Monitoring the Birds of the Black Hills: 2006 Field Season Report

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In Cooperation With:

ROCKY MOUNTAIN BIRD OBSERVATORY

The mission of the Rocky Mountain Bird Observatory (RMBO) is the conservation of birds of the Rocky Mountains, Great Plains, and Intermountain West, and the habitats on which they depend. *RMBO practices a multi-faceted approach to bird conservation that integrates scientific research and monitoring studies with education and outreach programs to bring bird conservation issues to the public and other conservation partners. RMBO works closely with state and federal natural resource agencies, private landowners, schools, and other nonprofit organizations. RMBO accomplishes its mission by working in four areas:*

***Research**:* *RMBO studies avian responses to habitat conditions, ecological processes, and management actions to provide scientific information that guides bird conservation efforts.*

***Monitoring**:* *RMBO monitors the distribution and abundance of birds through long-term, broad-scale monitoring programs designed to track population trends for birds of the region.*

***Education**:* *RMBO provides active, experiential, education programs for K-12 students in order to create an awareness and appreciation for birds, with a goal of their understanding of the need for bird conservation.*

***Outreach**:* *RMBO shares the latest information in land management and bird conservation practices with private landowners, land managers, and resource professionals at natural resource agencies. RMBO develops voluntary, working partnerships with these individuals and groups for habitat conservation throughout the Great Plains and Rocky Mountains.*

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Executive Summary

As a taxonomic group, birds are an excellent tool for monitoring overall environmental health. Bird are relatively easy to identify and conspicuous, and bird communities often reflect the abundance and distribution of other organisms with which they coexist. Therefore, compared to other taxonomic groups, such as insects or plants, monitoring entire bird communities at the habitat level offers a cost-effective means for monitoring biological integrity at a variety of scales. In addition, birds are one of the most highly visible and valued components of our native wildlife. Thus, monitoring birds allows for effective management of their populations, and provides a better understanding of the effects and sustainability of human activities on the ecosystem.

In 2006, Rocky Mountain Bird Observatory (RMBO), in conjunction with its funding partner, the Black Hills National Forest (BHNF), implemented the sixth year of Monitoring the Birds of the Black Hills (MBBH), as delineated by Panjabi et al. (2001). RMBO has designed this program to provide statistically rigorous long-term trend data for populations of most diurnal, regularly breeding bird species in the Black Hills, including some U.S. Forest Service Region 2 Sensitive Species, BHNF Management Indicator Species, and BHNF Species of Local Concern. In the short term, this program provides information needed to effectively manage and conserve bird populations in the Black Hills, including the spatial distribution, abundance, and relationship to important habitat characteristics for each species. This cooperative project supports the BHNF's efforts to comply with requirements set forth in the National Forest Management Act and other statutes and regulations. It also contributes to RMBO's broader landscape-scale breeding bird monitoring program.

This year, RMBO surveyed three of the ten habitats targeted under the monitoring plan, maintaining a level of effort consistent with funding. RMBO staff conducted 80 point transect surveys (1,148 point counts) in three habitats within the Black Hills (foothills riparian, montane riparian, and mixed-grass prairie). In 2006, RMBO did not survey seven habitats identified in the plan (aspen, burn areas, late-successional ponderosa pine, ponderosa pine (northern hills), ponderosa pine (southern hills), pine-juniper shrubland and white spruce). In 2006, one new transect was added in each riparian habitat.

RMBO staff recorded a total of 124 breeding bird species on point transects in the three habitats, many of which were observed on only a few occasions. The habitat-stratified point transects produced excellent results with low coefficients of variation (≤ 50%) on 47 bird species and moderate results (CV=50-75%) for another eight species in at least one habitat surveyed in 2006. Over 15 of these species are listed as priorities by Partners in Flight, and several more are listed as priorities by the BHNF as a Management Indicator Species or by the South Dakota Department of Game, Fish and Parks as Species of Greatest Conservation Need. We anticipate being able to detect habitat-specific population trends for these species within our maximum target of 30 years. For many species, the population may be more effectively monitored in a habitat not surveyed this year. These 55 species represent about 44% of *all species* observed in the three habitats surveyed in 2006, but they represent almost 80% of all *individual birds* observed.

Introduction

The Black Hills host a diverse and unique avifauna, representing species typical of a range of habitats from a much larger region. For this reason, the Black Hills play a critical role in understanding and conserving certain bird populations and subspecies. Much like the canary in the coalmine, birds can serve as indicators of biological integrity and ecosystem health (Morrison 1986, Croonquist and Brooks 1991, Bureau of Land Management 1998, Hutto 1998, O'Connell et al. 2000, Rich 2002, U.S. EPA 2002, Birdlife International 2003), and long-term population monitoring provides essential information for the effective management of bird populations.

In 2006, Rocky Mountain Bird Observatory (RMBO), in cooperation with its partner, the Black Hills National Forest (BHNF), implemented Year 6 of a habitat-based bird monitoring program designed to provide rigorous population trend data on most diurnal, regularly occurring breeding bird species in the Black Hills (Panjabi et al. 2001). Modeled after *Monitoring Colorado's Birds* (Leukering et al. 2000), this program is entitled *Monitoring the Birds of the Black Hills (MBBH).* MBBH is consistent with goals emphasized in the Partners In Flight National Landbird Monitoring Strategy (Bart et al. 2001), and in addition to monitoring bird populations, generates information useful in managing birds (e.g., habitat associations, spatial distribution). This report details the findings from the sixth year of what is designed to be a long-term, cooperative effort to monitor bird populations in the Black Hills.

Monitoring Objectives

RMBO's bird-monitoring programs are designed to provide population trend or status data on all regularly occurring breeding species within each program area. Initially, we expect to collect data to provide "early-warning" information for all species that can be monitored through a habitat-based approach. After establishing this monitoring framework, we anticipate collecting demographic information and testing *a priori* hypotheses to determine the possible reasons for known declines and to better inform management decisions. Herein we discuss the initial surveillance monitoring framework, the monitoring goals, and progress to date. In the future, with the initial trend information, we will develop and establish the second phase of the program to gather demographic and other information to address specific management issues.

The specific objectives of RMBO's monitoring program are:

1.) To integrate existing bird-monitoring efforts in the region to provide better information on distribution and abundance of all breeding-bird species, and especially for priority species;
2.) to provide basic habitat-association data for most bird species to address habitat-management issues;
3.) to provide long-term trend or status data on most regularly occurring breeding species in the region, with a target of detecting a minimum rate

of population change of ±3.0% per year over a maximum time period of 30 years with a statistical significance of p=0.1 and power of 0.8;

4.) to maintain a high-quality database that is accessible to all of our collaborators as well as the public on the Web in the form of raw and summarized data; and,

5.) to generate decision-support tools such as population-estimate models that help guide conservation efforts and provide a better measure of our conservation success.

The Habitats

In January 2001, RMBO, in coordination with biologists from the U.S. Forest Service and other agencies, selected 10 habitats (aspen, burn areas, mixed-grass prairie, southern ponderosa pine, northern ponderosa pine, late-successional ponderosa pine, pine-juniper shrublands, riparian, wet meadows, and white spruce) in which to implement this bird monitoring effort (Panjabi et al. 2001). In 2002, wet meadows were dropped from the sampling scheme due to poor on-the-ground representation of this habitat, and riparian was split into two discrete habitats, montane riparian and foothills riparian, due to differences in the bird communities across this elevational gradient (Panjabi 2003a). In 2006, three of the 10 habitats originally targeted for monitoring were sampled: foothills riparian (FR), montane riparian (MR), and mixed-grass prairie (MG) (Figure1).

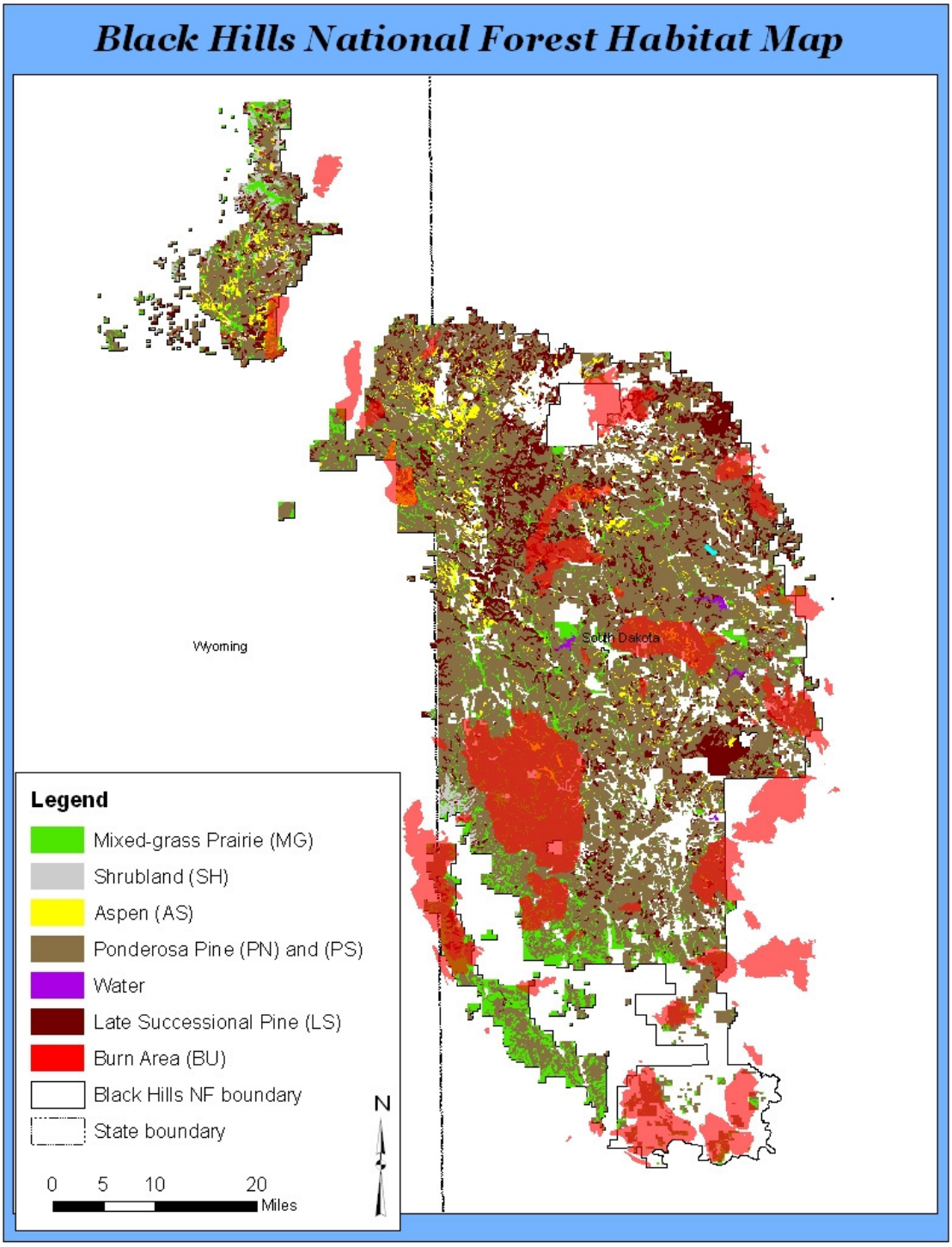


Figure 1. Distribution of habitats targeted for bird monitoring under *Monitoring the Birds of the Black Hills* (note: Foothills Riparian and Montane Riparian habitats not included).

Foothills riparian

Foothills riparian habitat (FR) refers to the wooded corridors along valley bottoms at lower elevations in the Black Hills, generally below 4,500ft. These habitats typically occur only in areas with surface water. Dominant tree species vary depending on location, but include plains cottonwood (*Populus deltoides*), narrow-leaf cottonwood (*Populus angustifolia*), peachleaf willow (*Salix amygdaloides*), boxelder (*Acer negundo*), American elm (*Ulmus americana*), green ash (*Fraxinus pensylvanica*), bur oak (*Querces macrocarpa*), and Russian olive (*Elaegmus angustifolia*). Shrubs may include silver buffaloberry (*Sheperdia argentea*), western snowberry (*Symphoricarpos occidentalis*), chokecherry (*Prunus virginiana*), sandbar willow (*Salix exigua*), Rocky Mountain juniper (*Juniperus scopulorum*), silver sagebrush (*Artemisia cana*) and big sagebrush (*A. tridentata*), among others. Herbaceous vegetation, especially grass, is also prevalent.

Montane riparian

Montane riparian (MR) refers to wooded habitats along valley bottoms at mid-to-upper elevations in the Black Hills, generally above 4,500ft. These habitats occur almost exclusively along flowing water. Some sites in this category lack an over-story component, while others contain well-developed under- and over-stories. Dominant over-story tree species typically include narrowleaf cottonwood, boxelder, ponderosa pine (*Pinus ponderosa*), bur oak, and/or white spruce (*Picea glauca*). Associated tree species may include aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*)and ironwood (*Ostrya virginiana*). Willows (*Salix* spp.), alders (*Alnus* spp.) and other shrubs, including snowberry, chokecherry, stinking elderberry (*Sambucus racemosa*), currant (*Ribes* spp.), and/or hawthorn (*Crataegus chrysocarpa*), typically form a fairly continuous shrub layer. The presence of an extensive shrub layer and flowing water are the unifying characteristics among sites in this habitat type. Herbaceous vegetation, especially grasses, is also prevalent.

Mixed-grass Prairie

Mixed-grass prairie refers to the expansive open areas of the Black Hills that are dominated by a variety of native, upland grasses, such as blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), and junegrass (*Koeleria macrantha*) (Larson and Johnson 1999). Mixed-grass prairies are fairly common within the Black Hills, especially in the south, although much of this habitat is in private ownership. Some of these grasslands are contiguous with the surrounding prairie of the Great Plains; others are surrounded by the forests of the Black Hills, and are isolated from the larger prairie landscape. Differences in the bird communities of the grasslands are apparent as one travels away from the forest-grassland ecotone and into the more expansive prairies where trees are absent.

