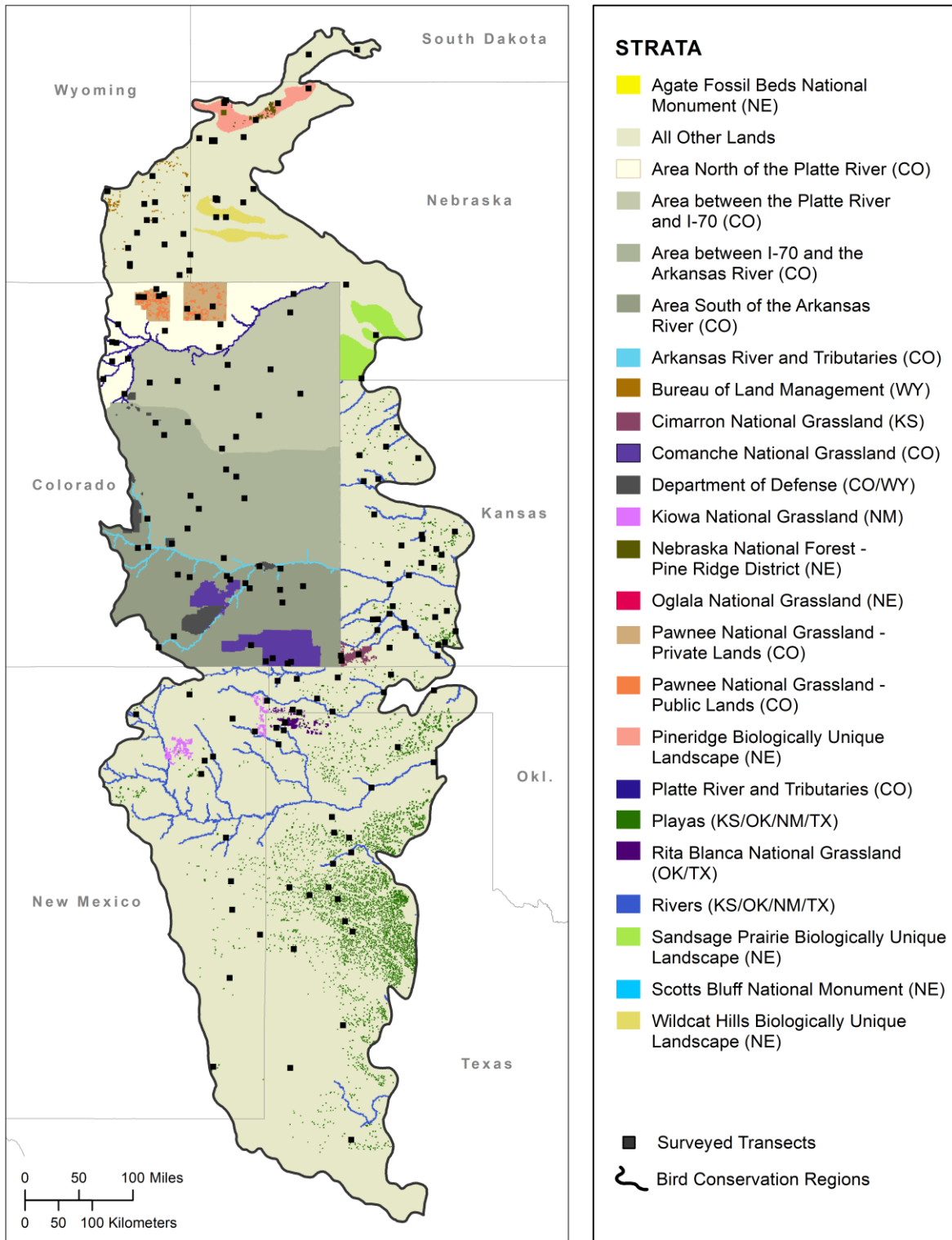


Figure 10. Survey location in the Shortgrass Prairie Bird Conservation Region (BCR 18), 2019.

BCR 18 Total

We obtained results for BCR 18 by compiling and jointly analyzing data from 37 strata in eight states (Figure 10).

Field technicians completed 188 of 191 planned surveys (98.4%) in 2019. Technicians conducted 1,947 point counts within the 188 surveyed grid cells between April 25 and July 9. They detected 187 bird species, including 19 priority species ([Appendix E](#)).

Bird Conservancy estimated densities and population sizes for 193 species that were detected in any year during which surveys were conducted, 21 of which are priority species. The data yielded robust density estimates (CV < 50%) for 68 of the species for which we estimated densities.

Bird Conservancy estimated the proportion of 1 km² grid cells occupied (Ψ , Psi) throughout BCR18 for 227 species that were detected in any year during which surveys were conducted, 18 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 108 of the species for which we estimated occupancies.

To view a map of survey locations, density and occupancy results and species counts within BCR18 across all years of the project, follow the web link below. Hit “Ok” on the Avian Data Center Disclaimer and hit the “Run Query” button highlighted in red located near the top of the page (the map will zoom to the area of interest). To view occupancy, density, or species count results, click on the respective occupancy, density, or species count tab in the upper left above the map. If you want to limit results to 2019, 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 2019, hit “Add Filter”, then “Run Query”.

[BCR18 Results](#)

Discussion

Applications of IMBCR Data

We collect breeding bird information in the Great Plains, Rocky Mountains, and Intermountain West each year and estimate occupancy, density, abundance, and population trend at a variety of spatial scales. This information is used in a variety of ways to inform avian conservation and management decisions:

1. Compare bird population estimates across space. The IMBCR program was designed to provide accurate and contextual information about bird populations from local management units up to BCRs. The hierarchical design of the IMBCR program is critical for understanding bird populations because avian responses to biotic and abiotic features are often scale-dependent (Johnson, 1980; Wiens, Rotenberry, & Van Horne, 1987). 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 landscape-level conservation efforts.
 - At the management unit scale, IMBCR population estimates are used to support local management efforts. Bird population monitoring is necessary to determine if management actions implemented in previous management cycles are achieving

conservation objectives. Stratum-level estimates are compared to state and regional estimates to determine whether local populations are above or below regional estimates, and population estimates within management units are compared to estimates in the surrounding region to evaluate the effectiveness of management actions.

- The large-scale context provides biological information for conservation planning and landscape prioritization. Population estimates help determine where to focus conservation efforts, such as targeting areas with larger populations for conservation easements and prioritizing areas with lower populations for habitat restoration.
 - The large-scale context allows an assessment of conservation responsibility. By comparing stratum and BCR-level abundance estimates, a biologist for a management unit (e.g., National Grassland) can determine what proportion of a species' regional population resides on his or her unit during the breeding season. If a significant proportion of the regional population spends time on the management unit during the breeding season, it might warrant additional conservation or protection measures.
2. Compare bird population estimates over time. Monitoring at regional and BCR-wide scales provides land managers with dependable knowledge about the status and change of bird populations at ecologically relevant scales (NABCI, 2009).
- Annual estimates of density and occupancy are 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 likely driven by declines in local abundance. In contrast, if both density and occupancy rates of a species decline over time, then population change was likely the result of reduced distribution on the landscape.
 - Land managers and conservation organizations use IMBCR population estimates to better understand annual fluctuations and long-term trends in landbird populations (NABCI, 2009). With new Bayesian analyses, we now provide population trends at multiple scales for over 300 species with a level of confidence in the direction of change. Population trends inform management plans, such as State Wildlife Action Plans and show which species should be of regional conservation concern. Managers can also set thresholds to trigger management action when populations decline above a certain rate and be informed when populations are increasing.
 - The IMBCR data are also used to investigate population, metapopulation, and community dynamics over time. Sampling units surveyed every year provide information on dynamic processes (e.g., colonization and extinction) that give rise to the patterns of abundance, occupancy, and species richness over time. This information helps generate hypotheses for potential drivers of change on the landscape that could be influencing site occupancy over time.
3. Model habitat relationships to predict species' responses to changes on the landscape. Although IMBCR sampling frames are not stratified based on vegetation, the monitoring data can be post-stratified to estimate density within primary habitat types (e.g., sagebrush shrubland).

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- Because IMBCR strata are based on fixed attributes rather than existing vegetation types, we can connect changes in bird populations to changes in vegetation (or other dynamic variables) at multiple scales. The hierarchical stratification scheme is well-suited for linking bird population responses to climate and landscape change at biogeographical scales (Opdam & Wascher, 2004).
 - Monitoring data are useful for evaluating competing hypotheses about how bird populations respond to system dynamics. Understanding regional bird population dynamics should help land managers predict species' responses to landscape change and local or large-scale conservation efforts (Jones, 2011; Noon, Bailey, Sisk, & McKelvey, 2012).
 - For project planning in specific strata (e.g., National Forest, BLM field office), the monitoring data inform environmental assessments by estimating population-level impacts from proposed activities. If the project is occurring in specific habitat(s) within the stratum, such as ponderosa pine forests, we can use the habitat-specific density estimates to calculate the number of individual birds that could be impacted within the project area.
4. The IMBCR design provides a legitimate way to extend population estimates to un-sampled regions because 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. The IMBCR data also provide a source for tool development to help land managers and resource professionals address important conservation issues and make more defensible decisions.
- Species distribution maps based on relationships between the monitoring data and environmental features (e.g., Sparks et al. 2016, Correll et al. 2016) provide an objective means for landscape prioritization to direct conservation efforts (Brooks et al. 2004). Large-scale species distribution maps combined with the local habitat relationships are useful for answering the “where” and “what to do” questions in conservation planning (Wilson et al., 2007).
 - The foundation of decision support tools (DSTs) are bird-habitat relationships used to evaluate the effectiveness of conservation practices. DSTs that integrate biological, social, and economic objectives are important for cost-effective conservation outcomes in working landscapes with multiple management objectives. For example, we developed a DST for sagebrush birds, which combined local habitat relationships developed from the bird and vegetation monitoring data, several management actions (e.g., deferred and continuous grazing), and vegetation potential within a structured framework. The tool evaluates the optimal management action to benefit sagebrush birds and forage production for livestock.
5. Auxiliary, or "overlay" projects are a growing component of the IMBCR program. They are designed to address specific management questions. Overlay 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 overlay projects by improving the accuracy and precision of population estimates for infrequently detected species and providing regional context for those estimates. Some example overlay projects include:

- a. Monitor birds in the Atlantic Rim Natural Gas area (south-central Wyoming) to determine energy development impacts on birds, and set management triggers to determine when a threshold is met for sagebrush songbird occupancy in the project area compared to surrounding BLM lands;
- b. examine community-level effects and bird species relationships with restoration treatments under the US Forest Service's Collaborative Forest Landscape Restoration Program implemented across the Front Range in Colorado;
- c. evaluate riparian songbird response to tamarisk removal and revegetation efforts along the Dolores River and tributaries in southwestern Colorado and southeastern Utah to inform future restoration efforts;
- d. compare population estimates on private ranches in the Great Plains to estimates in the surrounding region to see if participating Audubon Conservation Ranches provide breeding habitat for grassland birds and can market beef on these ranches as bird-friendly; and
- e. examine livestock grazing impacts on breeding songbirds in high altitude riparian areas in the Bridger-Teton National Forest in grazed and ungrazed allotments to inform grazing management plans.

IMBCR as an Adaptive Management Resource and Management Tool

Monitoring is integral to the management and conservation of wildlife populations (Marsh & Trenham, 2008; Sauer & Knutson, 2008). In particular, monitoring is a key part of adaptive management, providing the means for assessing the impacts of management changes and improving system understanding (Lyons et al., 2008; Nichols & Williams, 2006). The IMBCR program accommodates the principles of adaptive monitoring (Lindenmayer & 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 (Pavlacky et al., 2017). 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). As a relevant management tool, IMBCR population estimates provide information about species' responses to local management efforts, which can be compared to state-wide or BCR-wide estimates to place the local populations in a regional context.

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. The IMBCR program allows for different stratification schemes across state and regions and the re-stratification of local management units to better address partner management objectives or new questions. The flexible hierarchical design also accommodates annual fluctuation of sampling intensity without compromising regional population estimates. In

addition, overlay (auxiliary) projects can address specific management questions or hypotheses without affecting the integrity of the overall IMBCR framework.

Special Focus: Priority Grassland Bird Species of the Playa Lakes Joint Venture Region

Grassland birds are among the fastest declining group of birds in North America, according to a recent publication (Rosenberg et al. 2019). Grassland prairie converted for cropland or residential development threatens these populations on both the breeding and wintering grounds (NABCI 2016), and the loss may be as high as 700 million breeding individuals since 1970 (Rosenberg et al. 2019). To address population declines of grassland birds in the Great Plains, Playa Lakes Joint Venture (PLJV) collaborates with several state and federal agencies and NGOs to implement IMBCR surveys across the region. The “IMBCR for PLJV” monitoring program has occurred region-wide since 2016 with PLJV coordinating the funding and management partners and Bird Conservancy implementing the field work and summarizing population estimates. Below we present population estimates across the PLJV footprint for five priority species identified by PLJV partners for the short and mixed-grass prairie regions: Cassin’s Sparrow, Eastern Meadowlark, Grasshopper Sparrow, Northern Bobwhite, and Scissor-tailed Flycatcher.

Grassland birds often show low site fidelity from year-to-year as they track suitable breeding sites (Cody 1985), which are influenced by local precipitation (Niemuth et al. 2008), management actions, and disturbances (Augustine and Derner 2015). Thus, occupancy at any one site can vary annually, which stresses the importance of regional monitoring; local occupancy rates may decline due to local habitat conditions while conditions at the landscape scale remain suitable for the species (Green et al. 2019). Occupancy rates across the PLJV region for the five priority species appear relatively stable from 2016 to 2019 (Figure 11). Grasshopper Sparrow occupancy was highest during this time period, and occupancy was lowest for Eastern Meadowlark and Scissor-tailed Flycatcher (Figure 11). The PLJV region represents the western edge of Grasshopper Sparrow breeding range, and in this region, the species typically prefers breeding sites with greater grass cover and some shrubs (Vickery 1996). Therefore higher, relatively stable occupancy rates indicate the presence of suitable breeding sites for this species throughout the PLJV region. While occupancy rates were lower for Eastern Meadowlarks and Scissor-tailed Flycatchers during this period, they were still relatively stable. In this situation, it is helpful to look at density estimates to see if these populations are declining despite their relatively stable occupancy rates.

The range for a species (i.e., its occupancy across the landscape) may not change much from year-to-year, but the number of individuals using breeding sites could vary due to natural and anthropogenic drivers. Although Grasshopper Sparrow occupancy was relatively stable over the monitoring period, its density estimates show a decline during this period from 53.5 individuals/km² in 2016 to 31.5 individuals/km² in 2019 (Figure 12). Based on new [trend results](#) with IMBCR data, we are confident Grasshopper Sparrows are declining approximately 16% each year (Table 3). Although their density estimates appear relatively stable (Figure 12), Cassin’s Sparrow, Eastern Meadowlark, and Northern Bobwhite are also declining each year across the PLJV region, while Scissor-tailed Flycatchers are increasing approximately 16% each year (Table 3). It is important to note that although we are at least 90% certain of these population declines and the flycatcher’s increase, these estimates reflect four years of monitoring data. Additional years of monitoring will provide valuable insight on population estimates and change over time, especially for grassland bird populations, which tend to fluctuate in response to local conditions (e.g., precipitation).

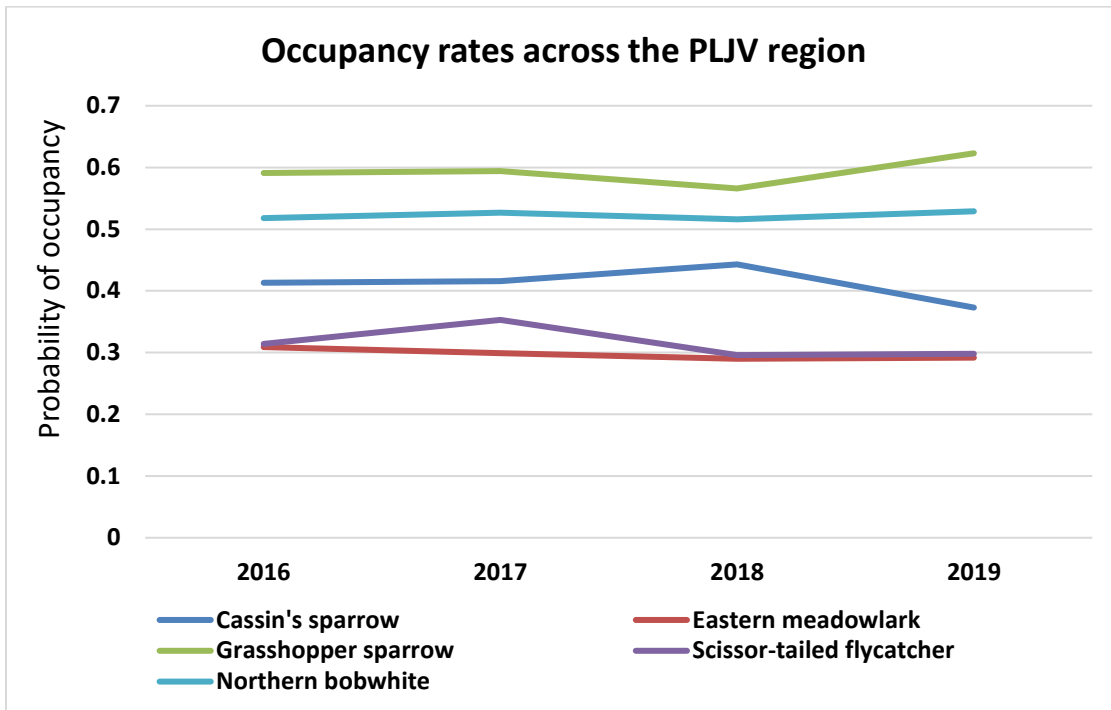


Figure 11. Occupancy rates estimated from IMBCR data for five priority grassland species in the PLJV region, 2016-2019.

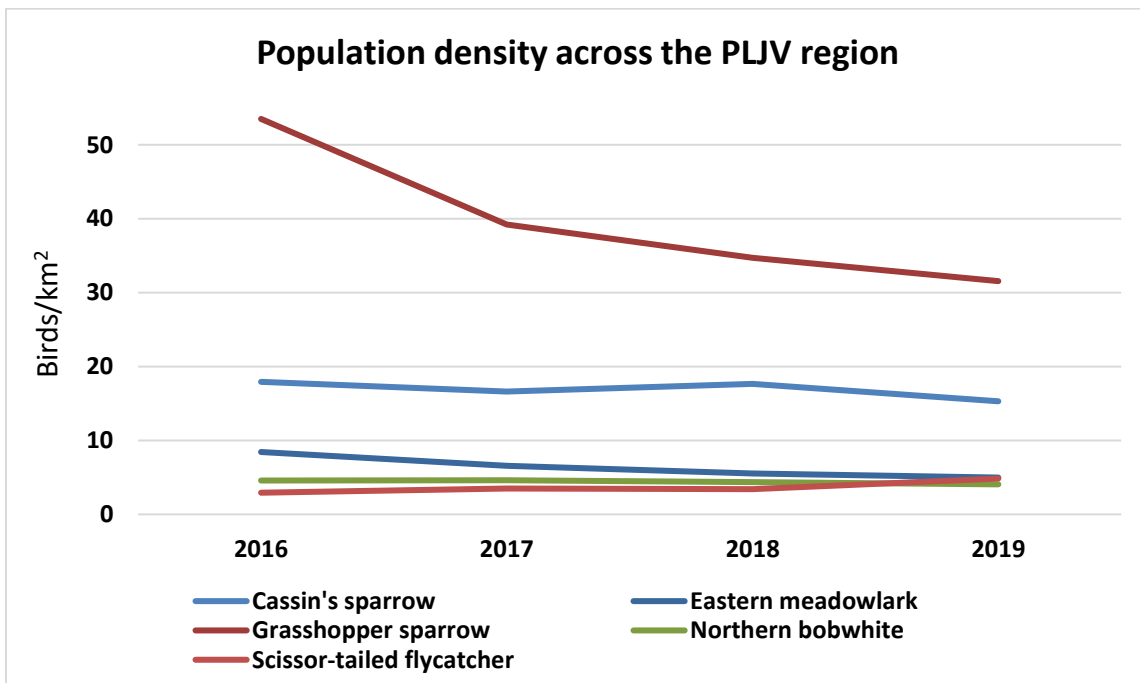


Figure 12. Population density estimated from IMBCR data for five priority grassland species in the PLJV region, 2016-2019.

Table 3. Population trend estimates for five priority grassland species across the PLJV region, 2016-2019, and for Northern Bobwhite in Cimarron National Grassland, 2016-2019. Trend metrics are mean, standard deviation (SD), and 95% lower and upper credible intervals (LCI95, UCI95). A mean >1 indicates an increasing population and a mean <1 indicates a decreasing population. Our confidence in the direction of the trend (i.e., increasing or decreasing) is represented by “Significance,” where 1 indicates 100% confidence the population is changing in the direction of the mean and 0.5 indicates an equal probability of an increasing or decreasing population.

Stratum	Species	Mean	SD	LCI95	UCI95	Significance
PLJV area	Cassin’s Sparrow	0.96	0.03	0.90	1.01	0.93
PLJV area	Eastern Meadowlark	0.84	0.03	0.78	0.91	1.00
PLJV area	Grasshopper Sparrow	0.84	0.04	0.78	0.92	1.00
PLJV area	Northern Bobwhite	0.96	0.03	0.90	1.02	0.92
PLJV area	Scissor-tailed Flycatcher	1.16	0.10	1.00	1.35	0.98
Cimarron National Grassland	Northern Bobwhite	1.19	0.10	1.01	1.41	0.98

To see if local populations in the PLJV region mirror what is occurring at the regional scale, we can compare density over the monitoring period for Northern Bobwhite across the PLJV region to a specific management unit, like Cimarron National Grassland in southwestern Kansas. While population density might be somewhat stable across a region, populations may increase or decrease within a management unit due to local habitat conditions and events. Based on a comparison of density estimates from 2016-2019, it appears Northern Bobwhite populations are higher within Cimarron National Grassland compared to the region and are increasing (Figure 13). In contrast to the declining population trend for Northern Bobwhite across the PLJV region, the bobwhite population in Cimarron National Grassland is increasing each year by approximately 19% (Table 3). The monitoring data serve as a logical place to form hypotheses for observed population fluctuations and predictions about bird response to drivers of change (Pavlacky et al. 2017). For example, we could model habitat features critical for Northern Bobwhites in the breeding season (e.g., grass and shrub cover) to understand population discrepancies between regional and local scales (Figure 13).

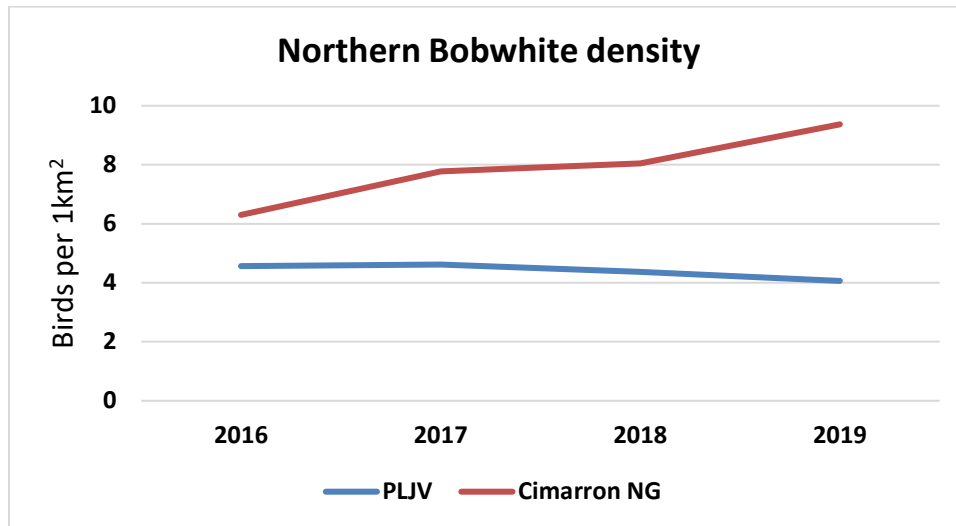


Figure 13. Northern Bobwhite density in the PLJV region (blue line) and on Cimarron National Grassland, Kansas (red line) based on IMBCR data from 2016-2019.