Methods

Field Personnel

Seven experienced biological technicians with excellent aural and visual bird-identification skills comprised the RMBO staff who executed the field component of MBBH in 2006. Their names are provided in the acknowledgements section. All technicians completed a four-day training session at the beginning of the field season to ensure full understanding of the field protocols and to practice bird identification and distance estimation in a variety of habitats. Three of the technicians also had at least two years of prior experience conducting RMBO bird monitoring, bringing with them considerable experience with the protocol and knowledge of the birds.

Site Selection

Survey sites were selected in 2001 and 2002 according to procedures described by Panjabi (2001, 2003a). In 2006, we did not move or re-establish any existing transects; however, we did establish new transects in both the foothills and montane riparian habitats to try and meet our goal of establishing 30 long-term monitoring sites in each habitat type. We added one new transect to each riparian habitat: FR13 and MR95. In 2006, we were close but still unable to meet our goal of 30 transects in each of the riparian habitats due to difficulties in identifying, locating, and accessing sufficient independent sites in these habitats. We will continue to try to reach our target of 30 transects in each of these habitats in future years. By 2006 we had already reached our goal of establishing 30 long-term monitoring sites in the mixed-grass prairie habitat; however, due to time, weather constraints, and staffing limitations, we were not able to survey a few transects in this habitat.

Point Transect Protocol

RMBO staff conducted point transects (Buckland et al. 1993) in order to sample bird populations in each habitat selected for monitoring. Each transect was surveyed by one observer following protocol established by Leukering (2000) and modified by Panjabi (2005). RMBO technicians conducted all transect surveys in the morning, between ½-hour before sunrise and 11 AM; most surveys were completed before 10 AM. To maximize efficiency, observers located the selected stand on the ground prior to the morning of the survey. For new transects, observers used this pre-survey visit to establish an access point for each stand, and a random distance (between 0-400 m) and bearing from the access point at which the first point count station would be located. On the morning of the survey, the observer began the point transect at the first count station and then continued along the pre-selected bearing for the remaining 14 points, if possible. In many cases, the pre-selected bearing eventually would lead the transect out of the target habitat, or to some obstruction (e.g., cliff or private land), forcing the observer to change the bearing of the transect. When this happened, the observer back-tracked to the last completed point count and randomly turned the transect right or left, at an angle perpendicular to the original bearing, and then

alternated right or left if additional turns were necessary. In some small or linear stands (e.g., riparian sites), the size and shape of the stand determined the location and course of the transect.

Observers conducted up to 15 five-minute point counts at stations located at 250-m intervals along each point transect, recording all bird detections on standardized forms. Each one-minute interval of every point count was noted on the datasheet so that bird detections were recorded as part of a specific one-minute interval. Fly-overs (birds flying over, but not using the immediate surrounding landscape) were recorded, but excluded from analyses of density. For each bird detected, observers recorded the species, sex, how it was detected (e.g., call, song, drumming, etc.), and distance from the observation point. Whenever possible, they measured distances using Bushnell® Yardage Pro 500™ laser rangefinders. When it was not possible to measure the distance to a bird, staff used rangefinders to gauge distance estimates by measuring to some closer object. Observers treated the 250-m intervals between count stations as parts of a line transect, and recorded individuals of a short list of low-density species (all grouse, raptors, woodpeckers, and a few other rare or uncommon species) and measured the distance and bearing to each from where it was detected along the transect line. They also recorded bearings and distances to individuals of the same low-density species when they were detected at count stations. Birds initially detected on points that were again detected while moving between points were not included in the line-transect data. However, birds detected between points, but then again during the subsequent point count, were removed from the line-transect data, and included only on the point count.

A change in the bird data collection protocol from previous years was that since 2004, we treat all non-independent detections of individual birds as part of a 'cluster' together with the first independently observed bird, rather than as separate independent observations of those individuals. This means that if the detection of an individual bird is dependent upon the previous detection of another individual, the resulting observation is recorded as one independent detection with a cluster size of *C*, where *C* is the original individual detected plus the sum of any additional individuals whose detection was dependent upon the first individual revealing its presence.

Observers recorded atmospheric data (i.e., temperature in degrees Fahrenheit, cloud cover, precipitation, and wind--Beaufort scale) and the time at the start and end of each transect. They measured distances between count stations using hand-held Garmin® E-trex™ Global Positioning System units. All GPS data were logged in Universal Transverse Mercator (UTM) North American Datum 1927. At each count station, observers recorded UTM coordinates, whether or not the station was within 100 m of a road, and vegetative data, including the structural stage and canopy closure of the forest, mean canopy height, the types and relative proportions of overstory trees, the sub-canopy volume and tree species composition, and the percent coverage and types of shrubs within a 50-m radius

of the point. Observers recorded these data prior to beginning each bird count.

Data Analysis

We used program DISTANCE (Thomas et al. 2006) to generate density estimates (*D*) using only data collected at point count stations. The notation, concepts, and analysis methods of DISTANCE were developed by Buckland et al. (1993). In DISTANCE analysis, a unique detection function is fit to each distribution of distances associated with a species in a given habitat. Because the detection function is unique to each species in each habitat, DISTANCE analysis avoids some serious problems inherent in traditional analyses of point count data (e.g., unquantifiable differences in detectability among habitats, species, and years). DISTANCE analysis relies on three assumptions, all of which are reasonably well met by *MBBH*: 1) all birds at distance=0 are detected, 2) distances of birds close to the point are measured accurately, and 3) birds do not move in response to the observer's presence.

As a general rule, density estimates were generated only for species for which there was a minimum of *25 independently detected observations* as recorded from count stations in a given habitat (not including fly-overs or between-point observations, and prior to truncation or removal of outliers). Because we considered only independent detections in our analyses of density, the number of *observations* (n) reported for each species may be lower than the number of *individuals* (N) observed. This is especially true for species that tend to associate in groups (e.g., sharp-tailed grouse, swifts, swallows, crossbills, etc.) Both numbers may be useful, especially for low-density species, and thus both are reported in the "Species Accounts" section. Note however, that in the habitat accounts in the "Results" section, the number of observations reported (n) reflects only the number of independent detections *used to estimate density* (i.e., after any truncation or removal of outliers), and may be less than the total number of independent detections or the total number of individuals observed.

Results

RMBO staff conducted 1,148 point counts along 80 point transects in three different habitats (Figure 2) between 22 May and 21 July, 2006. At least 26 point transects were surveyed in each habitat (Table 1). We recorded 12,774 birds of 124 species on point-count transects in 2006. Fifty-five probable breeding species were observed in sufficient numbers to estimate density in at least one habitat. In total, RMBO staff has documented 166 species since 2001 that have either bred or summered in the Black Hills (Appendix A).

Table 1. Bird sampling periods and effort in each habitat in the Black Hills, summer 2006.

Habitat	Dates sampled	# point transects	# point counts
Foothills Riparian	22 May – 4 July	27	375
Montane Riparian	10 June – 18 July	26	381
Mixed-grass Prairie	11 June – 21 July	27	392
All habitats	22 May – 21 July	80	1148

The total number of species detected in each habitat in 2006 ranged from 81 in mixed-grass prairie to 94 in foothills riparian (Table 2). While these totals communicate the magnitude of the spectrum of possible species across a range of sites within a habitat type, it should be understood that some species included in each total were largely peripheral to the habitat in which they were recorded. Thus, species richness measures reflect both the within- and between-habitat diversity of the sites surveyed in each habitat category.

Of the habitats surveyed in 2006, the greatest number of birds and species were detected in the riparian habitats (Table 2, Figure 3). We have provided estimates of the average number of species both the point-level (i.e., sub-sample) and the transect (i.e., site) level. Since the point-level data are not influenced by stand size (i.e., the number of sub-samples per site), these data are best for direct inter-habitat comparisons. Whereas, the site-level data, which are influenced by stand size, provide a more complete picture of the bird community within a given stand of habitat. Thus, both estimates are useful from a management perspective.

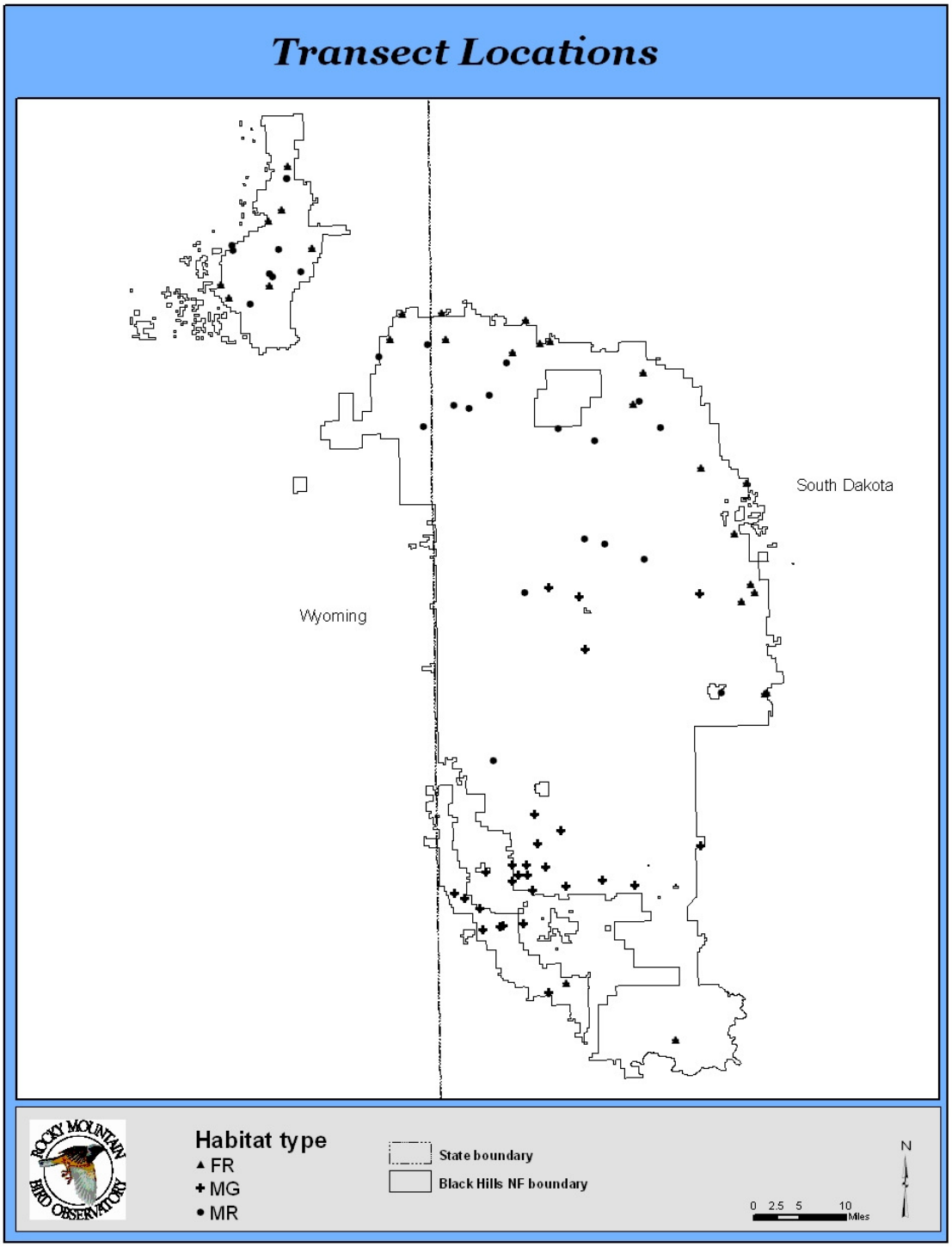


Figure 2. Distribution of habitat-stratified point transects in the Black Hills, 2006.

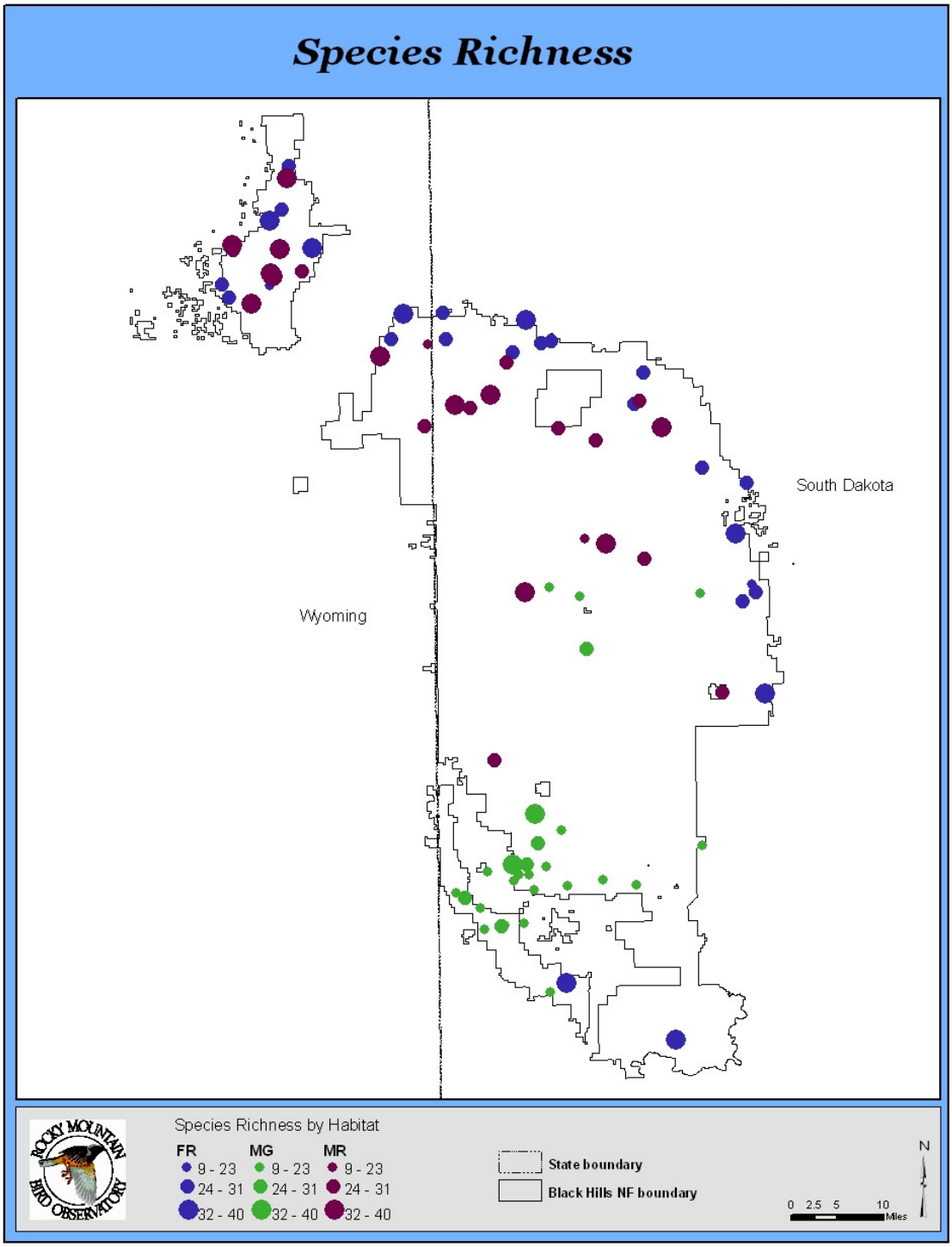


Figure 3. Number of species detected by habitat in the Black Hills, summer 2006.