In addition to baseline monitoring of bird populations, PLJV also implements off-year studies to address specific management questions for regional partners. For the first off-year study, PLJV is looking at the effects of woody encroachment in the Great Plains to understand the effects on grassland birds. They mapped mesquite and eastern red cedar encroachment over the last 15 years using high-resolution satellite imagery. In spring 2019, technicians sampled in New Mexico, Oklahoma, and Texas in areas of low, medium, and high mesquite shrub cover to assess what canopy thresholds lead to changes in the grassland bird community. In spring 2020, technicians will sample in Kansas, Nebraska, and Oklahoma across a gradient of eastern red cedar encroachment. The results from this overlay study should inform how grassland birds respond to woody encroachment and prioritize areas for shrub removal.

Bird Conservancy completed a study to evaluate the effectiveness of Conservation Reserve Program (CRP) practices within the PLJV region. We post-stratified density estimates from 2016-2017 by CRP land, agricultural land, and native grassland within the PLJV region to understand the contribution of CRP to grassland bird populations (Pavlacky et al. 2018). Relative to agricultural lands, bird density was higher on CRP land for Cassin’s and Grasshopper Sparrows, Lark Buntings, and Mourning Doves, and bird density was higher on CRP land compared to native grassland for Dickcissel, Long-billed Curlew, Mourning Dove, and Northern Bobwhite. CRP lands contributed significantly to regional populations of the Dickcissel, Grasshopper Sparrow, Lark Bunting, Long-billed Curlew, Ring-necked Pheasant, and Swainson’s hawk, and land enrolled in CRP provided breeding habitat for approximately 5 million Grasshopper Sparrows in 2016 and 2017 (Pavlacky et al. 2018). A reduction in land enrolled in CRP over time may have important consequences for grassland bird populations in the PLJV region.

Bird Conservancy also began nonbreeding surveys on selected ranches in Texas in 2019 to learn about grassland bird populations on the wintering grounds. We expanded this project into a region-wide effort in the Chihuahuan Desert (BCR 35 portion) of Texas in 2020 and plan to expand these nonbreeding surveys in future years to other southwestern states and Mexico, building on previous efforts in these areas. Together, the baseline monitoring of grassland bird populations and additional studies across the breeding and nonbreeding ranges help provide information on population declines and how to most effectively reduce these losses.

Conclusion

The availability of consistent monitoring data at multiple scales is an important challenge for avian conservation (Ruth et al., 2003). The IMBCR program meets this challenge through its randomized, hierarchical design, which allows for inference to multiple strata of interest, from National Grasslands to states to BCRs (Pavlacky et al., 2017). With this design, we can model habitat relationships to evaluate species' responses to local management actions and predict species' distributions for landscape prioritization. The stratification of the IMBCR sampling frame based on eco-regional boundaries and other fixed attributes is also a critical feature of the program because it allows for the evaluation of long-term avian responses to landscape and climate change (Metzger et al., 2013; Pavlacky et al., 2017).

The importance of long-term population monitoring at larger spatial scales is well known (Jones, 2011; Thompson et al., 1998), but it is expensive and often cost-prohibitive. The IMBCR design reduces expenses through cooperation with multiple partners, one of the stated goals of effective collaboration and coordinated bird monitoring (NABCI Monitoring Subcommittee, 2007). Partners can investigate priority species and management questions with slight modifications to the IMBCR design, further reducing costs associated with developing new studies and monitoring programs. These cost savings allow for an increased sampling effort and/or for the development of decision support tools to aid land managers and conservation practitioners on the ground. Based on the spatially balanced design, the IMBCR program can also accommodate a shortage of monitoring funds in certain years or strata without reducing the overall rigor of the program (Stevens Jr. & Olsen, 2004).

The IMBCR program is well-positioned to address the conservation and management needs of a wide range of stakeholders due to its rigorous, hierarchical design and the strength of the IMBCR partnership. This partnership is an ongoing collaboration between multiple entities from state and federal agencies to non-governmental organizations, and was created to address management and conservation objectives of larger avian programs like NABCI (NABCI Monitoring Subcommittee, 2007). Through the IMBCR partnership, monitoring resources are pooled among separate management entities, promoting a more efficient use of resources and allowing for inference to larger landscapes (Pavlacky et al., 2017). By providing essential knowledge of bird populations at multiple scales relevant to management and conservation, the IMBCR program informs prioritization of management actions and facilitates a collaborative approach to bird conservation (Ruth et al., 2003, Pavlacky et al., 2017).

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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.

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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

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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 from the Great Plains to the Intermountain West. 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 across space.** 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 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 sage-grouse 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 2019 and density results for 2008 through 2019 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

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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: IMBCR Program and Stratification 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” (NABCI Monitoring Subcommittee, 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 & Hanni, 2009).

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 re-stratified 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 re-stratifications done in Colorado BCRs 10 and 16 between 2009 and 2010. The Colorado BCR 10 stratum was re-stratified 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 re-stratified because some NCPN park units were initially misclassified into the RMNW stratum. In Wyoming, the USFS Region 4 stratum was re-stratified 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 re-stratification 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 re-stratifications 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 re-stratified 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 re-stratified into two strata based on elevation for the same reason. In Montana, several strata were re-stratified 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 re-stratification 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 re-stratified 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 re-stratification 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 re-stratification 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 re-stratified 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 re-stratifying 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. Russell NWR stratum and an “All Other USFWS Lands” stratum.

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In addition to re-stratification, 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 re-stratified 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 re-stratification. 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 re-stratified for a variety of reasons. In North and South Dakota, we re-stratified 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 re-stratified 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.

2017: In 2017, the IMBCR program expanded to include Humboldt-Toiyabe National Forest in two new states, Nevada and California. This, coupled with an expansion into national forests in Idaho BCR 9 and

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Utah yielded complete coverage of USFS lands at the regional level for USFS Region 4. Idaho also experienced a significant expansion with statewide coverage of BLM lands. In a concerted effort from several implementation partners, Utah sampling included statewide coverage, including several new BLM Field Offices, All Other Lands in BCR 10, and remaining Region 4 National Forests. We also obtained complete coverage of BCR 18 for the first time by expanding into the BCR 18 portion of South Dakota.

USFWS strata in Montana BCR 11 and BCR 17 were re-combined in 2017 and reverted back to their pre-2014 areas. In Idaho, BLM Four Rivers Field Office in BCR 9 was split into two strata, incorporating the boundaries of Morley Nelson Snake River Birds of Prey National Conservation Area into the design. Additionally, we resampled All Other Lands in Nebraska BCR 17 to include eastern areas not included in the sampling frame from 2013-2016.

2018: In 2018, several Montana strata were combined to help produce statewide estimates. In BCR 10, the All Other Lands, Fish and Wildlife Service, National Park Service, Rivers, Blackfeet and Crow Reservations, and Flathead Reservation strata were combined into a single All Other Lands Stratum. In Montana BCR 11, we collapsed the Fish and Wildlife Service and Tribal Lands strata into a single Fish and Wildlife Service and Tribal Lands stratum. Two strata in Montana BCR 17, Fish and Wildlife Service and Rivers, were combined into a single Fish and Wildlife Service and Rivers stratum.

Additionally, Agate Fossil Beds National Monument and Scotts Bluff National Monument in Nebraska BCR 18 were combined into a single National Park Service Lands Stratum. In South Dakota BCR 17, the Badlands National Park - South Unit and Tribal Lands strata were combined into a single, new Tribal stratum, and Jewel Cave National Monument and Mount Rushmore were also collapsed into one National Park Service lands stratum.

Finally, Department of Defense strata in Utah were completely re-stratified to better assess the effects of military training on bird species.

2019: In 2019, the IMBCR program expanded to include all BLM lands in BCR 9 in California, Nevada, and Oregon. Great Basin Bird Observatory, Klamath Bird Observatory, and Point Blue conducted the field work in these new areas. This expansion improved coverage of sagebrush-steppe habitat.

The National parks strata in Nebraska and South Dakota that were collapsed in 2018 were separated into individual park units again in 2019 as they were in years previous to 2018. The individual park strata are Agate Fossil Beds National Monument and Scotts Bluff National Monument in Nebraska and Jewel Cave National Monument and Mount Rushmore in South Dakota.

Appendix C: 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, observers 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. Observers 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). Observers 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 observers could record the actual minute of each bird detection during a point count. Previously, observers used tick marks to separate minute intervals. We added a “visual” checkbox to the bird datasheet for observers to check if they visually observed and identified any of the species recorded. This reminds observers 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 observers 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, observers 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, observers 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, observers 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, observers 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 observers to survey no later than five hours after sunrise in 2012. Observers 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 observers 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 observers to only identify the sex of a visually observed bird of a sexually dimorphic species. We instructed observers 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 observers 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 observers 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

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vegetation was present, observers 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, observers 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 observers spend estimating these values.

In 2012, crew leaders provided observers 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 observers recorded all contacts or attempted contacts they had with landowners. This information was later entered into the landowner database when the observer had internet access.

In 2015, we began recording American pika, similarly to the way we record Abert's and American red squirrels. In 2017, we added a checkbox onto the vegetation data sheet to mark the presence/absence of invasive cheatgrass.

In 2018, we made one change to the ground cover section of the vegetation protocol to collect more specific data on ground cover types. We split the bare/litter ground cover category into bare ground and litter cover so that future analyses could treat these categories separately.

Appendix D: Data Analysis

Distance Analysis

Density and Abundance Estimation

State process

We developed a zero-inflated N-mixture model (Royle 2004, Sillett et al. 2011) to estimate density and abundance for all strata and superstrata across all species with sufficient data. For a given species, the true occupancy state of point count location k in grid j , stratum i , and year t is distributed

$$z_{ijkt} \sim \text{Bern}(\psi_i).$$

The number of independent clusters of individuals, N , of a given species at point count location k in grid j , stratum i , and year t came from a Poisson distribution

$$N_{ijkt} \sim \text{Poisson}(\lambda_{ijt} \times z_{ijkt})$$

with mean λ_{ijt} . Abundances at all points within a grid came from a distribution with the same mean to account for the lack of independence between points, and we modeled λ as a function of time to estimate trend for each stratum:

$$\log(\lambda_{ijt}) = \alpha_i + r_i(t - 1) + \varepsilon_j,$$

where α and r are stratum-specific intercepts and trends, respectively, and ε is a grid-specific random effect.

To avoid predicting species occurrence outside of observed ranges, we fixed ψ to 0 for all strata in which the species was never observed and used a prior informed by the observed proportion of grid-year combinations in a stratum in which the species was detected

$$\text{logit}(\psi_i) \sim \text{Normal}(\mu_{\psi_i}, \sigma_{\psi}^2),$$

where μ_{ψ_i} is the stratum-specific naïve occupancy and σ_{ψ}^2 is the annual variation in occupancy probabilities shared across strata. All other parameters had vague priors:

$$\alpha \sim \text{Normal}(0, 4),$$

$$\exp(\mathbf{r}) \sim \text{Uniform}(0.25, 1.75),$$

$$\varepsilon \sim \text{Normal}(0, \sigma_{\varepsilon}^2),$$

and

$$\sigma_{\varepsilon}^2 \sim \text{Uniform}(0, 5).$$

We derived density, D , at the point count location as

$$D_{ijkt} = \frac{N_{ijkt} \times s}{A_c},$$

where A_c is the area of the point count circle (see *Observation process* section below) and s is the cluster size, which was sampled from the distribution

$$s \sim \text{Gamma}(k, \theta) + 1,$$

where k and θ were derived from the mean and variance of observed cluster sizes. We subtracted 1 from the mean when calculating k and θ and added 1 to the random variable to ensure cluster sizes were ≥ 1 . We derived stratum-level density estimates by averaging all point-level density estimates within each stratum, and we took the area-weighted average of strata estimates to obtain superstrata estimates.

Observation process

We estimated the probability of detecting an independent cluster of individuals by fitting distance functions to the distance data collected during surveys (Buckland et al. 2001). We fit four detection models including: 1) half-normal constant (HN(.)), 2) hazard rate constant (Haz(.)), 3) half-normal year (HN(t)), and 4) hazard rate year (Haz(t)).