Table 2. Bird totals and average number of species per point and transect in habitats surveyed in the Black Hills, summer 2006.

Habitat	# birds detected	Avg. # birds/point	# species detected	Avg. # species/point	Avg. # species/transect
Foothills Riparian	4,504	12.0	90	8.1	30.7
Montane Riparian	5,025	13.2	94	9.1	31.6
Mixed-grass Prairie	3,245	8.3	81	5.3	21.9
All habitats	12,774	11.1	124	7.5	28.0

Foothills riparian (FR)

This was the 3rd year RMBO staff surveyed the foothills riparian habitat. We surveyed 375 point counts along 27 transects in this habitat between 11 June and 21 July, 2006 (Table 1). We recorded 4,504 individual birds, with an average of 12.0 birds per point count (Table 2). Observers detected 90 species with an average of 8.1 species per point count and 30.7 species per transect in this habitat.

The point transect data from foothills riparian habitat yielded robust density estimates (CV<50%) for 35 species and a moderately robust estimate for three additional species (CV=50-75%; Table 3). MBBH is expected to effectively monitor these 38 species in this habitat, which represent 42% of all species recorded from foothills riparian in 2006.

American Robin, Chipping Sparrow, American Redstart, Cordilleran Flycatcher and Common Yellowthroat were the most abundant species in foothills riparian this year. Seventeen species (Chipping Sparrow, American Redstart, Cordilleran Flycatcher, Violet-green Swallow, Black-capped Chickadee, Red-breasted Nuthatch, Warbling Vireo, Black-headed Grosbeak, White-throated Swift, Western Wood-Peewee, Yellow Warbler, Mourning Dove, Plumbeous Vireo, White-breasted Nuthatch, American Goldfinch, Blue Jay, and Canyon Wren), were more abundant in foothills riparian than any other habitat surveyed in 2006.

Table 3. Estimated densities of breeding birds in foothills riparian habitat in the Black Hills, summer 2006.

Species	*D*	*LCL*	*UCL*	*CV*	*n*	*N*
Mourning Dove	3.7	2.2	6.1	31	77	77
White-throated Swift	6.3	3.0	13	46	67	179
Red-naped Sapsucker	2.1	1.1	4.2	41	30	30
Hairy Woodpecker	1.3	0.7	2.5	40	31	32
Northern Flicker	1.0	0.5	1.9	40	26	27
Western Wood-Pewee	4.3	2.4	7.5	35	65	66
Dusky Flycatcher	7.2	4.1	12.7	33	111	111
Cordilleran Flycatcher	44	30	63.9	23	207	208
Plumbeous Vireo	3.4	2.1	5.7	31	42	42
Warbling Vireo	18	12	26	22	212	212

Table 3 cont. Estimated densities of breeding birds in foothills riparian habitat in the Black Hills, summer 2006.

Species	*D*	*LCL*	*UCL*	*CV*	*n*	*N*
Red-eyed Vireo	7.1	4.2	12	32	40	40
Blue Jay	0.9	0.4	1.7	44	29	33
American Crow	0.4	0.2	0.8	4.1	27	35
Violet-green Swallow	30	17	51	33	129	229
Black-capped Chickadee	24	17	34	21	157	167
Red-breasted Nuthatch	22	15	33	24	143	143
White-breasted Nuthatch	3.2	1.9	5.4	32	89	90
Canyon Wren	1.3	0.7	2.7	44	31	31
Ruby-crowned Kinglet	2.0	1.0	4.1	45	50	50
Townsend's Solitaire	3.0	1.8	5.0	32	45	45
Swainson's Thrush	7.6	5.1	11	24	146	146
American Robin	66	47	92	20	322	323
Cedar Waxwing	1.8	0.7	4.9	63	25	29
Yellow Warbler	4.2	1.9	9.5	51	56	56
Yellow-rumped Warbler (Audubon's)	6.1	4.3	8.7	21	127	127
American Redstart	63	40	101	28	240	240
Ovenbird	19	13	27	23	289	289
MacGillivray's Warbler	3.6	2.0	6.5	37	27	27
Common Yellowthroat	37	12*	116*	77*	60	63
Western Tanager	7.4	5.3	11	21	128	129
Spotted Towhee	23	11	43	42	116	116
Chipping Sparrow	64	44	94	23	133	133
Song Sparrow	15	8.1	29	40	70	70
White-winged Junco	3.7	2.1	6.5	34	66	67
Black-headed Grosbeak	12	8.2	18	24	123	123
Brown-headed Cowbird	2.5	1.5	4.2	31	66	66
Red Crossbill	2.2	1.2	3.8	35	42	51
Pine Siskin	4.1	2.4	7.2	34	54	59
American Goldfinch	2.9	1.2	6.9	55	48	54
Red Squirrel	7.1	4.2	12	32	43	43

D = density estimate in birds/km^2; LCL and UCL = lower and upper 95% confidence limits on D; CV = coefficient of variation of D; n = number of observations used to estimate; N = number of individuals detected; * = variance is not estimable

Montane riparian (MR)

This was the 4th year RMBO staff surveyed montane riparian habitat. We conducted 381 point counts along 26 transects in this habitat between 10 June and 18 July, 2006 (Table 1). We recorded 5,025 individual birds, with an average of 13.2 birds per point count (Table 2). Observers detected 94 species, with an average of 9.1 species per point count and 31.6 species per transect in this habitat (Table 2).

The point transect data from montane riparian habitat yielded robust density estimates (CV<50%) for 32 species and a moderately robust estimate for six additional species (CV=50-75%; Table 4). MBBH is expected to effectively monitor these 38 species in this habitat, which represent 40% of all species recorded in montane riparian habitat in 2006.

American Robin, Chipping Sparrow, Song Sparrow, Common Yellowthroat, and American Redstart were the most abundant species in montane riparian this year. Twenty-six species (American Robin, Song Sparrow, Common Yellowthroat, Ovenbird, Dusky Flycatcher, Spotted Towhee, Gray Catbird, MacGillavray's Warbler, Swainson's Thrush, Pine Siskin, Red-eyed Vireo, Ruby-crowned Kinglet, Audubon's Warbler, Red-naped Sapsucker, House Wren, Dark-eyed Junco, Townsend's Solitaire, Red-winged Blackbird, Cedar Waxwing, Veery, Brown-headed Cowbird, Red Crossbill, Bobolink, Hairy Woodpecker, Northern Flicker, and American Crow), had higher estimated densities in montane riparian relative to the other habitats surveyed in 2006.

Table 4. Estimated densities of breeding birds in montane riparian habitat in the Black Hills, summer 2006.

Species	*D*	*LCL*	*UCL*	*CV*	*n*	*N*
American Crow	0.6	0.3	1.1	44	35	39
American Redstart	52	28	99	40	154	156
American Robin	95	68	132	20	452	463
Audubon's Warbler	6.6	4.7	9.4	21	128	128
Black-capped Chickadee	17	11	26	27	141	143
Brown-headed Cowbird	3.2	2.0	5.2	29	78	81
Black-headed Grosbeak	5.7	3.5	9.2	29	63	63
Bobolink	2.4	1.0	5.9	56	46	51
Cedar Waxwing	3.3	1.8	5.9	36	35	44
Chipping Sparrow	59	40	89	24	176	186
Cordilleran Flycatcher	26	14	47	37	132	132
Common Yellowthroat	53	37	75	21	161	161
Dusky Flycatcher	43	28	65	26	231	232
Gray Catbird	22	9.5	49	52	39	39
Hairy Woodpecker	2.0	1.2	3.2	29	30	31
House Wren	4.9	2.0	12	58	27	28
MacGillavray's Warbler	12	7.1	19	30	75	75
Northern Flicker	1.9	1.2	3.0	29	47	56
Ovenbird	46	27	77	32	258	258
Pine Siskin	8.8	5.9	13	24	154	168
Plumbeous Vireo	1.7	0.8	3.6	50	31	31
Red-breasted Nuthatch	9.6	6.7	14	21	140	140
Ruby-crowned Kinglet	6.7	4.5	10	24	142	142
Red Crossbill	3.1	2.1	4.7	25	70	89
Red-eyed Vireo	8.3	3.2	21	62	36	36
Red-naped Sapsucker	6.4	4.4	9.3	23	74	75
Red-winged Blackbird	3.5	1.7	7.1	44	80	83
Song Sparrow	58	33	102	35	210	211
Spotted Towhee	32	14	71	50	61	65
Swainson's Thrush	9.3	6.2	14	25	128	128
Townsend's Solitaire	3.6	2.4	5.5	26	57	59
Veery	3.2	1.3	7.9	57	40	40
Violet-green Swallow	8.8	5.0	16	35	93	155
Warbling Vireo	15	11	21	19	351	352
White-breasted Nuthatch	1.5	0.7	3.3	48	33	33

Table 4 cont. Estimated densities of breeding birds in montane riparian habitat in the Black Hills, summer 2006.

Species	*D*	*LCL*	*UCL*	*CV*	*n*	*N*
Western Tanager	3.3	2.0	5.7	32	76	76
Western Wood-Peewee	3.8	2.2	6.6	33	92	92
White-winged Junco	3.9	2.1	7.1	37	91	92

D = density estimate in birds/km^2; LCL and UCL = lower and upper 95% confidence limits on D; CV = coefficient of variation of D; n = number of observations used to estimate; N = number of individuals detected

Mixed-grass Prairie (MG)

This was the 4th year RMBO staff surveyed the mixed-grass prairie habitat. We conducted 392 point counts along 27 transects in this habitat between 11 June and 21 July, 2006 (Table 1). We detected 3,245 birds, with an average of 8.3 birds detected at each count station (Table 2). This average number of birds per count was the lowest recorded in any habitat in 2006 (Table 2). Observers detected 81 species, with an average of 5.3 species per point count and 21.9 species per transect.

The point transect data from mixed-grass prairie habitat yielded robust density estimates (CV<50%) for eight species and moderately robust estimates for two other species (CV=50-75%; Table 5). MBBH is expected to effectively monitor these 10 species in this habitat, which represent 12% of all species recorded from mixed-grass prairie habitat in 2006.

Grasshopper Sparrow, Mountain Bluebird, Vesper Sparrow, Western Meadowlark and Lark Sparrow were the most abundant species in this habitat in 2006. Eight species (Grasshopper Sparrow, Mountain Bluebird, Vesper Sparrow, Western Meadowlark, Lark Sparrow, Horned Lark, Dickcissel, and Rock Wren) had higher estimated densities in mixed-grass prairie habitat than in other habitats surveyed in 2006.

Table 5. Estimated densities of breeding birds in mixed-grass prairie stands in the Black Hills, 2006.

Species	*D*	*LCL*	*UCL*	*CV*	*n*	*N*
American Crow	0.5	0.3	0.8	29	38	62
Dickcissel	2.4	0.8	7.4	74	28	28
Grasshopper Sparrow	56	41	78	19	375	380
Horned Lark	3.0	1.3	7.1	53	34	38
Lark Sparrow	9.7	6.2	15	27	117	139
Mountain Bluebird	14	11	19	18	171	218
Mourning Dove	3.5	2.3	5.2	24	82	95
Rock Wren	1.8	1.1	3.0	32	48	52
Vesper Sparrow	12	8.9	15	16	254	261
Western Meadowlark	11	7.9	14	18	401	453

D = density estimate in birds/km^2; LCL and UCL = lower and upper 95% confidence limits on D; CV = coefficient of variation of D; n = number of observations used to estimate; N = number of individuals detected

SPECIES ACCOUNTS

In this section we present one-page accounts for each bird species detected in 2006 that is of management interest, as designated by either the U.S. Forest Service, the U.S. Fish and Wildlife Service, the South Dakota Dept. of Game, Fish, and Parks, South Dakota Comprehensive Wildlife Conservation Plan, or Partners In Flight. Each of these organizations has a stake in maintaining healthy populations of birds in the Black Hills. For the U.S. Forest Service, we include designations for BHNF Management Indicator Species (MIS), Species of Local Concern (as per the phase II amendment of the Forest Plan), and Region 2 Sensitive Species (R2SS). For the U.S. Fish and Wildlife Service, we include designations for Birds of Conservation Concern for Bird Conservation Region 17 (BCR17; USFWS 2002). For the South Dakota Department of Game, Fish, and Parks, we include designations for State Threatened or Endangered Species and Species of Greatest Conservation Need. For Partners In Flight we include designations from the Partners In Flight Species Assessment Database for Bird Conservation Region 17, (PIF Species Assessment Database 2005), and the Wyoming Partners In Flight Bird Conservation Plan (2003; this designation included only for Level I and II priority species that were recorded in the Wyoming portion of the Black Hills).