We removed the furthest 10% of observed detection distances from the data set and binned the remaining detections into 10 evenly spaced distance classes. For half-normal functions, we calculated the detection probability, p , for each distance class, l , as:

$$p_l = \frac{2\pi \int_{c=b_l}^{c=b_{l+1}} \exp\left(-\frac{c^2}{2\theta^2}\right) c \, dc}{A_l},$$

where b_l and b_{l+1} are the cutpoints for l , θ is the half-normal shape parameter, and A_l is the area of l . Because of the lack of an analytical solution to the integral of the hazard rate function, we calculated p at the midpoint, m , of each distance class

$$p_l = 1 - \exp\left(-\left(\frac{m_l}{a}\right)^b\right).$$

To allow detection probabilities to vary by year, we sampled year-specific shape parameters from hyperdistributions:

$$\theta_t \sim \text{Normal}(\mu_\theta, \sigma_\theta^2),$$

$$a_t \sim \text{Normal}(\mu_a, \sigma_a^2),$$

and

$$b_t \sim \text{Normal}(\mu_b, \sigma_b^2),$$

with priors of

$$\mu_\theta \sim \text{Unif}(0,1000),$$

$$\mu_a \sim \text{Unif}(0,500),$$

$$\sigma_\theta, \sigma_a, \mu_b \sim \text{Unif}(0,100),$$

and

$$\sigma_b \sim \text{Unif}(0,25).$$

We then multiplied p_l by the proportional area of l to account for the probability that a cluster is within distance class l and obtain π_l , the probability a cluster is present within distance class l and is detected,

$$\pi_{lt} = \frac{p_{lt} A_l}{\sum_{l=1}^L A_l}.$$

We calculated the overall capture probability, p_{cap} , as

$$p_{cap} = \sum_{l=1}^L \pi_l,$$

and modeled the number of detections in each distance class at each point count location in year t as

$$y_{ijkt} \sim \text{Multinom}(\boldsymbol{\pi}_t, N_{ijkt}).$$

Detection model selection

To find the most parsimonious detection function while minimizing computing time, we fit detection-only models to the distance data, using the four model structures described above. We used the Watanabe-Akaike Information Criterion (WAIC; Watanabe 2010, Hooten and Hobbs 2015) to select the most parsimonious detection structure and then used that structure for detection probabilities in the full model to estimate density and abundance.

Superstratum trends

We developed a post-hoc approach to estimate trends for superstrata. Using the rolled-up estimates of density for superstratum, i , we fit a general linear model (GLM) to the samples from each Bayesian iteration, m ,

$$\log(\widehat{D}_{itm}) \sim \alpha_{im} + r_{im}(t - 1).$$

Fitting a GLM across iterations allowed us to incorporate uncertainty in trends due to uncertainty around density estimates, but it did not account for temporal variation. To incorporate this second form of variation, we sampled a random intercept ($\tilde{\alpha}_{im}$) and slope (\tilde{r}_{im}) for each iteration using the mean and standard error estimated using the GLM and made inference on the distribution of the resampled values,

$$\tilde{\alpha}_{im} \sim \text{Normal}(\mu_{\alpha_{im}}, SE_{\alpha_{im}})$$

and

$$\tilde{r}_{im} \sim \text{Normal}(\mu_{r_{im}}, SE_{r_{im}}).$$

Occupancy Estimation

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 Bayesian, multi-scale occupancy model (Nichols et al. 2008, Mordecai et al. 2011, Green et al. 2019) 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) and 3) the proportion of sampling units occupied by a species (ψ).

We truncated the data, using only detections <125 m from the sample points, except for species in Accipitriformes, Anseriformes, Falconiformes, Galliformes, Gruiformes, Pelecaniformes, Podicipediformes, and Suliformes for which we used the maximum observed distance for each species.

Truncating the data 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 θ (the proportion of points occupied within each sampling unit) (Pavlacky Jr., Blakesley, White, Hanni, & Lukacs, 2012). The interpretation of θ for species for which we used maximum distances changes from occupancy to use because point count buffers overlap, but we chose this approach to provide estimates for a larger number of species.

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 (ψ) for each stratum by estimating BCR by year specific estimates of detection (p) and point-level occupancy (θ). We fixed p and θ to 0 for BCRs in which a particular species was never detected. Otherwise these parameters came from hyperdistributions,

$$\text{logit}(p_{BCR,t}) \sim \text{Normal}(\mu_{p_{BCR}}, \sigma_p^2)$$

and

$$\text{logit}(\theta_{BCR,t}) \sim \text{Normal}(\mu_{\theta_{BCR}}, \sigma_\theta^2),$$

where μ_p and μ_θ are BCR-specific means for detection and point-level occupancy, respectively, and σ_p^2 and σ_θ^2 are the annual variances shared across BCRs.

We fixed ψ to 0 for all strata in which the species was never detected. Otherwise, the true occupancy state ($z_{i,t}$) of a 1-km² grid cell, j , in a given year, t , in stratum i was modeled as

$$z_{ijt} \sim \text{Bernoulli}(\psi_{it})$$

and

$$\text{logit}(\psi_{it}) \sim \text{Normal}(\mu_{\psi_i}, \sigma_\psi^2),$$

where μ_{ψ_i} is the stratum-specific mean occupancy rate on the logit scale and σ_ψ^2 is the annual variance shared across all strata. As with density, we took an area-weighted mean of stratum-level occupancy estimates (i.e., ψ) to estimate superstratum-level occupancy probabilities.

The true point-level occupancy state (u) was conditional on the grid-cell-level occupancy state (i.e., $z = 1$, occupied; $z = 0$, unoccupied), such that a point could only be occupied if the grid cell was occupied,

$$u_{ijkt} \sim \text{Bernoulli}(\theta_{BCR,t} \times z_{ijt}).$$

Finally, we modeled the observation process conditional on the point being occupied (i.e., $u = 1$) as

$$y_{ijkt} \sim \text{Binomial}(p_{BCR,t} \times u_{ijkt}, J_{ijkt}),$$

where y_{ijkt} are the observation data at point k in year t ($y = 1$, observed; $y = 0$, not observed) and J_{ijkt} is the 2-minute interval in which the species was first detected (i.e., $J = 1$, 1-2 minutes, $J = 2$, 3-4 minutes, $J = 3$, 5-6 minutes or not detected).

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 θ (Nichols et al., 2008; Pavlacky Jr. et al., 2012). We considered both p and θ to be nuisance variables that were important for generating unbiased estimates of ψ . θ 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 Jr. et al., 2012).

Automated Analysis

We updated our analytical methods and are used Bayesian hierarchical models specifically designed for analysis of IMBCR data. We performed all data and output manipulation in R (R Core Team, 2019) and model fitting in JAGS (Plummer 2003, 2017) using the R package jagsUI (Kellner 2018). The R code called the raw data from the IMBCR Structured Query Language (SQL) server database and reformatted the data into a form usable with the JAGS code. 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 R code provided an automated framework for combining strata-level estimates of population density and site occupancy at multiple spatial scales, as well as estimating the standard deviations and credible intervals for the combined estimates.

We fit initial models to all species with at least 30 detections for density estimation and 10 detections for occupancy estimation. For density estimation, we fit the full model after determining whether there were enough detections based on results from the detection-only model fits. In some cases for both density and occupancy estimation, it was necessary to use a less parsimonious detection structure or simplified model structure to facilitate model convergence. We currently maintain version control of the automated analysis code in the Bird Conservancy repository (Atlassian Stash, version 3.6.1

Appendix E: Priority Species Designations by Partners in Flight

Priority species detected in Bird Conservation Regions (BCRs) surveyed in 2019, as designated by Partners in Flight. BCRs include BCR 9 (Great Basin), BCR 10 (Northern Rockies), BCR 11 (Prairie Potholes), BCR 15 (Sierra Nevada) and 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 Mojave 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.

Species	Partners in Flight										Occupancy Estimate	Density Estimate
	BCR 9	BCR 10	BCR 11	BCR 15	BCR 16	BCR 17	BCR 18	BCR 19	BCR 33	BCR 34		
Abert's Towhee									RS		X	X
American Avocet	RC,RS				RC						X	X
American Bittern	RC	RC			RC						X	X
American Coot	RC		RS								X	X
American Dipper		RS		RC	RC	RC				RC	X	X
American Kestrel	RC	RC			RC					RC	X	X
American White Pelican	RC		RC,RS								X	X
American Wigeon						RC					X	X
Ash-throated Flycatcher				RC							X	X
Baird's Sparrow		RC	RC,RS			RC					X	X
Baltimore Oriole								RC			X	X
Band-tailed Pigeon				RC	RC					RC	X	X
Bank Swallow			RC								X	X
Bell's Vireo										RC	X	X
Belted Kingfisher	RC										X	X
Bewick's Wren								RC		RC	X	X
Black Rosy-Finch	RC	RS,RC			RC						X	X
Black Tern	RC	RC	RC,RS		RC		RC	RC			X	
Black-billed Cuckoo			RC			RC		RC			X	X
Black-billed Magpie						RC					X	X
Black-chinned Hummingbird										RC	X	X

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Species	Partners in Flight										Occupancy Estimate	Density Estimate
	BCR 9	BCR 10	BCR 11	BCR 15	BCR 16	BCR 17	BCR 18	BCR 19	BCR 33	BCR 34		
Black-chinned Sparrow	RC									RC	X	X
Black-tailed Gnatcatcher									RS,RC		X	X
Black-throated Gray Warbler	RC			RC	RC					RC	X	X
Blue-winged Teal			RS								X	X
Bobolink	RC	RC	RS								X	X
Brewer's Blackbird	RS										X	X
Brewer's Sparrow	RC,RS	RC		RC	RC	RC					X	X
Bridled Titmouse										RS	X	X
Broad-tailed Hummingbird					RS,RC						X	X
Brown Creeper				RC							X	X
Brown Thrasher			RC					RC			X	X
Brown-capped Rosy-Finch					RS,RC						X	X
Bullock's Oriole				RC				RC	RC	RC	X	X
Burrowing Owl						RC		RC			X	X
Cactus Wren									RC		X	X
California Gull	RS			RC							X	X
California Quail	RS										X	X
Calliope Hummingbird	RS	RS									X	X
Canvasback			RS								X	
Cassin's Finch	RS	RC,RS		RC	RC						X	X
Cassin's Sparrow							RC,RS	RC			X	X
Cassin's Vireo		RS									X	X
Chestnut-collared Longspur		RC	RC,RS			RC	RC				X	X
Chimney Swift								RC			X	X
Chipping Sparrow		RC									X	X
Cinnamon Teal	RS	RC						RC			X	X
Clark's Nutcracker		RS			RC,RS					RC	X	X
Clay-colored Sparrow			RS								X	X
Common Nighthawk	RC	RC			RC					RC	X	X

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Species	Partners in Flight										Occupancy Estimate	Density Estimate
	BCR 9	BCR 10	BCR 11	BCR 15	BCR 16	BCR 17	BCR 18	BCR 19	BCR 33	BCR 34		
Common Poorwill	RC									RC	X	X
Cordilleran Flycatcher										RC	X	X
Costa's Hummingbird									RC,RS		X	
Dickcissel								RS			X	X
Dusky Flycatcher		RS									X	X
Dusky Grouse		RS								RC	X	X
Eared Grebe	RS										X	X
Eastern Kingbird			RC					RC			X	X
Eastern Meadowlark								RC			X	X
Evening Grosbeak		RC		RC	RC						X	X
Ferruginous Hawk	RC	RC	RS			RC	RC	RC			X	X
Forster's Tern	RC,RS	RC			RC		RC				X	
Franklin's Gull	RC	RC	RC,RS			RC		RC			X	X
Gambel's Quail									RS		X	X
Gila Woodpecker									RS,RC		X	X
Gilded Flicker					RC				RC	RC	X	X
Golden Eagle				RC	RC	RC					X	X
Golden-crowned Kinglet		RC									X	X
Grace's Warbler					RS,RC					RC	X	X
Grasshopper Sparrow			RC			RC	RC	RC			X	X
Gray Flycatcher	RS										X	X
Gray Vireo					RS				RC		X	X
Greater Prairie-Chicken			RC			RC	RC	RC,RS			X	X
Greater Sage-Grouse	RC	RS,RC	RC	RC	RC	RC					X	X
Green-tailed Towhee	RS,RC				RS						X	X
Green-winged Teal		RC									X	X
Hammond's Flycatcher		RS									X	X
Hooded Oriole									RC	RC	X	
Juniper Titmouse					RS						X	X