The geographic distribution maps in the following accounts depict the locations and relative abundance of species of management interest that were detected on point transects in 2006. The relative abundance scale used in the maps is based on the number of points *along each transect* where the species was detected. It should also be noted that the location of the dots do not indicate the precise location of the point at which the species was observed, but rather the access point of the transect on which the species was observed. It is important to keep in mind that the maps only reflect the abundance and distribution of the species across the sites we surveyed, and should not necessarily be construed to suggest anything about the areas in between.

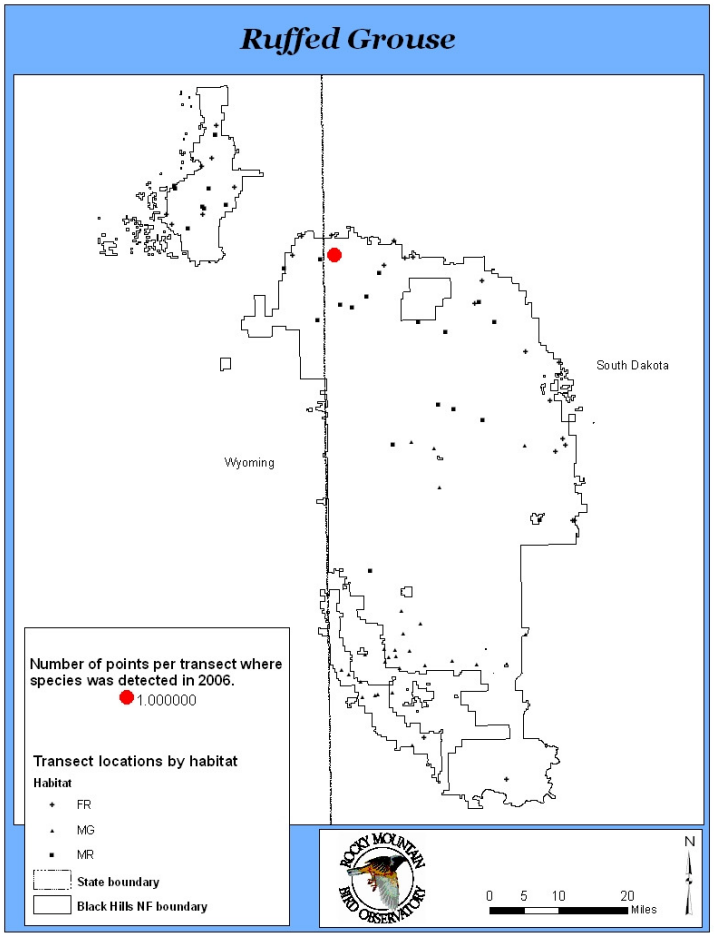
In each table we provide two numbers pertaining to the number of observations for each species: *N, the number of individuals observed,* and *n, the number of independent observations for each species*. These numbers may be different as often several individuals are detected in a single observation, as when birds are in a flock. While the number of individuals observed is often of interest, especially for rare species, density estimates are derived using only independent observations. It should also be noted that the number of individuals observed (N) includes flyovers and between point detections. This explains why the total number of birds in Appendix A is greater than the totals in Table 2.

In a few cases, we provide comparisons with available historical accounts of the avifauna of the Black Hills (Grinnell 1875; Pettingill and Whitney 1965) to provide a historical perspective in which to interpret the current findings.

Ruffed Grouse

(BHNF Management Indicator Species)

Ruffed Grouse occurs in low abundance throughout much of the northern Black Hills. In 2002, we detected 62 birds, the highest number in the history of the program, with 16 in ponderosa pine-north and 11 in white spruce. Aspen and late-successional pine habitats have also supported relatively large numbers of detections of Ruffed Grouse in previous years. In 2006, we did not survey the habitats where Ruffed Grouse are most frequently detected and we only recorded one individual along a foothills riparian transect.



Ruffed Grouse is difficult to monitor under MBBH since the timing of our surveys does not correspond well with the period of peak detectability of Ruffed Grouse, which occurs earlier in the spring. Thus, the species probably goes undetected on many of our late-spring/early summer surveys. Therefore, these data should not be relied upon to reflect abundance as many individuals are likely missed during our surveys.

Total number of independent detections, number of individuals, and habitat-specific density estimates for Ruffed Grouse for the MBBH monitoring project, 2006.

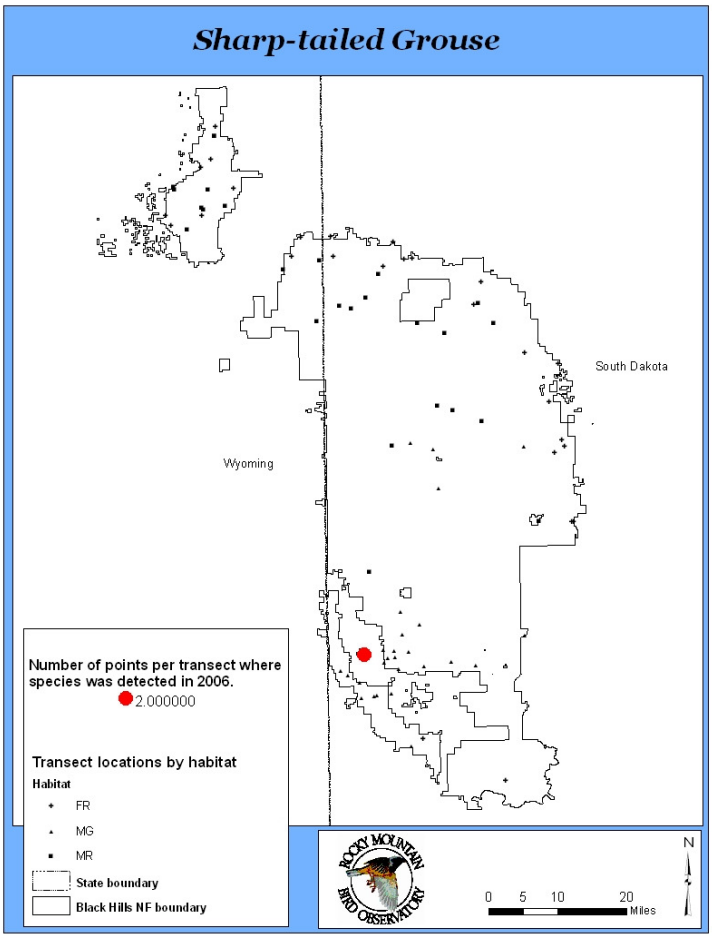
Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	1

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Sharp-tailed Grouse

(PIF Continental and Regional Stewardship Species)
(WY-PIF Level I Priority)

Sharp-tailed Grouse occurs almost exclusively in areas of native mixed-grass prairie, primarily in the southern Black Hills, Elk Mountains, and also in the large prairies in the central hills. This species is also starting to colonize the Jasper burn area as it begins to revert to grassland. In 2006, we recorded four Sharp-tailed Grouse along one mixed-grass prairie transect, MG10, in late May. In 2004, when we last surveyed this habitat, we observed eight Sharp-tailed Grouse along this same transect and 25 individuals in this habitat.



It is important to realize that the timing of our surveys does not correspond well to the period of peak detectability of Sharp-tailed Grouse, which occurs earlier in the spring. Thus the species probably goes undetected on many of our late-spring/early summer surveys. Therefore, these data should not be relied upon to reflect abundance as many individuals are likely missed during our surveys. Continued surveys in mixed-grass prairie, especially earlier in the spring, would most likely provide better information on Sharp-tailed Grouse.

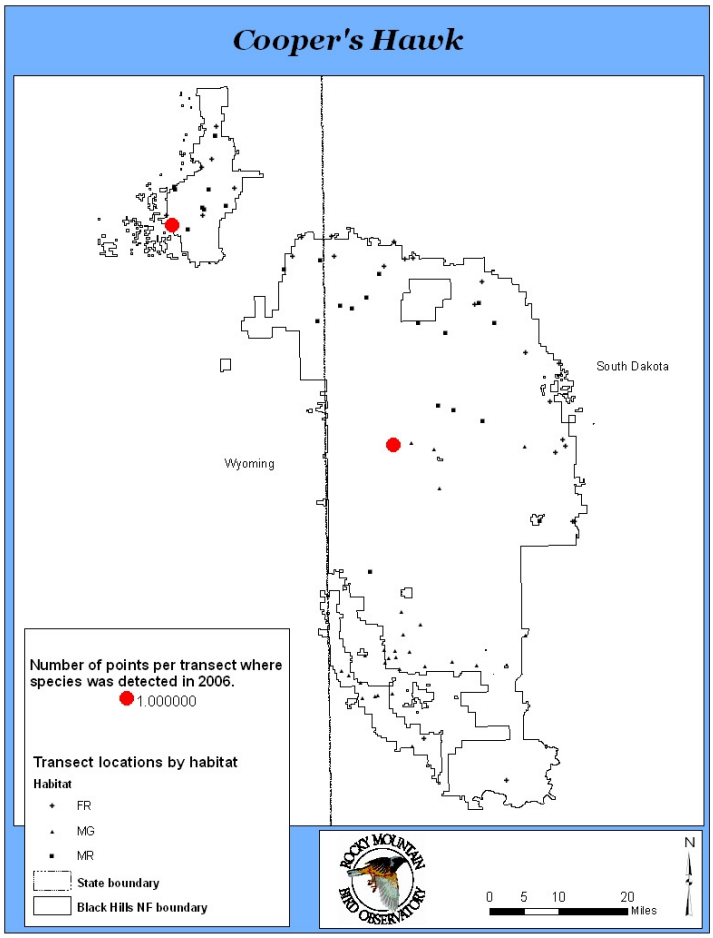
Total number of independent detections, number of individuals, and habitat-specific density estimates for Sharp-tailed Grouse for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
MG	ID	--	--	--	--	4

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Cooper's Hawk

(BHNF Species of Local Concern)



Cooper's Hawk occurs throughout the Black Hills; however, Pettingill and Whitney described this species as "probably uncommon to rare". In 2006 we observed only two individuals, one along a montane riparian transect and the other on a foothills riparian transect, FR81, and in 2005 we observed a Cooper's Hawk along this same foothills riparian transect at the same point count station.

Data from the full spectrum of habitat-based point transects across the Black Hills may provide a means to loosely track the status of Cooper's Hawk over time. Effective monitoring, however, will likely require more intensive and focused efforts, probably involving call-response surveys or occupancy modeling. Given interest, such a program could be implemented cost-effectively as part of MBBH, with observers using playback to detect Cooper's Hawks and other forest raptors at count stations after point-transect surveys.

Total number of independent detections, number of individuals, and habitat-specific density estimates for Copper's Hawk for the MBBH monitoring project, 2006.

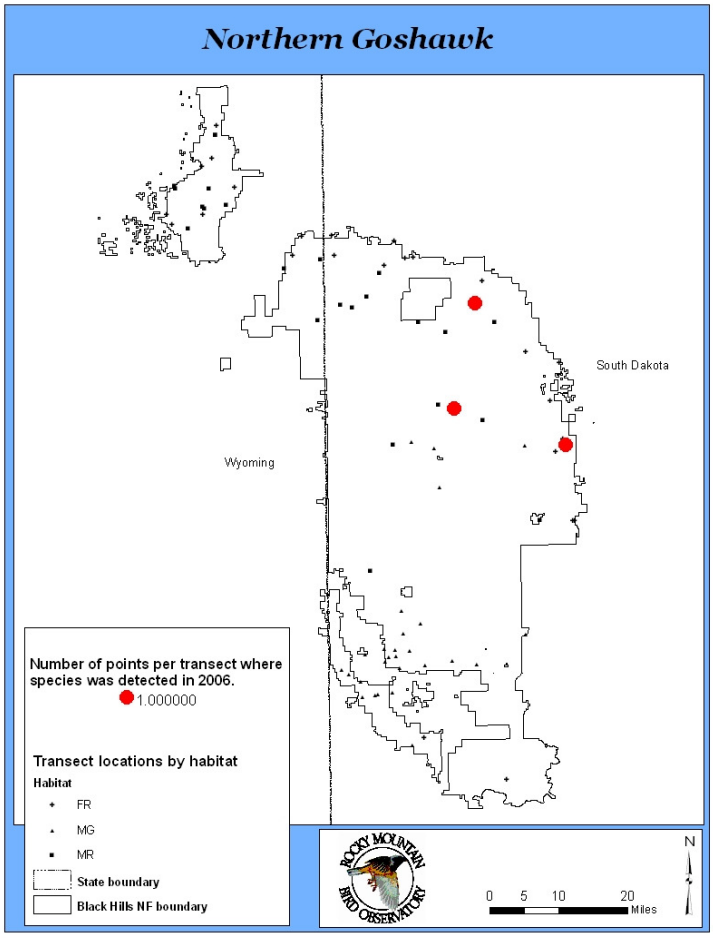
Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	1
MR	ID	--	--	--	--	1

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Northern Goshawk

(Region 2 Sensitive Species)
(PIF Species of Regional Concern)
(WY-PIF Level I Priority)
(SDGFP Species of Greatest Conservation Need)

Northern Goshawk occurs widely in the Black Hills, although it is rare to uncommon throughout. In 2006, we observed only three individuals: two along foothills riparian transects and one along a montane riparian transect. This was lower than in any other year of the MBBH program but we did not survey the species' primary forested habitat in 2006.



Even in 2006 with only three detections, Northern Goshawk has consistently been the most frequently observed species of the *Accipiter* hawks that breed in the Black Hills, and thus may be more abundant than either Cooper's Hawk or Sharp-shinned Hawk.

Effective monitoring for this species will likely require more intensive and focused efforts, probably involving call-response surveys such as those implement through the region-wide Northern Goshawk monitoring program. This new program was implemented on the BHNF in 2006, and results will be presented in a separate report.

Total number of independent detections, number of individuals, and habitat-specific density estimates for Northern Goshawk for the MBBH monitoring project, 2006.