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Species	Partners in Flight										Occupancy Estimate	Density Estimate	
	BCR 9	BCR 10	BCR 11	BCR 15	BCR 16	BCR 17	BCR 18	BCR 19	BCR 33	BCR 34			
Killdeer	RC		RC									X	X
Lark Bunting		RC	RC			RS,RC	RC,RS	RC				X	X
Lark Sparrow								RC				X	X
Lazuli Bunting	RS	RS			RC							X	X
Least Tern			RC			RC	RC	RC				X	X
Lesser Prairie-Chicken							RC,RS	RC,RS				X	X
Lesser Scaup			RS									X	X
Lewis's Woodpecker	RS,RC	RC,RS		RC	RC	RC	RC				RC	X	X
Loggerhead Shrike						RC	RC	RC	RC	RC		X	X
Long-billed Curlew	RC		RC	RC	RC	RC	RC	RC				X	X
Long-eared Owl	RC											X	
Lucy's Warbler									RC	RS		X	X
MacGillivray's Warbler	RC	RS										X	X
Marbled Godwit		RC	RC,RS			RC						X	X
Marsh Wren			RS									X	X
McCown's Longspur		RC	RC,RS		RC	RC	RC					X	X
Mexican Jay											RS	X	X
Mississippi Kite								RS				X	X
Mountain Bluebird		RS			RS,RC							X	X
Mountain Chickadee	RC	RS			RC						RC	X	X
Mountain Plover	RC	RC	RC		RC	RC	RC,RS					X	X
Mountain Quail				RS								X	X
Northern Bobwhite								RC				X	X
Northern Goshawk		RC				RC						X	X
Northern Harrier	RC		RC,RS		RC	RC	RC	RC				X	X
Northern Pintail		RC	RC		RC	RC	RC					X	X
Northern Rough-winged Swallow	RC											X	X
Olive-sided Flycatcher	RC	RC		RC	RC							X	X
Phainopepla											RC	X	X

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Species	Partners in Flight										Occupancy Estimate	Density Estimate	
	BCR 9	BCR 10	BCR 11	BCR 15	BCR 16	BCR 17	BCR 18	BCR 19	BCR 33	BCR 34			
Pine Siskin	RC	RS										X	X
Pinyon Jay	RS,RC	RC		RC	RS,RC	RC	RC		RC	RC		X	X
Plumbeous Vireo		RC			RS					RC		X	X
Prairie Falcon					RC	RC	RC			RC		X	X
Pygmy Nuthatch				RC	RS					RS		X	X
Pyrrhuloxia									RC			X	X
Red Crossbill		RC										X	X
Red-breasted Nuthatch		RS										X	X
Red-faced Warbler										RS		X	X
Redhead	RC		RS									X	X
Red-headed Woodpecker			RC			RC	RC	RC				X	X
Red-naped Sapsucker	RC	RS			RC							X	X
Rock Wren	RS						RC					X	X
Rufous Hummingbird		RC										X	X
Rufous-winged Sparrow									RS			X	X
Sage Thrasher	RC,RS	RS,RC			RC							X	X
Scaled Quail					RC		RC	RC		RC		X	X
Scissor-tailed Flycatcher								RC				X	X
Scott's Oriole	RC								RC	RC		X	X
Sharp-tailed Grouse	RC											X	X
Short-eared Owl	RC		RC		RC		RC					X	X
Sora			RS									X	X
Spotted Towhee										RC		X	X
Sprague's Pipit			RS,RC			RC						X	X
Swainson's Hawk			RS					RC				X	X
Townsend's Solitaire		RS										X	X
Townsend's Warbler	RC	RS,RC										X	X
Upland Sandpiper		RC	RC				RC	RC				X	X
Varied Thrush	RC	RC										X	X

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Species	Partners in Flight										Occupancy Estimate	Density Estimate	
	BCR 9	BCR 10	BCR 11	BCR 15	BCR 16	BCR 17	BCR 18	BCR 19	BCR 33	BCR 34			
Vaux's Swift		RC		RC								X	X
Veery	RC	RC										X	X
Verdin									RC			X	X
Vesper Sparrow	RC	RC	RS		RC	RC						X	X
Violet-green Swallow					RC							X	X
Virginia's Warbler	RC				RS,RC					RC		X	X
Warbling Vireo		RS		RC								X	X
Western Bluebird					RS							X	X
Western Grebe	RS											X	X
Western Kingbird							RS					X	X
Western Meadowlark			RC				RC	RC				X	X
Western Tanager		RS										X	X
Western Wood-Pewee		RC,RS		RC						RC		X	X
White-tailed Ptarmigan		RC			RC							X	X
White-throated Swift					RC					RC		X	X
Willet		RC	RC,RS		RC			RC				X	X
Williamson's Sapsucker		RS,RC			RS,RC							X	X
Willow Flycatcher	RC	RC,RS			RC							X	X
Wilson's Phalarope	RC	RC	RS		RC							X	X
Woodhouse's Scrub-Jay					RS							X	X
Yellow-billed Cuckoo								RC				X	X
Yellow-headed Blackbird	RC,RS		RS		RC							X	X

*RC = Regional Concern Species; RS = Regional Stewardship Species (Partners in Flight 2019).

Appendix F: Priority Species Designations by State Agency

Priority species detected in 2019, by state, with management designations by state agencies. Agencies include Arizona Game and Fish Department (AZGF), 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), and 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.

Species	State Agencies						Occupancy Estimate	Density Estimate
	AZGF	CPW	IDFG	KDWPT	MTFWP	NGPC		
Abert's Towhee	T1B						X	X
Acorn Woodpecker	T1C						X	X
American Avocet				T2		T2	X	X
American Bittern	T1B	T2	T2	T2	S3B		X	X
American Dipper	T1B						X	X
American Kestrel							X	X
American Pipit	T1C						X	X
American Wigeon						T2	X	X
American Three-toed Woodpecker	T1C						X	X
American White Pelican		T2	T2	T2	S3B		X	X
Bald Eagle	T1A	SC,T2		T2		T2	X	X
Baird's Sparrow	T1C			T2	S3B	T1	X	X
Baltimore Oriole				T2			X	X
Black-and-white Warbler						T2	X	X
Black-billed Cuckoo				T2	S3B	T1	X	X
Black-billed Magpie	T1B					T1	X	X
Black-backed Woodpecker					S3		X	X
Brown-crested Flycatcher	T1C						X	X
Brown-capped Rosy-Finch		T1					X	X
Black-chinned Sparrow	T1C						X	X
Bell's Vireo	T1B			T2			X	X
Blue-gray Gnatcatcher					S2B		X	X

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Species	State Agencies						Occupancy Estimate	Density Estimate
	AZGF	CPW	IDFG	KDWPT	MTFWP	NGPC		
Black Rosy-Finch		T2	T3		S2		X	X
Black Tern		T2	T2	T2	S3B	T1	X	
Bobolink		T2	T2	T2	S3B		X	X
Boreal Chickadee					S3		X	X
Botteri's Sparrow	T1B						X	X
Brown Creeper					S3	T2	X	X
Brewer's Sparrow	T1C	T2			S3B	T1	X	X
Bridled Titmouse	T1C						X	X
Black-tailed Gnatcatcher	T1C						X	X
Band-tailed Pigeon	T1C	T2					X	X
Black-throated Gray Warbler	T1C						X	X
Bullock's Oriole	T1C			T2		T2	X	X
Burrowing Owl	T1B	ST,T1	T2	T2	S3B		X	X
Cassin's Finch		T2			S3		X	X
California Gull			T2				X	X
Canada Jay	T1B						X	X
Cassin's Kingbird						T2	X	X
Canvasback				T2		T2	X	
Cassin's Sparrow	T1C	T2		T2		T2	X	X
Curve-billed Thrasher				T2			X	X
Chestnut-collared Longspur	T1C	T2		T2	S2B	T1	X	X
Chihuahuan Raven				T2			X	X
Cinnamon Teal						T2	X	X
Clark's Nutcracker			T3		S3		X	X
Cordilleran Flycatcher	T1C					T2	X	X
Costa's Hummingbird	T1C						X	
Common Nighthawk	T1B		T3	T2			X	X
Common Poorwill	T1C			T2			X	X
Dusky-capped Flycatcher	T1B						X	X

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Species	State Agencies						Occupancy Estimate	Density Estimate
	AZGF	CPW	IDFG	KDWPT	MTFWP	NGPC		
Dark-eyed Junco						T2	X	X
Dickcissel				T2			X	X
Dusky Flycatcher	T1C						X	X
Dusky Grouse	T1B						X	X
Eastern Bluebird	T1B						X	X
Eared Grebe				T2			X	X
Eastern Kingbird				T2			X	X
Eastern Meadowlark	T1C			T2		T2	X	X
Eastern Wood-Pewee				T2			X	X
Evening Grosbeak	T1B				S3		X	X
Ferruginous Hawk	T1B	SC,T2	T2	T2	S3B	T1	X	X
Forster's Tern				T2	S3B	T2	X	
Franklin's Gull			T3		S3B		X	X
Great Blue Heron					S3		X	X
Golden-crowned Kinglet	T1C						X	X
Gilded Flicker	T1B						X	X
Gila Woodpecker	T1B						X	X
Golden Eagle	T1B	T1	T2	T2	S3	T2	X	X
Gray Catbird	T1B						X	X
Gray Flycatcher	T1C						X	X
Greater Prairie-Chicken		T2		T2		T2	X	X
Greater Sage-Grouse		SC,T1	T1		S2		X	X
Grasshopper Sparrow	T1B	T2	T3	T2			X	X
Gray Vireo	T1C	T2					X	X
Grace's Warbler	T1C	T2					X	X
Green-tailed Towhee					S3B		X	X
Hooded Oriole	T1C						X	
Juniper Titmouse	T1C	T2					X	X
Lark Bunting		T2		T2			X	X

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Species	State Agencies						Occupancy Estimate	Density Estimate
	AZGF	CPW	IDFG	KDWPT	MTFWP	NGPC		
Lark Sparrow				T2			X	X
Lazuli Bunting	T1C	T2					X	X
Long-billed Curlew		SC,T2	T2	T2	S3B	T1	X	X
Ladder-backed Woodpecker				T2			X	X
Long-eared Owl	T1C						X	
Lesser Prairie-Chicken		ST,T1		T1			X	X
Lesser Scaup						T2	X	X
Least Tern	T1A	SE,T2		SE,T1	S1B	T1	X	X
Lewis's Woodpecker	T1C	T2	T2		S2B	T2	X	X
Lincoln's Sparrow	T1B						X	X
Loggerhead Shrike		T2		T2	S3B	T1	X	X
Lucy's Warbler	T1C						X	X
Marbled Godwit				T2			X	X
Marsh Wren	T1C					T2	X	X
McCown's Longspur	T1C	T2		T2	S3B	T1	X	X
Mexican Jay	T1C						X	X
Merlin						T2	X	
MacGillivray's Warbler	T1B						X	X
Mississippi Kite	T1B			T2		T2	X	X
Mountain Bluebird	T1C						X	X
Montezuma Quail	T1C						X	X
Mountain Plover	T1B	SC,T1		T2	S2B	T1	X	X
Mountain Quail			T2				X	X
Northern Bobwhite	T1A	T2		T2			X	X
Northern Goshawk	T1B	T2			S3		X	X
Northern Harrier		T2					X	X
Northern Pintail				T2		T2	X	X
Northern Pygmy-Owl	T1B,T1C						X	X
Orange-crowned Warbler	T1C						X	X

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Species	State Agencies						Occupancy Estimate	Density Estimate
	AZGF	CPW	IDFG	KDWPT	MTFWP	NGPC		
Olive Warbler	T1C						X	X
Olive-sided Flycatcher	T1C	T2	T3				X	X
Painted Bunting				T2			X	X
Pacific Wren	T1B				S3		X	X
Pied-billed Grebe						T2	X	X
Peregrine Falcon	T1A	SC,T2		T2	S3	T2	X	X
Phainopepla	T1C						X	X
Pine Grosbeak	T1B						X	X
Pinyon Jay	T1B	T2	T2		S3	T1	X	X
Pine Siskin						T2	X	X
Pileated Woodpecker					S3	T2	X	X
Plumbeous Vireo						T2	X	X
Prairie Falcon	T1C	T2				T2	X	X
Purple Martin	T1B,T1C	T2					X	X
Pygmy Nuthatch						T2	X	X
Ring-billed Gull			T3				X	X
Red Crossbill	T1C						X	X
Red-faced Warbler	T1C						X	X
Red-headed Woodpecker				T2	S3B		X	X
Red-naped Sapsucker	T1C						X	X
Rufous Hummingbird		T2					X	X
Rufous-winged Sparrow	T1B						X	X
Sandhill Crane		SC,T1	T3			T2	X	X
Sage Thrasher	T1C		T2		S3B		X	X
Savannah Sparrow	T1B					T2	X	X
Scott's Oriole	T1C						X	X
Scaled Quail	T1C			T2			X	X
Short-eared Owl		T2	T3	T2		T1	X	X
Sedge Wren					S3B		X	X

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Species	State Agencies						Occupancy Estimate	Density Estimate
	AZGF	CPW	IDFG	KDWPT	MTFWP	NGPC		
Sora	T1C						X	X
Sprague's Pipit	T1A			T2	S3B	T1	X	X
Spotted Towhee				T2			X	X
Scissor-tailed Flycatcher				T2		T2	X	X
Sharp-tailed Grouse		SC,SE,T1	T2		S1,S4		X	X
Summer Tanager	T1C					T2	X	X
Swainson's Hawk	T1C	T2		T2			X	X
Swainson's Thrush	T1B						X	X
Townsend's Solitaire						T2	X	X
Tufted Titmouse						T2	X	X
Upland Sandpiper		T2		T2			X	X
Varied Bunting	T1C						X	X
Varied Thrush					S3B		X	X
Veery		T2			S3B		X	X
Vermilion Flycatcher	T1C						X	X
Violet-green Swallow						T2	X	X
Virginia Rail	T1C						X	X
Virginia's Warbler	T1C	T2					X	X
White-crowned Sparrow	T1C						X	X
Western Grebe	T1C		T2	T2		T2	X	X
Western Kingbird				T2			X	X
Western Meadowlark							X	X
White-faced Ibis		T2	T2		S3B		X	X
Willow Flycatcher	T1A	SE,T1					X	X
Willet							X	X
Wilson's Phalarope				T2			X	X
Williamson's Sapsucker	T1C						X	X
Wild Turkey	T1B						X	X
Wood Duck	T1B						X	X

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Species	State Agencies						Occupancy Estimate	Density Estimate
	AZGF	CPW	IDFG	KDWPT	MTFWP	NGPC		
Woodhouse's Scrub-Jay	T1C						X	X
Wood Thrush						T1	X	
White-tailed Ptarmigan		T1			S3		X	X
White-throated Swift	T1C					T2	X	X
Yellow-breasted Chat	T1C						X	X
Yellow-billed Cuckoo	T1A	SC,T1	T1		S3B	T2	X	X
Yellow Warbler	T1B						X	X
Yellow-throated Vireo						T2	X	X

***AZGF:** 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; SSC = State Special Concern; SE = State Endangered; ST = State Threatened (Colorado Parks and Wildlife, 2015); **IDFG:** T1 = Tier 1 priority species; T2 = Tier 2 priority species; T3 = Tier 3 priority species (J. Halka, personal communication, 2018); **KDWPT:** T1 = Tier 1 priority species; T2 = Tier 2 priority species (C. Berens, personal communication, 2018); **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); **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, 2018).

Appendix F Continued. Priority species detected in 2019, by state, with management designations by state agencies. Agencies include New Mexico Department of Game and Fish (NMDGF), North Dakota Game and Fish (NDGF), 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 (WYGF). 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.

Species	State Agencies							Occupancy Estimate	Density Estimate
	NMDGF	NDGF	ODWC	SDGFP	TPWD	UDWR	WYGF		
Abert's Towhee	SGCN,ST							X	X
American Avocet		L2						X	X
American Bittern	SGCN	L1				S3,S3N,S4B	T2	X	X
American Dipper				1,ST				X	X

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Species	State Agencies							Occupancy Estimate	Density Estimate
	NMDGF	NDGF	ODWC	SDGFP	TPWD	UDWR	WYGF		
American Kestrel		L2			S4B		T3	X	X
American Pipit							T3	X	X
Ash-throated Flycatcher							T2	X	X
American Three-toed Woodpecker				3				X	X
American White Pelican		L2		2b	S2B,S3N	S3B	T2	X	X
Bald Eagle	SGCN,ST	L2	T3	1	S3B,S3N	S2B,S4N	T2	X	X
Baird's Sparrow	SGCN,ST	L1	T3	2a	S2		T2	X	X
Bank Swallow	SGCN							X	X
Black-billed Cuckoo		L1					T2	X	X
Black-backed Woodpecker				3			T2	X	X
Black-chinned Hummingbird							T2	X	X
Brown-capped Rosy-Finch	SGCN						T2	X	X
Black-chinned Sparrow	SGCN							X	X
Bell's Vireo	SGCN,ST		T2		S3B			X	X
Bewick's Wren					S5B		T3	X	X
Blue-gray Gnatcatcher							T3	X	X
Blue Grosbeak							T3	X	X
Black Rosy-Finch						S1	T2	X	X
Black Tern		L1		2a	S3		T2	X	
Bobolink		L2					T2	X	X
Botteri's Sparrow	SGCN				S3B			X	X
Brewer's Sparrow		L3					T2	X	X
Band-tailed Pigeon						S3B		X	X
Black-throated Gray Warbler	SGCN						T2	X	X
Bullock's Oriole			T3					X	X
Burrowing Owl	SGCN	L2	T2	3	S3B	S3B	T1	X	X
Bushtit							T2	X	X
Carolina Chickadee					S5B			X	X

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Species	State Agencies							Occupancy Estimate	Density Estimate
	NMDGF	NDGF	ODWC	SDGFP	TPWD	UDWR	WYGF		
Cattle Egret							T2	X	X
Cassin's Finch	SGCN							X	X
Calliope Hummingbird							T2	X	X
Canvasback		L2	T3					X	
Canyon Wren							T3	X	X
Cassin's Sparrow	SGCN		T2		S4B			X	X
Chestnut-collared Longspur	SGCN	L1	T2	2a			T2	X	X
Clark's Nutcracker	SGCN						T2	X	X
Common Ground-Dove	SGCN,SE							X	X
Costa's Hummingbird	SGCN,ST							X	
Common Nighthawk	SGCN						T3	X	X
Common Yellowthroat					S5B		T3	X	X
Dickcissel		L2			S4B		T2	X	X
Eared Grebe	SGCN							X	X
Eastern Meadowlark					S5B			X	X
Evening Grosbeak	SGCN							X	X
Ferruginous Hawk		L1	T3	3	S2B,S4N	S3B	T2	X	X
Field Sparrow					S5B			X	X
Forster's Tern					S5		T2	X	
Franklin's Gull		L1			S2		T2	X	X
Great Blue Heron							T2	X	X
Golden-fronted Woodpecker			T3					X	X
Gila Woodpecker	SGCN,ST							X	X
Golden Eagle		L2	T3		S3B	S4	T2	X	X
Gray Hawk					S2B			X	X
Green Heron					S5B			X	
Greater Prairie-Chicken		L2	T3	2a	S1B			X	X
Greater Sage-Grouse		L1		3		S3	T2	X	X

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Species	State Agencies							Occupancy Estimate	Density Estimate
	NMDGF	NDGF	ODWC	SDGFP	TPWD	UDWR	WYGF		
Grasshopper Sparrow	SGCN,SE	L1			S3B		T2	X	X
Gray Vireo	SGCN,ST						T2	X	X
Grace's Warbler	SGCN							X	X
Juniper Titmouse	SGCN		T3				T2	X	X
Lark Bunting		L1		2a				X	X
Lark Sparrow					S4B			X	X
Long-billed Curlew	SGCN	L1	T2	2a	S3B,S5N		T2	X	X
Lesser Prairie-Chicken	SGCN		T2		S2B			X	X
Lesser Scaup		L2	T3					X	X
Least Tern	SGCN,SE	L2	T2	1,ST	S3B			X	X
Lewis's Woodpecker	SGCN			3		S3	T2	X	X
Loggerhead Shrike	SGCN	L2	T1		S4B		T2	X	X
Lucy's Warbler	SGCN							X	X
Marbled Godwit		L1		2a				X	X
McCown's Longspur	SGCN	L3	T2		S4		T2	X	X
Merlin							T3	X	
MacGillivray's Warbler							T2	X	X
Mississippi Kite					S4B			X	X
Mountain Bluebird	SGCN							X	X
Montezuma Quail					S3B			X	X
Mountain Plover	SGCN		T1		S2		T1	X	X
Northern Bobwhite			T3		S4B			X	X
Northern Goshawk				3			T1	X	X
Northern Harrier		L2			S2B,S3N			X	X
Northern Pintail		L2	T3		S3B,S5N			X	X
Northern Pygmy-Owl						S3,S4B	T2	X	X
Orchard Oriole					S4B			X	X
Olive-sided Flycatcher	SGCN					S3,S4B		X	X

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Species	State Agencies							Occupancy Estimate	Density Estimate
	NMDGF	NDGF	ODWC	SDGFP	TPWD	UDWR	WYGF		
Osprey				1,ST				X	X
Painted Bunting			T2		S4B			X	X
Peregrine Falcon	SGCN,ST	L3	T3	1,ST	S3	S3B	T2	X	X
Pinyon Jay	SGCN		T3					X	X
Pileated Woodpecker					S4B			X	X
Prairie Falcon		L2	T3					X	X
Purple Martin							T3	X	X
Pygmy Nuthatch	SGCN						T2	X	X
Rufous-crowned Sparrow					S4B			X	X
Red Crossbill							T2	X	X
Red-eyed Vireo							T2	X	X
Red-faced Warbler	SGCN							X	X
Red-headed Woodpecker	SGCN	L1	T2		S3B		T2	X	X
Ruffed Grouse				3				X	X
Rufous Hummingbird							T2	X	X
Sage Thrasher							T2	X	X
Scott's Oriole							T2	X	X
Scaled Quail			T3		S4B			X	X
Short-eared Owl		L2	T3		S4N		T2	X	X
Sedge Wren					S4			X	X
Sprague's Pipit	SGCN	L1	T3	2a	S3N			X	X
Scissor-tailed Flycatcher					S3B			X	X
Sharp-tailed Grouse		L2				S2	T2	X	X
Summer Tanager					S5B			X	X
Swainson's Hawk		L1	T2		S4B		T2	X	X
Upland Sandpiper		L2	T3				T2	X	X
Varied Bunting	SGCN,ST							X	X
Vesper Sparrow	SGCN							X	X

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Species	State Agencies							Occupancy Estimate	Density Estimate
	NMDGF	NDGF	ODWC	SDGFP	TPWD	UDWR	WYGF		
Virginia Rail							T3	X	X
Virginia's Warbler	SGCN						T2	X	X
Western Bluebird	SGCN							X	X
Western Grebe							T2	X	X
Western Meadowlark		L2						X	X
White-faced Ibis					S4B	S2,S3B	T2	X	X
Willow Flycatcher	SGCN,SE		T3			S1B	T3	X	X
Willet		L2		2b				X	X
Wilson's Phalarope		L1	T3	2b				X	X
Williamson's Sapsucker	SGCN						T2	X	X
Wild Turkey	SGCN,ST				S5B			X	X
Woodhouse's Scrub-Jay							T2	X	X
Wood Thrush			T2		S4B			X	
White-tailed Ptarmigan	SGCN,SE							X	X
Yellow-billed Cuckoo	SGCN				S4,S5B	S2B	T2	X	X
Zone-tailed Hawk					S3B			X	

* **NMDGF:** SGCN = Species of Greatest Conservation Need; ST = State Threatened; SE = State Endangered (New Mexico Department of Game and Fish, 2016); **NDGF:** 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 (Dyke et al, 2015); **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 (E. Dowd, personal communication; 2018); **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

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= 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); **WYGF**: 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 G: Priority Species Designations for the Bureau of Land Management

Priority species detected on Bureau of Land Management lands in 2019, 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.