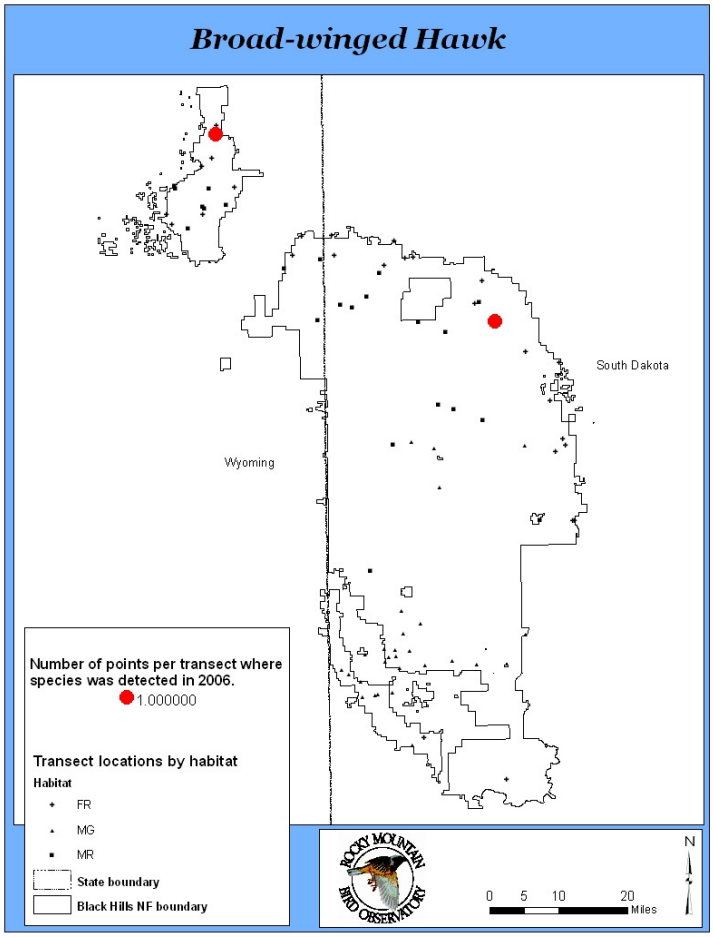
Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	1
MR	ID	--	--	--	--	1

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Broad-winged Hawk

(BHNF Species of Local Concern)

Broad-winged Hawk occurs primarily in the northern Black Hills and Bear Lodge mountains, where it is an uncommon to fairly common summer resident, although the species has been observed in other parts of the Black Hills as well. We observed three Broad-winged Hawks in 2006 along three montane riparian transects. The number of detections of this species in riparian habitats was much higher in 2005 with three detections in foothills riparian and seven in montane riparian. In previous years, however, aspen and late-succesional pine have had higher numbers of Broad-winged Hawks than any of the habitats surveyed in 2006.



As with most raptors, Broad-winged Hawks are observed too infrequently to be adequately monitored through point transects in any single habitat. Given interest, it would be possible to reliably monitor Broad-winged Hawks and other forest raptors cost-effectively as part of MBBH. Such a program could be implemented by conducting broadcast surveys for Broad-winged Hawks and other forest raptors along existing MBBH point transects.

Total number of independent detections, number of individuals, and habitat-specific density estimates for Broad-winged Hawk for the MBBH monitoring project, 2006.

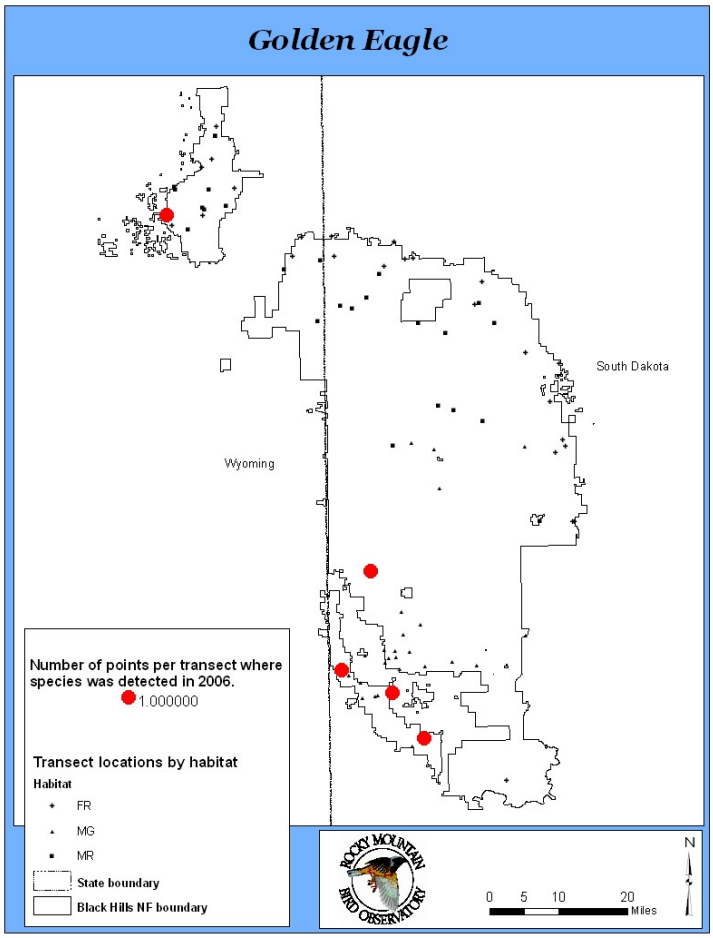
Habitat	D	LCL	UCL	CV	n	N
MR	ID	--	--	--	--	3

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Golden Eagle

(PIF Species of Regional Concern)
(USFWS Bird of Conservation Concern)

Golden Eagle occurs locally in the Black Hills, especially in areas with remote, high cliffs suitable for nesting. In 2006, we recorded six Golden Eagles, which doubled the total number of observations for this species from the MBBH program. A pair of eagles was observed along a montane riparian transect, and the other four detections were from two foothills riparian transects and two mixed-grass prairie transects.



Because of the scarcity and localized nature of the species, Golden Eagle will not be effectively monitored through habitat-based point transects. Effective monitoring will likely best be accomplished through locating and monitoring as many nests as possible of this species in the Black Hills. Given interest, such a program could be implemented cost-effectively as part of MBBH, with observers recording and cataloguing nest locations and surveying each nest or a random subset of nests for occupancy over time.

Total number of independent detections, number of individuals, and habitat-specific density estimates for Golden Eagle for the MBBH monitoring project, 2006.

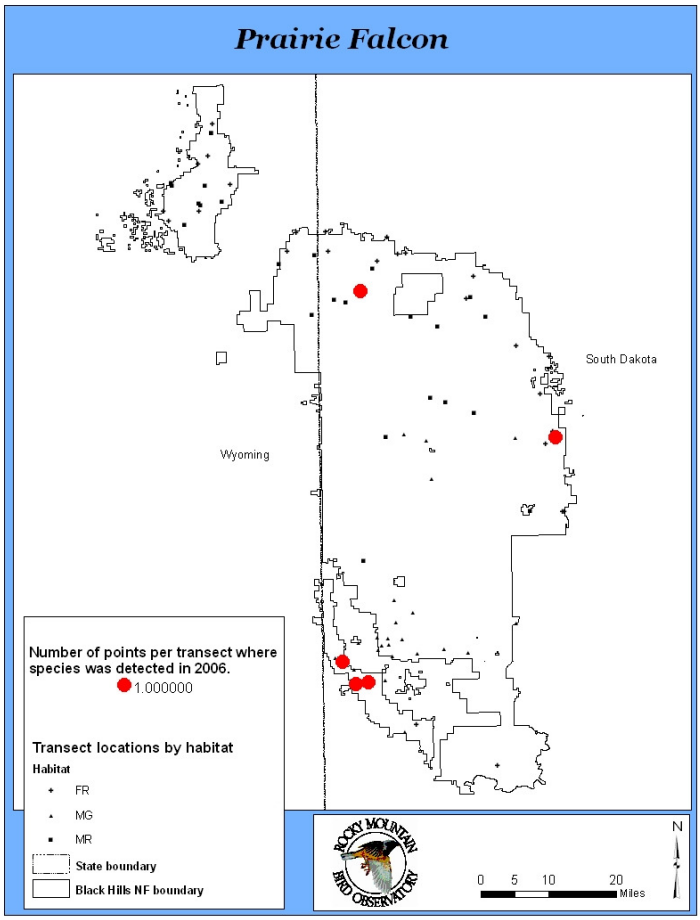
Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	2
MG	ID	--	--	--	--	2
MR	ID	--	--	--	--	2

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Prairie Falcon

(USFWS Bird of Conservation Concern)

Prairie Falcon is a rare to locally uncommon species in the Black Hills, occurring primarily where high cliffs provide suitable nesting sites in proximity to open areas for hunting. Six individuals were observed in 2006, two in foothills riparian, three in mixed-grass prairie, and one in montane riparian.



Due to the low-density and localized distribution of Prairie Falcons in the Black Hills, habitat-stratified point transects will only provide a means to loosely track the status of this species. Effective monitoring will likely best be accomplished through locating and monitoring as many nests as possible of this species in the Black Hills. Such an effort could be incorporated into MBBH in a cost-effective manner, especially if combined with similar efforts for other cliff-nesting species (e.g., Golden Eagle).

Total number of independent detections, number of individuals, and habitat-specific density estimates for Prairie Falcon for the MBBH monitoring project, 2006.

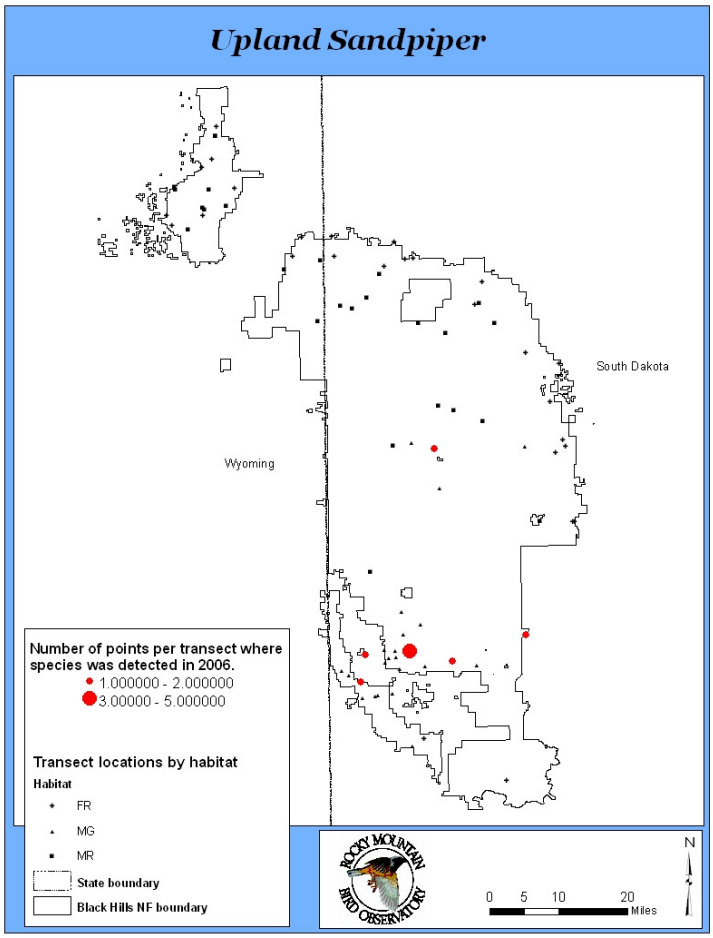
Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	2
MG	ID	--	--	--	--	3
MR	ID	--	--	--	--	1

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Upland Sandpiper

(PIF High Overall Priority BCR17)
(WY-PIF Level I Priority)
(USFWS Bird of Conservation Concern)

Upland Sandpiper occurs locally in the Black Hills, primarily in the south, where the species is restricted to large expanses of mixed-grass prairie. In 2006, 12 individuals were detected on BHNF lands, all in mixed-grass prairies.



While Upland Sandpipers are generally more abundant on the plains surrounding the BHNF, the central plains region, which includes the Black Hills, is considered to be the single most important area for breeding and migratory stopover of this species in North America (Brown et al. 2001). No other bird conservation region (BCR) has a higher average density of this species than BCR17.

Too few independent detections of this species were made to generate a density estimate in the mixed-grass prairie habitat, and the species is too rare at present to be adequately monitored under the current level of effort of MBBH. However, given continued effort in this habitat, it should be possible to loosely track the status of Upland Sandpiper over time on the BHNF through the current array of point-transects in mixed-grass prairie.

Total number of independent detections, number of individuals, and habitat-specific density estimates for Upland Sandpiper for the MBBH monitoring project, 2006.

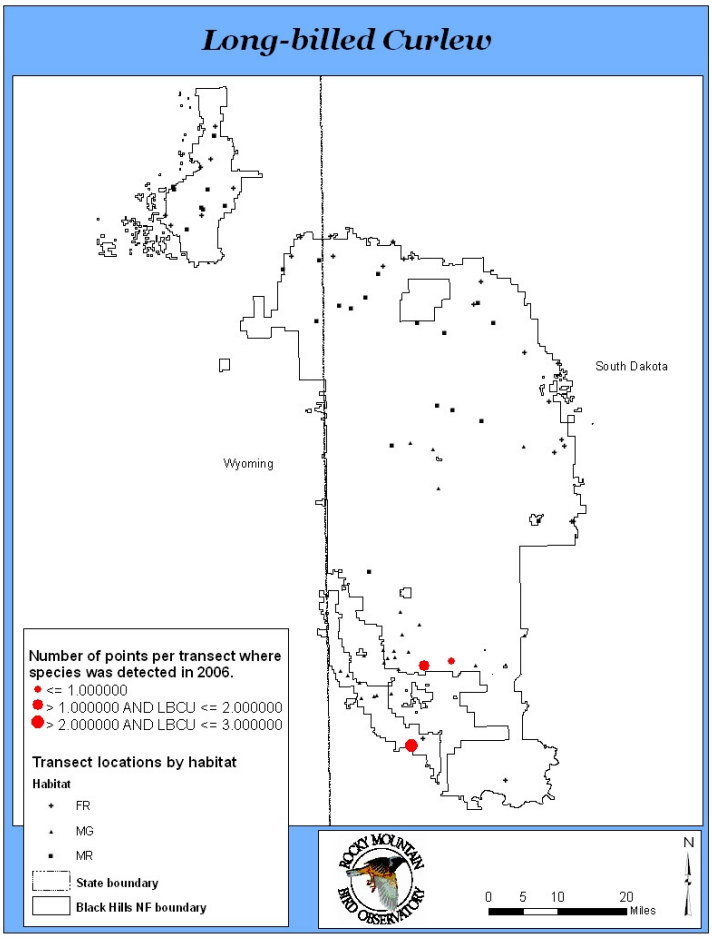
Habitat	D	LCL	UCL	CV	n	N
MG	ID	--	--	--	--	12

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Long-billed Curlew

(Region 2 Sensitive Species)
(WY-PIF Level I Priority)
(USFWS Bird of Conservation Concern)
(SDGFP Species of Greatest Conservation Need)

Long-billed Curlew is an uncommon migrant and summer resident in western South Dakota; however, it is not known to breed in the Black Hills. Formerly a common summer resident and migrant in southern South Dakota, the populations of this species appear to be decreasing, presumably due to loss of breeding habitat (Tallman et al. 2002). In 2006, we recorded the first detections of Long-billed Curlews in the history of the MBBH program, with seven individuals recorded along three mixed-grass prairie transects in the southwestern Black Hills.