Species	Bureau of Land Management					Occupancy Estimate	Density Estimate
	California	Colorado	Idaho	Montana	Nevada		
American Bittern				SS		X	X
American White Pelican		SS				X	X
Bald Eagle	SS	SS	T2	SS	SS	X	X
Baird's Sparrow				SS		X	X
Bank Swallow	SS					X	X
Black-backed Woodpecker				SS		X	X
Bell's Vireo	SS					X	X
Blue-gray Gnatcatcher				SS		X	X
Black Rosy-Finch					SS	X	X
Black Tern			T2	SS		X	
Brewer's Sparrow		SS	T2	SS	SS	X	X
Black-throated Sparrow			T2			X	X
Burrowing Owl	SS	SS	T2	SS	SS	X	X
Cassin's Finch			T2			X	X
Chestnut-collared Longspur				SS		X	X
Crissal Thrasher					SS	X	X
Ferruginous Hawk		SS	T2	SS	SS	X	X
Forster's Tern				SS		X	
Franklin's Gull				SS		X	X
Gilded Flicker	SS					X	X
Gila Woodpecker	SS					X	X
Golden Eagle	SS	SS	T2	SS	SS	X	X
Greater Sage-Grouse	SS	SS	T2	SS	SS	X	X

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Species	Bureau of Land Management					Occupancy Estimate	Density Estimate
	California	Colorado	Idaho	Montana	Nevada		
Grasshopper Sparrow			T2			X	X
Gray Vireo	SS					X	X
Green-tailed Towhee			T2			X	X
Long-billed Curlew		SS	T2	SS	SS	X	X
Lesser Prairie-Chicken		SS				X	X
Least Tern				FE		X	X
Lewis's Woodpecker			T2	SS	SS	X	X
Loggerhead Shrike			T2	SS	SS	X	X
Lucy's Warbler	SS					X	X
McCown's Longspur				SS		X	X
Mountain Plover	SS	SS		SS		X	X
Mountain Quail			T2		SS	X	X
Northern Goshawk	SS	SS	T2		SS	X	X
Olive-sided Flycatcher			T2			X	X
Peregrine Falcon		SS		SS	SS	X	X
Phainopepla					SS	X	X
Pinyon Jay			T2		SS	X	X
Red-headed Woodpecker				SS		X	X
Sandhill Crane	SS				SS	X	X
Sage Thrasher			T2	SS	SS	X	X
Short-eared Owl			T2		SS	X	X
Sprague's Pipit				SS		X	X
Sharp-tailed Grouse		SS	T2		SS	X	X
Swainson's Hawk	SS				SS	X	X
Vaux's Swift			T2			X	X
Veery				SS		X	X
Virginia's Warbler			T2			X	X
White-faced Ibis		SS		SS		X	X

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Species	Bureau of Land Management					Occupancy Estimate	Density Estimate
	California	Colorado	Idaho	Montana	Nevada		
Willow Flycatcher	SS		T2		SS	X	X
Yellow-billed Cuckoo	SS	FT	FT	FT	SS	X	X

*SS = Sensitive Species; California (Bureau of Land Management, 2019); FT = Federally Threatened; SS = Sensitive Species; Colorado (R. Sell, personal communication, 2018); Type 1 – Includes species listed under the Endangered Species Act (ESA) as Endangered (E) or Threatened (T), Experimental Essential (XE) populations, and designated Critical Habitat (CH); Type 2 – Idaho BLM Sensitive Species: Includes State Director designated species as well as FWS Candidate Species (C), FWS Proposed species (P), FWS Experimental Nonessential Populations (XN), and species delisted from ESA Threatened or Endangered status within the past 5-years (D); Idaho (Bureau of Land Management, 2014). Montana (Montana Natural Heritage Program, 2015); Nevada (Bureau of Land Management, 2017)

Appendix G Continued. Priority species detected on Bureau of Land Management lands in 2019, 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.

Species	Bureau of Land Management					Occupancy Estimate	Density Estimate
	North Dakota	Oregon	South Dakota	Utah	Wyoming		
Abert's Towhee				SS		X	X
American Avocet				SS		X	X
American Bittern			SS	SS		X	X
Ash-throated Flycatcher		SS				X	X
American Three-toed Woodpecker				SS		X	X
American White Pelican		SS		SS		X	X
Bald Eagle	SS	SS	SS	SS	SS	X	X
Baird's Sparrow	SS		SS		SS	X	X
Black-backed Woodpecker	SS		SS			X	X
Black-chinned Sparrow				SS		X	X
Bell's Vireo				SS		X	X
Blue-gray Gnatcatcher			SS			X	X
Black Rosy-Finch		SS		SS		X	X
Black Tern	SS		SS			X	
Bobolink		SS		SS		X	X
Brewer's Sparrow		SS	SS	SS	SS	X	X

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Species	Bureau of Land Management					Occupancy Estimate	Density Estimate
	North Dakota	Oregon	South Dakota	Utah	Wyoming		
Band-tailed Pigeon				SS		X	X
Black-throated Sparrow		SS				X	X
Black-throated Gray Warbler				SS		X	X
Burrowing Owl	SS		SS	SS	SS	X	X
Cassin's Finch				SS		X	X
Calliope Hummingbird				SS		X	X
Chestnut-collared Longspur			SS	SS		X	X
Crissal Thrasher				SS		X	X
Eared Grebe				SS		X	X
Ferruginous Hawk	SS	SS	SS	SS	SS	X	X
Forster's Tern			SS			X	
Franklin's Gull		SS	SS			X	X
Gambel's Quail				SS		X	X
Golden Eagle	SS		SS	SS		X	X
Gray Flycatcher		SS				X	X
Greater Sage-Grouse	SS	SS	SS	SS	SS	X	X
Grasshopper Sparrow		SS		SS		X	X
Gray Vireo				SS		X	X
Grace's Warbler				SS		X	X
Green-tailed Towhee				SS		X	X
Long-billed Curlew	SS	SS	SS	SS	SS	X	X
Lesser Goldfinch		SS				X	X
Least Tern	FE		FE			X	X
Lewis's Woodpecker				SS		X	X
Loggerhead Shrike			SS	SS	SS	X	X
Lucy's Warbler				SS		X	X
Marbled Godwit				SS		X	X
McCown's Longspur			SS			X	X

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Species	Bureau of Land Management					Occupancy Estimate	Density Estimate
	North Dakota	Oregon	South Dakota	Utah	Wyoming		
Mountain Plover			SS	SS	SS	X	X
Mountain Quail		SS				X	X
Northern Goshawk		SS		SS	SS	X	X
Northern Pygmy-Owl				SS		X	X
Northern Waterthrush		SS				X	X
Olive-sided Flycatcher				SS		X	X
Osprey				SS		X	X
Peregrine Falcon	SS		SS	SS	SS	X	X
Pinyon Jay				SS		X	X
Prairie Falcon				SS		X	X
Purple Martin		SS				X	X
Red-headed Woodpecker			SS			X	X
Sandhill Crane		SS				X	X
Sage Thrasher		SS	SS	SS	SS	X	X
Short-eared Owl		SS		SS		X	X
Sprague's Pipit	SS		SS			X	X
Sharp-tailed Grouse		SS		SS	SS	X	X
Upland Sandpiper		SS				X	X
Veery			SS	SS		X	X
Vesper Sparrow		SS				X	X
Virginia's Warbler				SS		X	X
White-faced Ibis			SS	SS	SS	X	X
Willow Flycatcher				SS		X	X
Wilson's Phalarope				SS		X	X
Williamson's Sapsucker				SS		X	X
Yellow-billed Cuckoo				FT	FT	X	X

North Dakota, South Dakota (Bureau of Land Management, 2014); Oregon (Bureau of Land Management, 2019); Utah (G.D. Cook, personal communication, 2018); Wyoming (Bureau of Land Management, 2010); T2 = Tier 2 Sensitive Species; Idaho (Bureau of Land Management, 2015).

Appendix H: Priority Species Designations for USFS Region 1

Priority species detected on US Forest Service lands in Region 1 in 2019, with management designations by region and unit. Codes for Units: Beaverhead-Deerlodge NF (BDNF), Bitterroot NF (BINF), Clearwater NF (CLNF), Custer NF (CUNF), Dakota Prairie NG (DPNG), Flathead NF (FLNF), Gallatin NF (GANF). 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 1							Occupancy Estimate	Density Estimate
	BDNF	BINF	CLNF	CUNF	DPNG	FLNF	GANF		
Bald Eagle	SS	SS	MIS,SS	SS	SS	MIS,SS	SS,MIS	X	X
Black-backed Woodpecker	SS	SS	SS	SS		SS,MIS	SS	X	X
Blue-gray Gnatcatcher				SS				X	X
Burrowing Owl				SS	SS			X	X
Greater Prairie-Chicken				MIS		MIS,SS		X	X
Least Tern				FE				X	X
Loggerhead Shrike				SS	SS			X	X
Peregrine Falcon	SS	SS		SS		MIS,SS	SS	X	X
Pileated Woodpecker		MIS	MIS					X	X
Pygmy Nuthatch			SS					X	X
Sharp-tailed Grouse				MIS		MIS		X	X
Baird's Sparrow				SS	SS			X	X
Greater Sage-Grouse	SS			SS		MIS,SS		X	X
Long-billed Curlew				SS	SS			X	X
Northern Goshawk			MIS		MIS		MIS	X	X
Spotted Towhee					MIS			X	X
Belted Kingfisher			MIS					X	X
Bullock's Oriole				MIS				X	X
Ovenbird				MIS				X	X
Ruffed Grouse				MIS				X	X
Sprague's Pipit					SS			X	X
Brewer's Sparrow				MIS				X	X

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Species	USFS Region 1							Occupancy Estimate	Density Estimate
	BDNF	BINF	CLNF	CUNF	DPNG	FLNF	GANF		
Cassin's Kingbird				MIS				X	X
Lark Sparrow				MIS				X	X
Western Kingbird				MIS				X	X
Yellow-billed Cuckoo		FT						X	X
Yellow Warbler				MIS				X	X

*R1SS = Region 1 Sensitive Species; MIS = Management Indicator Species; FS = Focal Species; FT = Federally Threatened; FE = Federally Endangered, SS = Sensitive Species (C. Staab, personal communication, 2018)

Appendix G continued. Priority species detected on US Forest Service lands in Region 1 in 2019, with management designations by region and unit. Codes for Units: Helena NF (HENF), Idaho Panhandle NF (IPNF), Kootenai NF (KONF), Lewis and Clark NF (LCNF), Lolo NF (LONF), Nez Perce NF (NPNF). 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 1							Occupancy Estimate	Density Estimate
	HENF	IDNF	KONF	LCNF	LONF	NPNF	Region-wide		
Bald Eagle	SS,MIS	SS	SS	MIS,SS	SS	MIS,SS	SS	X	X
Black-backed Woodpecker	SS	SS	SS	SS	SS	SS	SS	X	X
Blue-gray Gnatcatcher							SS	X	X
Burrowing Owl				SS			SS	X	X
Dusky Grouse				MIS				X	X
Greater Prairie-Chicken							SS	X	X
Loggerhead Shrike							SS	X	X
Olive-sided Flycatcher		FS	FS					X	X
Peregrine Falcon	SS,MIS		SS	MIS,SS	MIS,SS	MIS,SS	SS	X	X
Pileated Woodpecker	MIS				MIS		MIS	X	X
Pygmy Nuthatch		SS				SS	SS	X	X
American Three-toed Woodpecker				MIS				X	X

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Species	USFS Region 1							Occupancy Estimate	Density Estimate
	HENF	IDNF	KONF	LCNF	LONF	NPNF	Region-wide		
Baird's Sparrow							SS	X	X
Dusky Flycatcher		FS	FS					X	X
Greater Sage-Grouse							SS	X	X
Long-billed Curlew						SS	SS	X	X
Northern Goshawk	MIS			MIS	MIS		MIS	X	X
Prairie Falcon				MIS				X	X
Chipping Sparrow		FS	FS					X	X
Hairy Woodpecker	FS,MIS	FS	FS					X	X
Sprague's Pipit							SS	X	X
Golden Eagle				MIS				X	X
Hammond's Flycatcher		FS	FS					X	X
Mountain Quail						SS	SS	X	X
Yellow-billed Cuckoo					FT			X	X

* R1SS = Region 1 Sensitive Species; MIS = Management Indicator Species; FS = Focal Species; FT = Federally Threatened; FE = Federally Endangered, SS = Sensitive Species (C. Staab, personal communication, 2018)