It is not likely that this species will be recorded in sufficient numbers to estimate a density on this project. However, transects may provide a means to loosely track Long-billed Curlews in the Black Hills and determine if the species is indeed now breeding in the area.

Total number of independent detections, number of individuals, and habitat-specific density estimates for Long-billed Curlew for the MBBH monitoring project, 2006.

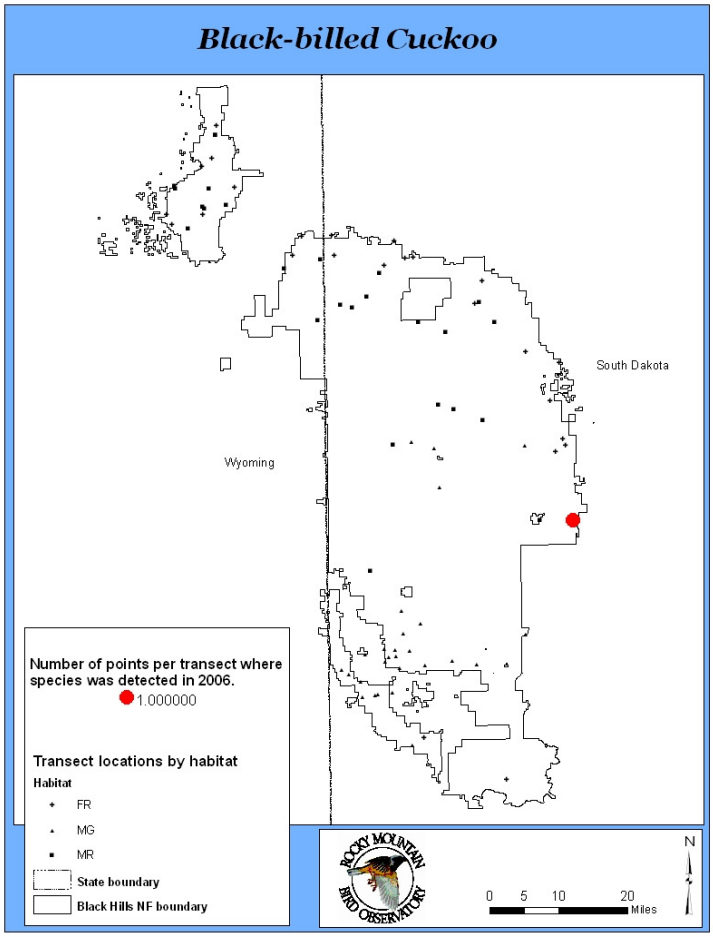
Habitat	D	LCL	UCL	CV	n	N
MG	ID	--	--	--	--	7

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Black-billed Cuckoo

(PIF Species of Regional Concern)
(WY-PIF Level II Priority)
(USFWS Bird of Conservation Concern)

Black-billed Cuckoo is considered a rare breeder in the Black Hills. One Black-billed Cuckoo was detected in foothills riparian habitat this year and this represents only the third detected in the history of the MBBH program. The other two detections of this species were in 2001, with one detection along a riparian transect and the other detection from a wet meadow transect.



It is not likely that this species will be recorded in sufficient numbers to estimate a density on this project in any habitat or over time. However, transects may provide a means to loosely track Black-billed Cuckoos in the Black Hills and determine if there are hot spots for this species and if it is indeed breeding in the area.

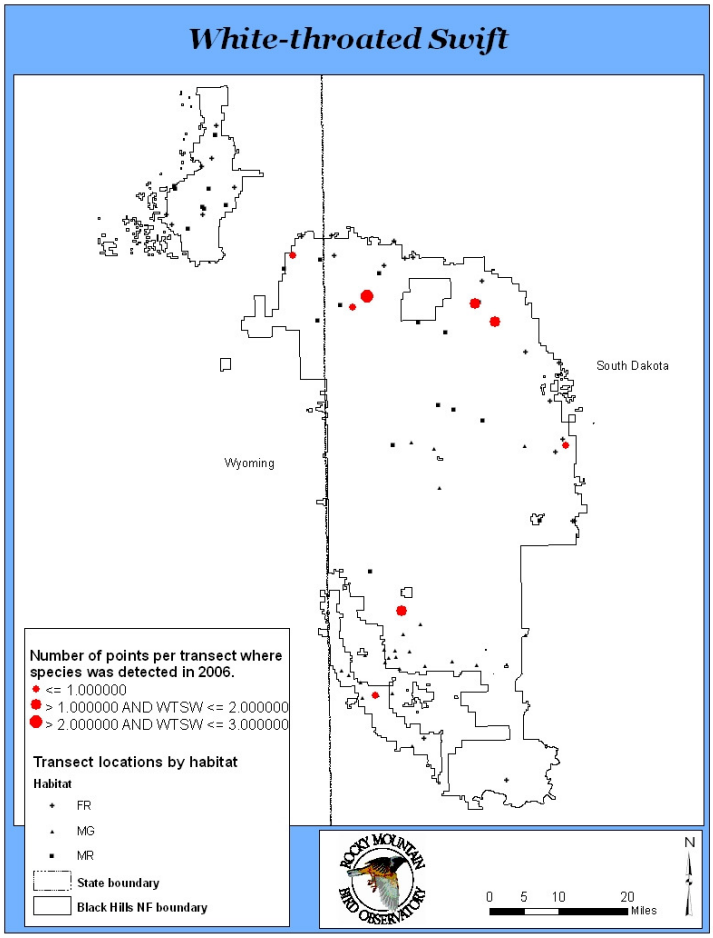
Total number of independent detections, number of individuals, and habitat-specific density estimates for Black-billed Cuckoo for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	1

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

White-throated Swift

(Species of Continental Concern)
(PIF Continental Watch List)
(WY-PIF Level II Priority)



White-throated Swift is locally common in the Black Hills, particularly at lower elevations, where high cliffs provide suitable nesting sites. Of the habitats surveyed in 2006, detections of White-throated Swifts were sufficient to calculate density only in foothills riparian, primarily due to the prevalence of high cliffs. Previous surveys have shown they also occur in high density in the pine-juniper shrubland habitat, again due to the prevalence of high cliffs.

Because White-throated Swifts are typically observed in flocks, the number of independent observations of clusters is often considerably lower than the number of individuals recorded. Independently observed clusters in three habitats surveyed in 2006 were too few to allow for statistically rigorous monitoring, other than in the foothills riparian habitat. Effective monitoring of White-throated Swifts will best be accomplished through point transects in pine-juniper shrubland and foothills riparian, or through complimentary techniques that specifically target cliff-nesting birds.

Total number of independent detections, number of individuals, and habitat-specific density estimates for White-throated Swift for the MBBH monitoring project, 2006.

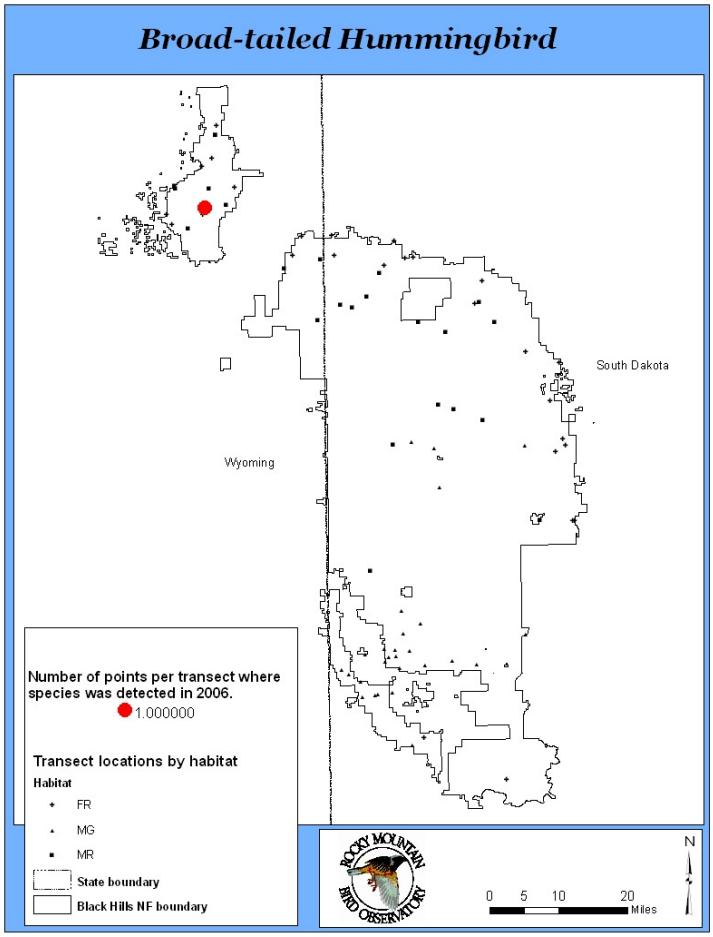
Habitat	D	LCL	UCL	CV	n	N
FR	6.3	3.0	13	46	67	179
MG	ID	--	--	--	--	3
MR	ID	--	--	--	--	21

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Broad-tailed Hummingbird

(WY-PIF Level II Priority)

Broad-tailed Hummingbird is considered rare in the Black Hills, which represent the extreme northeastern edge of its range. The status of this species in the Black Hills is still not fully clear, but annual sightings of the species during the breeding season and observations of displaying male birds suggest a small but regular breeding population exists. In 2006, RMBO staff recorded only one individual on a montane riparian transect.



It is not likely that this species will be recorded in sufficient numbers to estimate a density on this project. However, transects may provide a means to loosely track Broad-tailed Hummingbirds in the Black Hills.

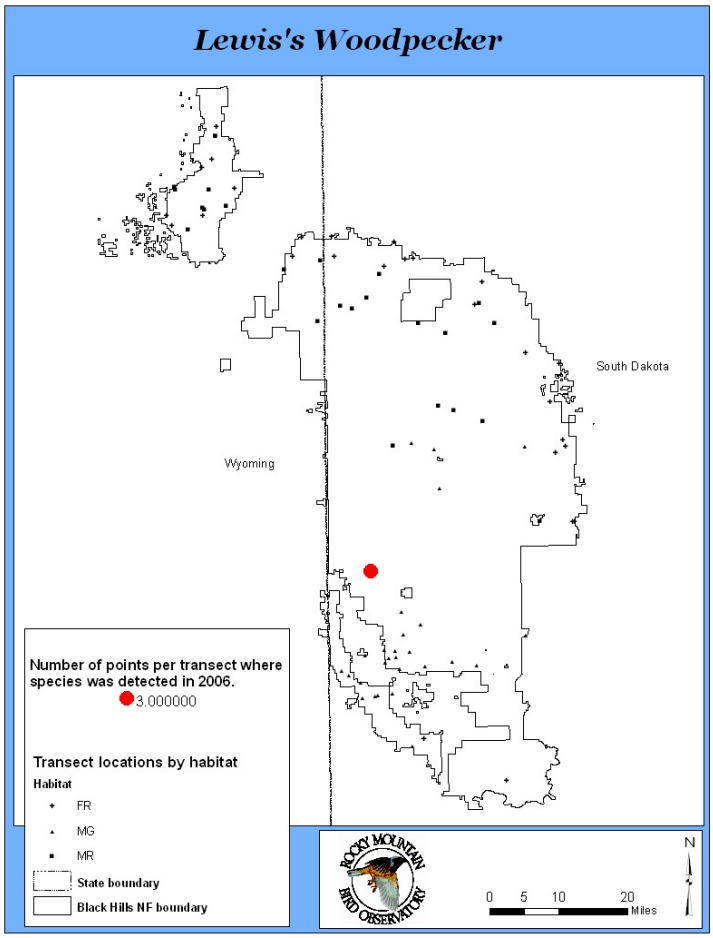
Total number of independent detections, number of individuals, and habitat-specific density estimates for Broad-tailed Hummingbird for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
MR	ID	--	--	--	--	1

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Lewis's Woodpecker

(Region 2 Sensitive Species)
(PIF Species of Continental and Regional Concern)
(PIF Continental Watch List)
(WY-PIF Level II Priority)
(USFWS Bird of Conservation Concern)
(SDGFP Species of Greatest Conservation Need)



Lewis's Woodpecker reaches the most northeasterly extent of its global distribution in the Black Hills, where it is generally uncommon to rare. In 2006, we observed seven individuals on the BHNF, all along one montane riparian transect, MR27. Lewis's Woodpecker was also recorded on this transect when we surveyed it in 2002. In previous years, we have recorded the greatest number of this species in the Jasper Burn; we did not survey this habitat in 2006.

In 2005, when we last surveyed the Jasper Burn, still too few Lewis's Woodpeckers were being recorded to estimate density; therefore, it seems that conducting point-transects only in recent burn areas (<5 yrs old) will be inadequate to monitor this species. However, a random sampling scheme that considers all burn areas in the Black Hills (at least up to a certain age, e.g., 20 yrs), and thus includes a greater proportion of older burns, could prove useful to monitoring or tracking the species on the Forest.