Appendix I: Priority Species Designations for USFS Region 2

Priority species detected on US Forest Service lands in Region 2 in 2019, with management designations by region and unit. Codes for Units: Arapaho and Roosevelt NF (ARNF), Bighorn NF (BINF), Black Hills NF (BHNF), Buffalo Gap NG (BGNG), Comanche NG (CONG), Fort Pierre NG (FPNG), Grand Mesa, Uncompaghre and Gunnison NF (GMUG), Medicine Bow NF (MBNF), Nebraska/Samuel R. McKelvie NF (NENF). 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 2									Occupancy Estimate	Density Estimate
	ARNF	BINF	BHNF	BGNG	CONG	FPNG	GMUG	MBNF	NENF		
Brown Creeper			MIS					SSC		X	X
Calliope Hummingbird		SLC								X	X
Ferruginous Hawk	MIS									X	X
Grasshopper Sparrow			MIS							X	X
Hairy Woodpecker	MIS						MIS			X	X
Lark Bunting	MIS									X	X
Lincoln's Sparrow								MIS		X	X
Mountain Bluebird	MIS									X	X
Northern Goshawk							MIS	MIS		X	X
Ruffed Grouse			MIS							X	X
Sharp-tailed Grouse				MIS		MIS			MIS	X	X
Swainson's Hawk		SLC								X	X
Warbling Vireo	MIS									X	X
Wilson's Warbler	MIS							MIS		X	X
Brown-capped Rosy-Finch								SSC		X	X
Juniper Titmouse							MIS			X	X
Long-billed Curlew					MIS					X	X
Pinyon Jay							MIS			X	X
Song Sparrow			MIS							X	X
Sharp-shinned Hawk			SLC							X	X
Black-backed Woodpecker			MIS							X	X
Brewer's Sparrow		MIS					MIS			X	X

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Species	USFS Region 2									Occupancy Estimate	Density Estimate
	ARNF	BINF	BHNF	BGNG	CONG	FPNG	GMUG	MBNF	NENF		
Burrowing Owl	MIS									X	X
Broad-winged Hawk			SLC							X	
Cooper's Hawk			SLC							X	X
Golden-crowned Kinglet	MIS	SLC	MIS					MIS		X	X
Greater Prairie-Chicken						MIS			MIS	X	X
Greater Sage-Grouse				MIS		MIS				X	X
Lesser Prairie-Chicken					MIS					X	X
Lewis's Woodpecker							MIS			X	X
Mountain Plover	MIS									X	X
Peregrine Falcon							MIS			X	X
Pygmy Nuthatch	MIS	SLC	SLC						MIS	X	X
Red-breasted Nuthatch		MIS								X	X
American Dipper			SLC							X	X
American Three-toed Woodpecker								MIS		X	X
Bald Eagle							MIS			X	X
Black-and-white Warbler			SLC							X	X
Bullock's Oriole					MIS					X	X
Red Crossbill							MIS			X	X

*R2SS = Region 2 Sensitive Species; MIS = Management Indicator Species; SI = Species of Interest; SLC = Species of Local Concern; SNI = Species Needing More Inventory; SC = Species of Concern; SVC = Species of Viability Concern; SSC = Species of Special Concern; FT = Federally Threatened; FE = Federally Endangered (US Forest Service, 2008).

Appendix H continued. Priority species detected on US Forest Service lands in Region 2 in 2019, with management designations by region and unit. Codes for Units: Oglala NG (OGNG), Pawnee NG (PANG), Rio Grande NF (RGNF), Routt NF (RONF), and San Juan NF (SJNF), Shoshone NF (SHNF), Thunder Basin NG (TBNG), and White River NF (WRNF). 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.

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Species	USFS Region 2									Occupancy Estimate	Density Estimate
	OGNG	PANG	RGNF	RONF	SJNF	SHNF	TBNG	WRNF	Region-wide		
American Bittern									SS	X	X
American Pipit								MIS		X	X
Black Tern									SS	X	
Brown Creeper			MIS							X	X
Ferruginous Hawk		MIS							SS	X	X
Grasshopper Sparrow									SS	X	X
Hairy Woodpecker		MIS			MIS	MIS				X	X
Lark Bunting		MIS								X	X
Lincoln's Sparrow			MIS							X	X
Mountain Bluebird		MIS			MIS					X	X
Northern Goshawk				MIS	MIS	MIS			SS	X	X
Purple Martin									SS	X	X
Ruffed Grouse						MIS				X	X
Sharp-tailed Grouse	MIS				MIS		MIS		SS	X	X
Virginia's Warbler								MIS		X	X
Warbling Vireo		MIS								X	X
Willow Flycatcher					MIS					X	X
Wilson's Warbler		MIS	MIS	MIS						X	X
Cassin's Sparrow									SS	X	X
Green-tailed Towhee					MIS					X	X
Long-billed Curlew									SS	X	X
Mallard					MIS					X	X
McCown's Longspur									SS	X	X
Black-backed Woodpecker									SS	X	X
Brewer's Sparrow						MIS		MIS	SS	X	X
Burrowing Owl		MIS							SS	X	X
Chestnut-collared Longspur									SS	X	X
Dusky Grouse						MIS				X	X

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Species	USFS Region 2									Occupancy Estimate	Density Estimate	
	OGNG	PANG	RGNF	RONF	SJNF	SHNF	TBNG	WRNF	Region-wide			
Golden-crowned Kinglet		MIS		MIS							X	X
Greater Prairie-Chicken										SS	X	X
Greater Sage-Grouse	MIS						MIS			SS	X	X
Hermit Thrush			MIS								X	X
Lesser Prairie-Chicken										SS	X	X
Lewis's Woodpecker										SS	X	X
Mountain Plover		MIS								SS	X	X
Northern Harrier										SS	X	X
Peregrine Falcon						MIS			SC		X	X
Pygmy Nuthatch		MIS	MIS						SVC		X	X
Short-eared Owl										SS	X	X
Vesper Sparrow			MIS	MIS							X	X
Wild Turkey					MIS						X	X
White-tailed Ptarmigan										SS	X	X
Yellow-billed Cuckoo										FT	X	X
Bald Eagle						MIS					X	X
Least Tern										FE	X	X
Loggerhead Shrike										SS	X	X
Olive-sided Flycatcher										SS	X	X

*R2SS = Region 2 Sensitive Species; MIS = Management Indicator Species; SI = Species of Interest, SLC = Species of Local Concern; SNI = Species Needing More Inventory; SC = Species of Concern; SVC = Species of Viability Concern; SSC = Species of Special Concern; FT = Federally Threatened; FE = Federally Endangered (US Forest Service, 2008)

Appendix J: Priority Species Designations for USFS Region 3

Priority species detected on US Forest Service lands in Region 3 in 2019, with management designations by region and unit. Codes for Units: Coconino NF (CCNF) and Kiowa/Rita Blanca NG (KRNG). 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*			Occupancy Estimate	Density Estimate
	CCNF	KRNG	Region-wide		
Bald Eagle			R3SS	X	X
Grasshopper Sparrow			R3SS	X	X
Hairy Woodpecker	MIS			X	X
Pygmy Nuthatch	MIS			X	X

*R3SS = USFS Region 3 Sensitive Species; MIS = Management Indicator Species; SC = Species of Concern; FS = Focal Species (S. R. Plunkett and N. Kline, personal communication, 2018).

Appendix K: Priority Species Designations for USFS Region 4

Priority species detected on US Forest Service lands in Region 4 in 2019, with management designations by region and unit. Codes for Units: Ashley NF (ASNF), Boise NF (BONF), Bridger-Teton NF (BTNF), Caribou-Targhee NF (CTNF), Humboldt-Toiyabe NF (HTNF), 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.

Species	USFS Region 4						Occupancy	Density
	ASNF	BONF	BTNF	CTNF	HTNF	MLNF		
Bald Eagle		SS	MIS	MIS			X	X
Great Gray Owl		SS						
Peregrine Falcon		SS	MIS	MIS			X	X
White-headed Woodpecker		MIS						
Black-backed Woodpecker		MIS					X	X
Golden Eagle	MIS				EPA	MIS,SS	X	X
Mountain Quail							X	X
Pygmy Nuthatch							X	X
Sharp-tailed Grouse		SS					X	X
Lewis's Woodpecker		FS				SS	X	X
Northern Goshawk	MIS	SS		MIS	MIS,CAS		X	X
Williamson's Sapsucker					MIS		X	X
Willow Flycatcher							X	X
Cooper's Hawk						SS	X	X
American Three-toed Woodpecker		SS					X	X
Dusky Grouse		FS				MIS	X	X
Red-naped Sapsucker	MIS						X	X
Pinyon Jay					NVSC		X	X
Brown Creeper							X	X
Song Sparrow	MIS						X	X
Wilson's Warbler		FS					X	X
Brown-headed Cowbird					MIS		X	X

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Species	USFS Region 4						Occupancy	Density
	ASNF	BONF	BTNF	CTNF	HTNF	MLNF		
Mountain Bluebird							X	X
Olive-sided Flycatcher							X	X
Yellow Warbler							X	X
Western Meadowlark		FS					X	X
Lincoln's Sparrow	MIS						X	X
Vesper Sparrow							X	X
Pine Siskin		FS					X	X
Brewer's Sparrow			MIS				X	X
Western Tanager					MIS		X	X
Warbling Vireo	MIS						X	X
Mountain Chickadee							X	X
Ruby-crowned Kinglet							X	X
Yellow-rumped Warbler					MIS		X	X

*CAS = Conservation Agreement Species; FE = Federally Endangered Species; FS = Focal Species; EPA = Eagle Protection Act; MIS = Management Indicator Species; NV SC = Nevada Species of Concern; PMIS = Proposed Management Indicator Species; R4SS = Region 4 Sensitive Species; SC = Species of Concern; SI = Species of Interest; SS = Sensitive Species (R. Sadak, personal communication, 2018)

Appendix K Continued. Priority species detected on US Forest Service lands in Region 4 in 2019, with management designations by region and unit. Codes for Units: 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.

Species	USFS Region 4					Region-wide	Occupancy	Density
	PANF	SCNF	SANF	UWCNF				
Bald Eagle						SS	X	X
Great Gray Owl		MIS				SS		
Peregrine Falcon						SS	X	X

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Species	USFS Region 4					Occupancy	Density
	PANF	SCNF	SANF	UWCNF	Region-wide		
White-headed Woodpecker	PMIS				SS		
Black-backed Woodpecker						X	X
Golden Eagle						X	X
Mountain Quail					SS	X	X
Pygmy Nuthatch		MIS				X	X
Sharp-tailed Grouse	MIS		SI		SS	X	X
Lewis's Woodpecker	MIS					X	X
Northern Goshawk		MIS	MIS	MIS	SS	X	X
Williamson's Sapsucker	MIS					X	X
Willow Flycatcher					FE	X	X
Cooper's Hawk						X	X
American Three-toed Woodpecker				MIS	SS	X	X
Dusky Grouse						X	X
Red-naped Sapsucker						X	X
Pinyon Jay						X	X
Brown Creeper		MIS				X	X
Song Sparrow						X	X
Wilson's Warbler						X	X
Brown-headed Cowbird						X	X
Mountain Bluebird		MIS				X	X
Olive-sided Flycatcher			SI			X	X
Yellow Warbler	MIS	MIS				X	X
Western Meadowlark						X	X
Lincoln's Sparrow						X	X
Vesper Sparrow	MIS	MIS				X	X
Pine Siskin						X	X
Brewer's Sparrow	MIS		SI			X	X
Western Tanager						X	X
Warbling Vireo						X	X

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Species	USFS Region 4					Occupancy	Density
	PANF	SCNF	SANF	UWCNF	Region-wide		
Mountain Chickadee	MIS					X	X
Ruby-crowned Kinglet		MIS				X	X
Yellow-rumped Warbler						X	X

*CAS = Conservation Agreement Species; FE = Federally Endangered Species; FS = Focal Species; EPA = Eagle Protection Act; MIS = Management Indicator Species; NV SC = Nevada Species of Concern; PMIS = Proposed Management Indicator Species; R4SS = Region 4 Sensitive Species; SC = Species of Concern; SI = Species of Interest; SS = Sensitive Species (R. Sadak, personal communication, 2018)