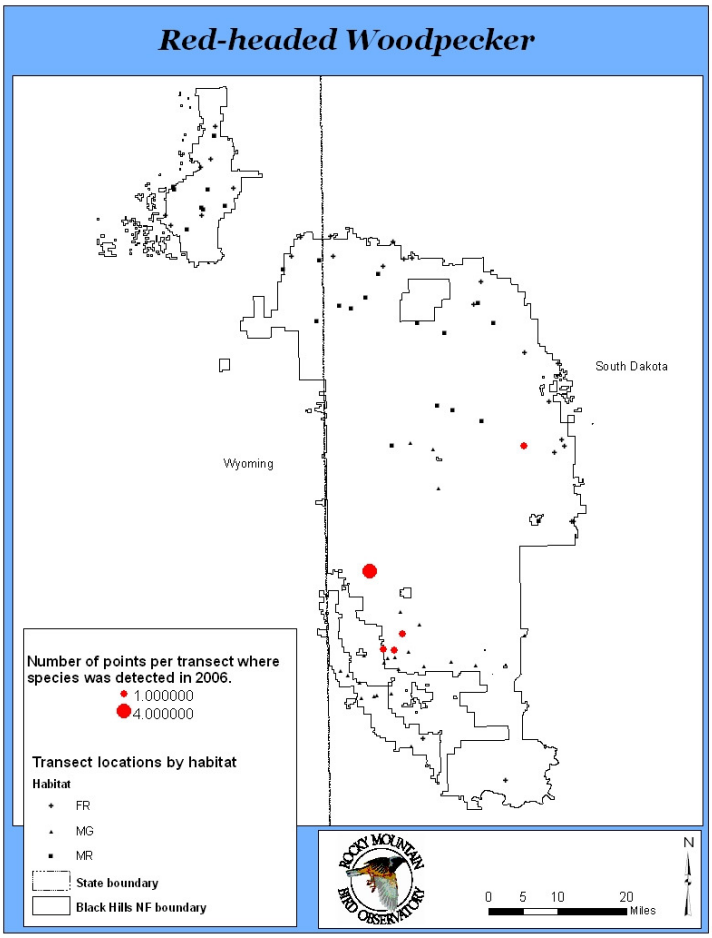
Total number of independent detections, number of individuals, and habitat-specific density estimates for Lewis's Woodpecker for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
MR	ID	--	--	--	--	7

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Red-headed Woodpecker

(PIF Species of Continental and Regional Concern)
(PIF Continental Watch List)



Red-headed Woodpeckers occur locally in the Black Hills, where they are generally uncommon to rare. At present, they occur in very low densities, primarily in burn areas. We did not survey the Jasper Burn in 2006 although the species is probably occupying this and other recent burn areas, presumably in similar low densities as in previous years. In 2006, we observed a total of 10 Red-headed Woodpeckers: five in mixed-grass prairie and five in montane riparian. All of the detections of this species in 2006 in montane riparian were from one transect, MR27. Red-headed Woodpecker was also recorded along this transect in 2005. Also, we detected Red-headed Woodpecker along the same mixed-grass prairie transect, MG25, in 2006 as in 2002 and 2004.

Red-headed Woodpecker should be effectively monitored under MBBH through point transects in burn areas. As with the other fire-dependent woodpeckers, a sampling scheme that considers all potentially suitable burn areas (e.g., those <20 years old) will likely yield a more accurate picture of this species' population status and trend at the Forest level.

Total number of independent detections, number of individuals, and habitat-specific density estimates for Red-headed Woodpecker for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
MG	ID	--	--	--	--	5
MR	ID	--	--	--	--	5

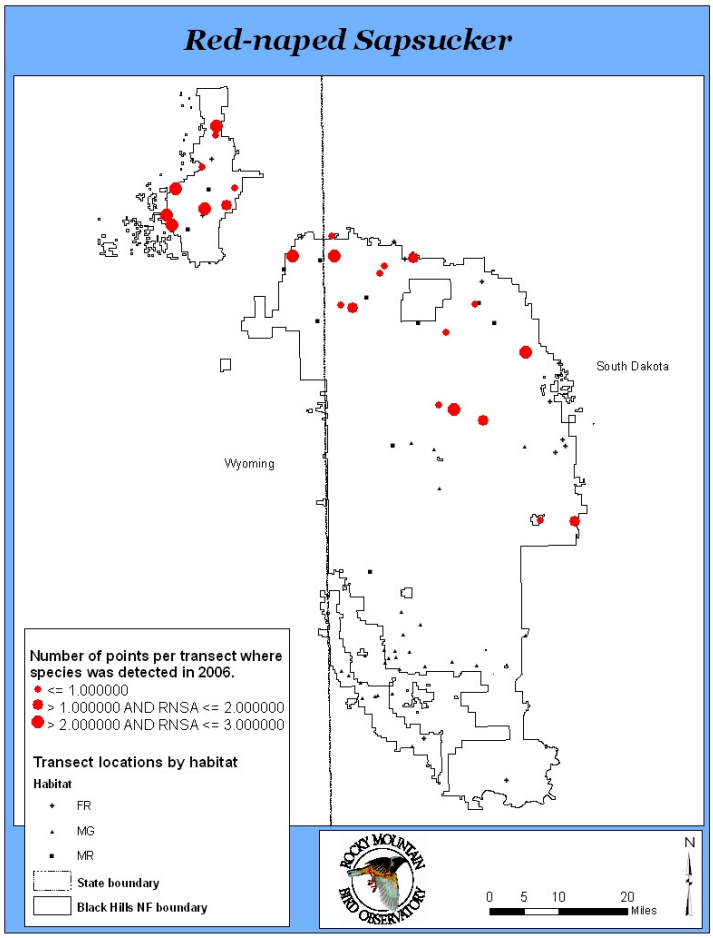
D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Red-naped Sapsucker

(USFWS Bird of Conservation Concern)
(WY-PIF Level II Priority)

Red-naped Sapsucker occurs in much of the Black Hills, typically in low to moderate density, but it is most abundant and widespread in the north. The abundance and distribution of Red-naped Sapsucker are largely tied to the availability of broad-leaved, woody vegetation, especially aspen and willows.

Of the habitats surveyed in 2006, Red-naped Sapsucker occurred in highest density in montane riparian stands. This species should be effectively monitored under MBBH by point transects in a range of habitats, especially aspen, montane riparian, ponderosa pine-north, and late-successional pine.



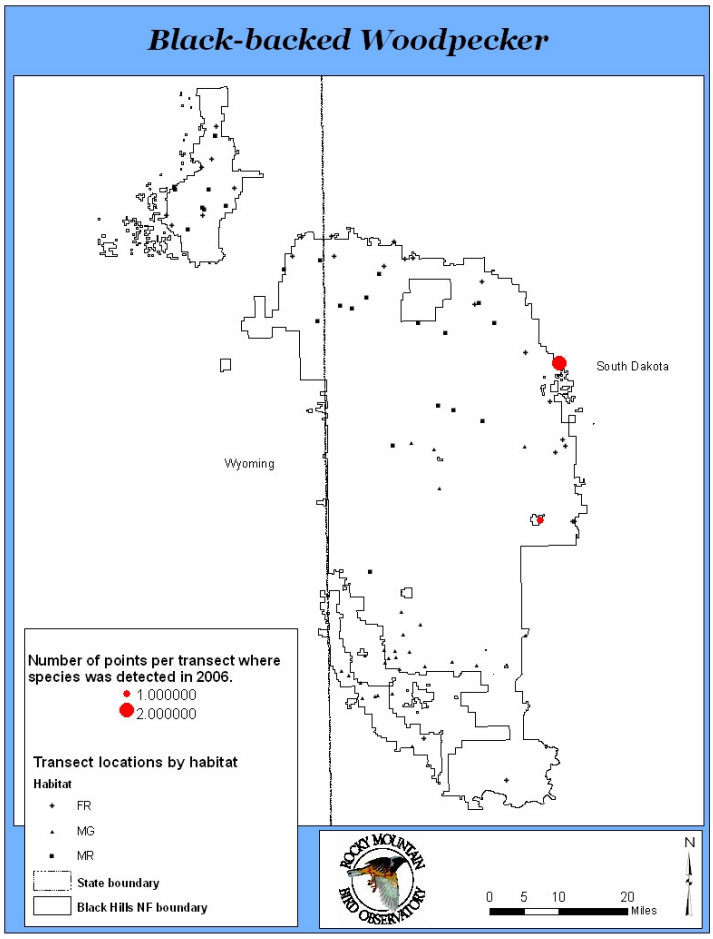
Total number of independent detections, number of individuals, and habitat-specific density estimates for Red-naped Sapsucker for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	2.1	1.1	4.2	41	30	30
MR	6.4	4.4	9.3	23	74	75

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Black-backed Woodpecker

(Region 2 Sensitive Species)
(BHNF Management Indicator Species)
(PIF Species of Regional Concern)
(WY-PIF Level II Priority)
(SDGFP Species of Greatest Conservation Need)



Black-backed Woodpecker occurs widely in the Black Hills, but is rare outside of burns. In 2006, we only recorded three Black-backed Woodpeckers, but we did not survey the Jasper Burn. Two of the birds we detected were along one foothills riparian transect, FR24, and the other detection was from a montane riparian transect.

As conditions change in the Jasper burn it will be necessary to focus effort on other burn areas in order to monitor this species at the Forest-level in the Black Hills. One option could be to switch to rotational sampling in this habitat, so that newer burn areas are continually rotated through the sampling scheme. Alternatively, a greater number of sites randomly selected from known burned areas on the Forest could provide a means to monitor Black-backed Woodpeckers and other high priority species that also depend on burns. For example, Lewis's and Red-headed Woodpeckers depend on older burns. Surveying a random selection of all available burns would allow for inference to Forest-wide population status and trends for a variety of burn-dependent species.

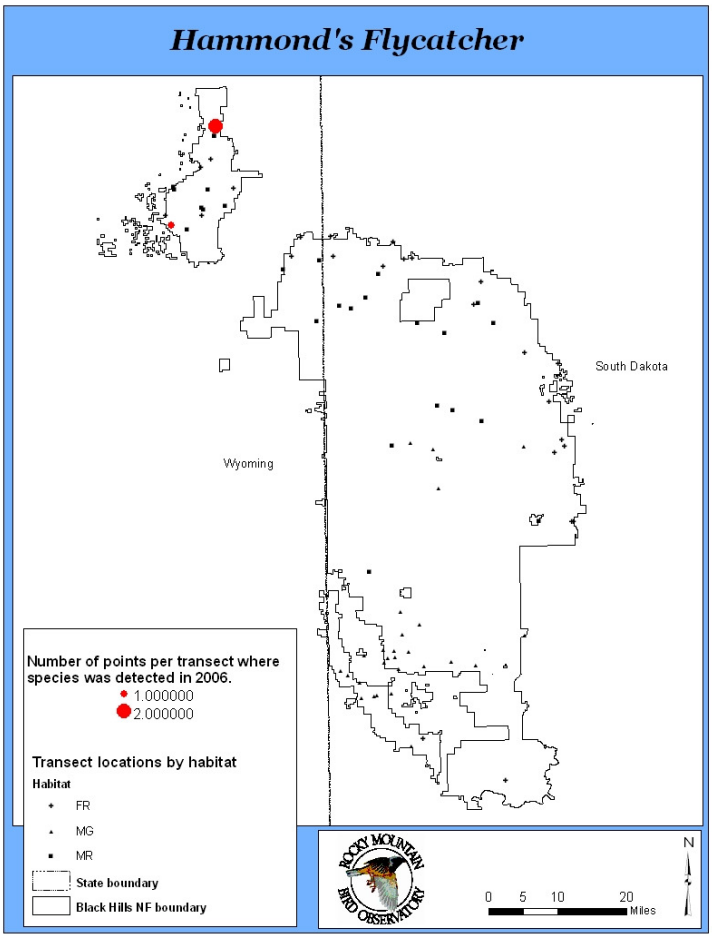
Total number of independent detections, number of individuals, and habitat-specific density estimates for Black-backed Woodpecker for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	2
MR	ID	--	--	--	--	1

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Hammond's Flycatcher

(WY-PIF Level II Priority)



Three individual Hammond's Flycatchers were detected in the Black Hills in 2006. The three detections were from two foothills riparian transects: FR83 and FR81. This species was also detected along these transects in 2005. Hammond's Flycatcher is not previously known to breed in this region, but the recent discovery in 2005 and 2006 of this species at multiple locations in the Black Hills suggests a regular breeding population may exist. However, careful identification by observers will be necessary to determine the extent of the species' population in the Black Hills. Because of the similarity of this species to the more common and widespread Dusky Flycatcher, RMBO will continue to heavily emphasize identification of these two species in future training sessions.

It is not likely that this species will be recorded in sufficient numbers to estimate a density on this project. However, transects may provide a means to loosely track Hammond's Flycatcher in the Black Hills.

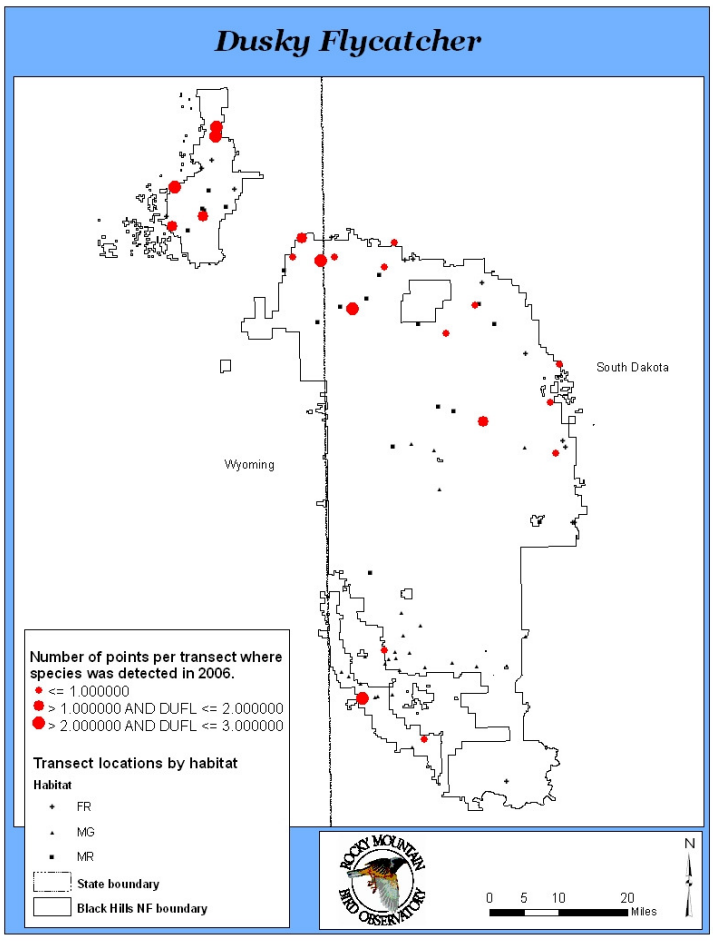
Total number of independent detections, number of individuals, and habitat-specific density estimates for Hammond's Flycatcher for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	3

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Dusky Flycatcher

(WY-PIF Level II Priority)



Dusky Flycatcher occurs widely throughout the Black Hills, and is generally common to abundant, although its density varies considerably among habitats. The abundance of this species appears to be tied with the prevalence of broad-leaved, deciduous vegetation of almost any kind.

Of the habitats surveyed in 2006, density was greatest in montane riparian. The species also occurs in high densities in pine-juniper shrubland (Panjabi 2003a, 2004) and aspen forests, which were not surveyed this year. In addition, Dusky Flycatcher appears to be responding positively to the changes caused by the Jasper Burn, and has become common in this area since 2001 (Panjabi 2003a, 2004).

Dusky Flycatcher should be effectively monitored through point-transects in a wide range of habitats under MBBH, especially pine-juniper-shrubland, montane riparian, and aspen.

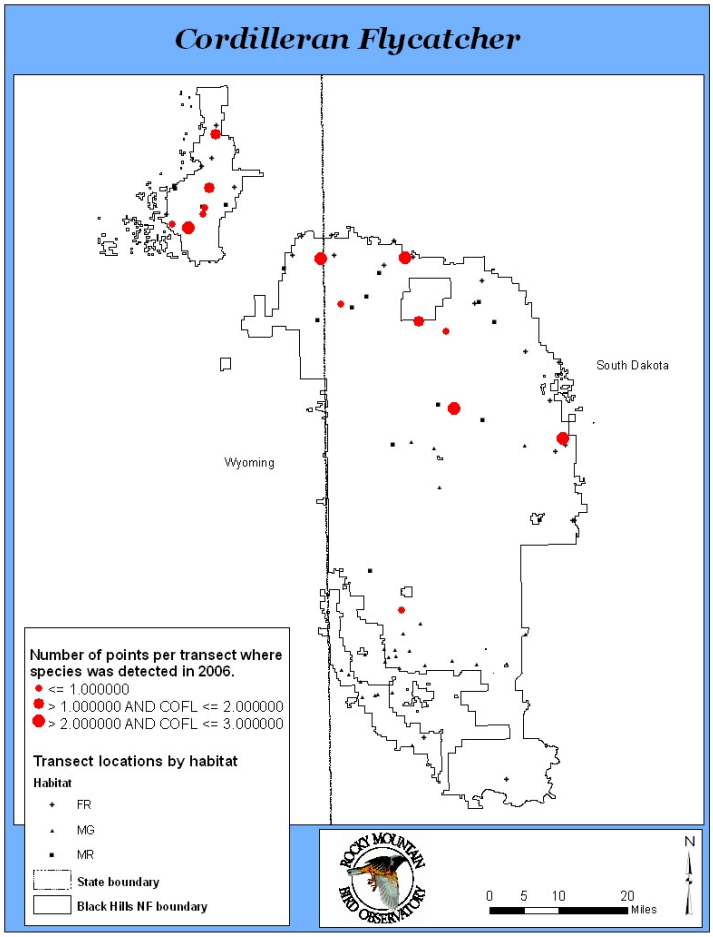
Total number of independent detections, number of individuals, and habitat-specific density estimates for Dusky Flycatcher for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	7.2	4.1	12.7	33	111	111
MG	ID	--	--	--	--	12
MR	43	28	65	26	231	232

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Cordilleran Flycatcher

(WY-PIF Level II Priority)



Cordilleran Flycatcher occurs widely in the Black Hills, but its distribution is tied closely to the availability of broad-leaved, deciduous vegetation in close proximity to suitable nest sites, primarily cliffs, rock outcrops, and other ledges, including human-built structures. The species seems to have the strongest preference for moist canyons with abundant broad-leaved, deciduous vegetation.

Of the habitats surveyed in 2006, estimated density was highest in foothills riparian, followed by montane riparian. Cordilleran Flycatchers are most abundant along the bottoms of steep canyons which are prevalent in most foothills riparian sites in the Black Hills. This probably explains the extraordinarily high density of Cordilleran Flycatchers in this habitat compared to elsewhere.

Cordilleran Flycatcher should be effectively monitored under MBBH through point-transects in a range of habitats, especially foothills riparian, montane riparian, and white spruce, which we did not survey in 2006.

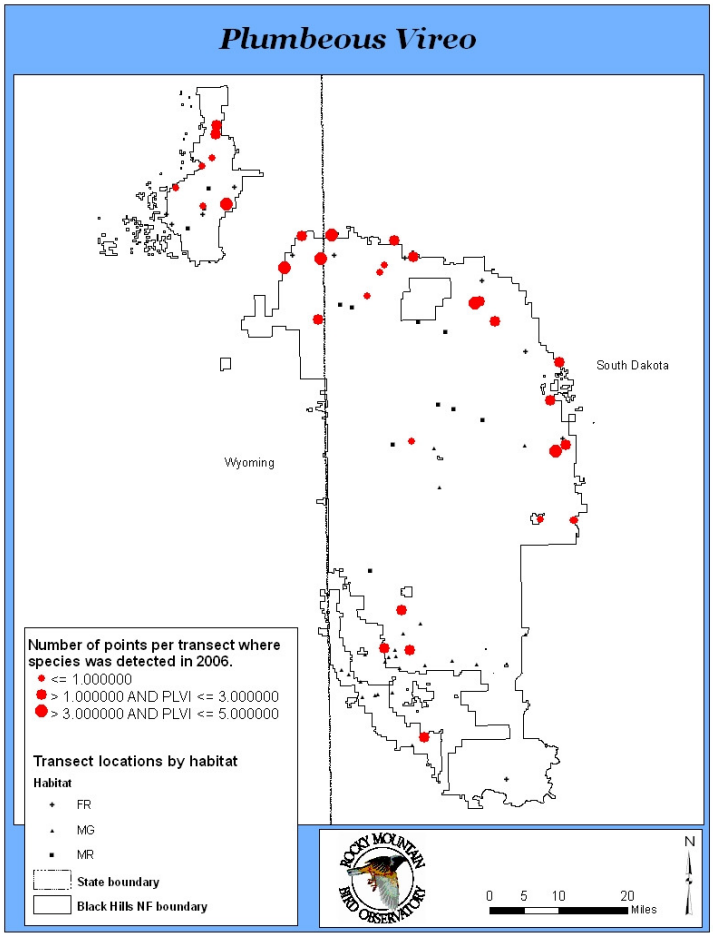
Total number of independent detections, number of individuals, and habitat-specific density estimates for Cordilleran Flycatcher for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	44	30	63.9	23	207	208
MG	ID	--	--	--	--	1
MR	26	14	47	37	132	132

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Plumbeous Vireo

(WY-PIF Level II Priority)



Plumbeous Vireo occurs in ponderosa pine forests throughout the Black Hills in low to moderate abundance, but it is most abundant at lower elevations, especially in the southwest. The species is often recorded from a variety of habitats, but its presence is tied to the availability of pine forests. In 2006, we detected this species in large enough numbers to estimate density in both riparian habitats; however, this is probably due to detections of birds from the adjacent pine forest. Overall, Plumbeous Vireo achieves its highest density in the Black Hills in the pine-juniper shrublands of the southwestern hills, although they are also fairly common in the southern ponderosa pine forests (Panjabi 2003, 2004).

Plumbeous Vireo should be effectively monitored under MBBH through point-transects in a range of habitats, especially those not surveyed in 2006 such as burned habitat, ponderosa pine-south, and pine-juniper shrubland.

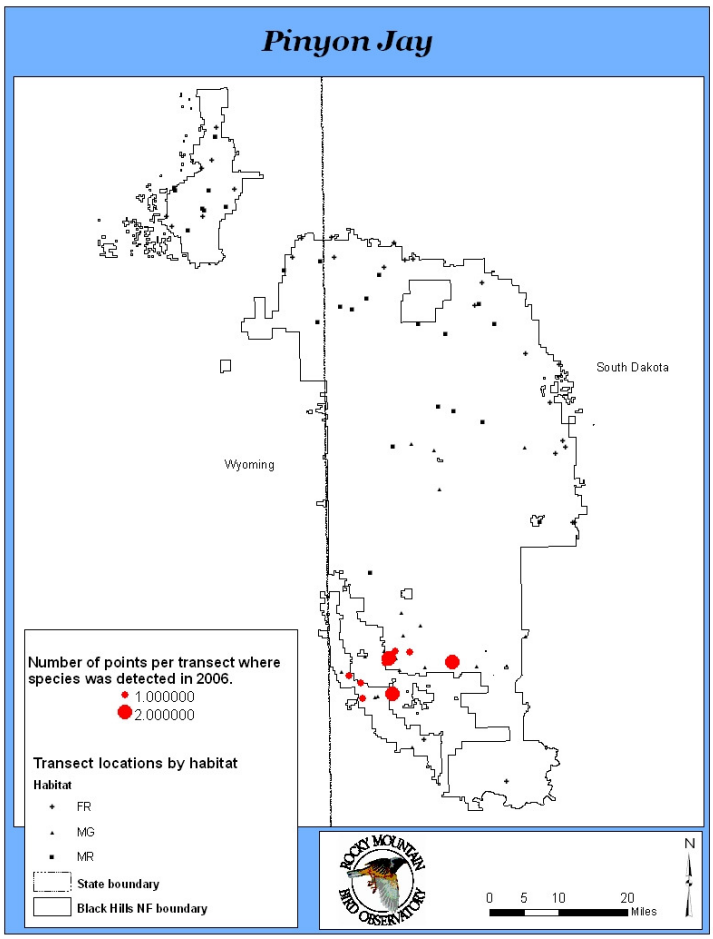
Total number of independent detections, number of individuals, and habitat-specific density estimates for Plumbeous Vireo for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	3.4	2.1	5.7	31	42	42
MG	ID	--	--	--	--	9
MR	1.7	0.8	3.6	50	31	31

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Pinyon Jay

(PIF Species of Continental and Regional Concern)
(PIF Continental Watch List)



Pinyon Jays are primarily restricted to arid low-elevation habitats in the southwestern Black Hills, although they do occur seasonally in other areas. In 2006, Pinyon Jays were recorded exclusively in mixed-grass prairie. We recorded 22 individuals along nine transects. We have observed Pinyon Jays along six of these same transects in previous years. However, it is difficult to discern their specific habitat preference from these data, as they are often detected at great distances, and sometimes in flight. Given their preferences for pine seeds and open woodland habitat, it seems reasonable to conclude that in the Black Hills Pinyon Jays prefer the sparse pine woodlands that are interspersed by extensive grasslands, and they probably move about in response to varying abundance of cone crops.

Due to their narrow distribution, small population, and strong propensity for flocking, the probability of encountering Pinyon Jays on point transect surveys is low. Therefore, Pinyon Jay may not be effectively monitored in any single habitat in the Black Hills, but the species should be reasonably well-monitored across all habitats, given continued effort in mixed-grass prairies, pine-juniper shrublands, and ponderosa pine forests.

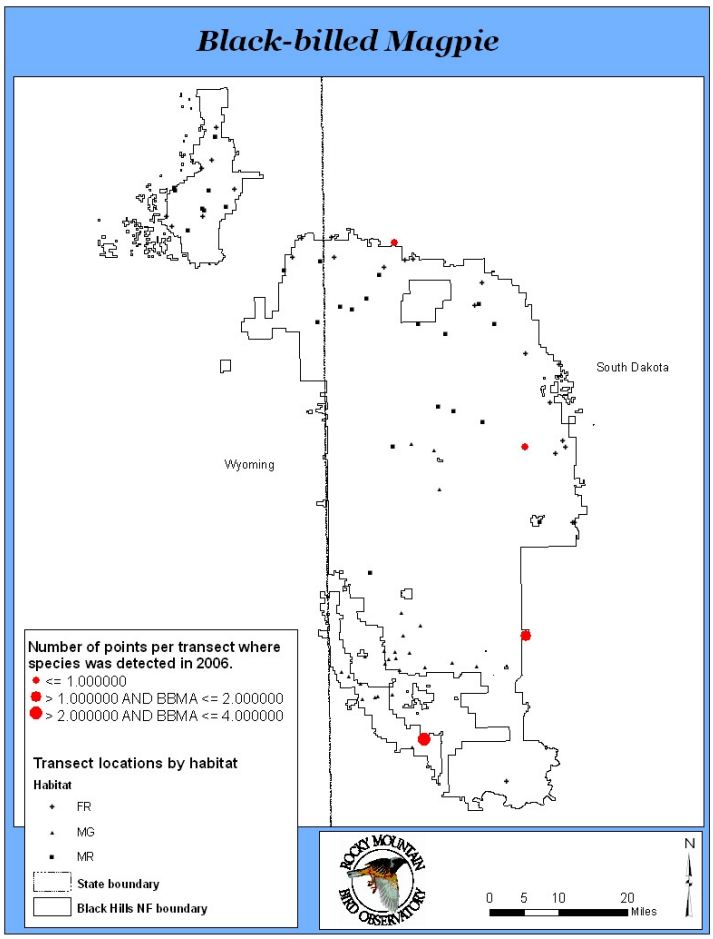
Total number of independent detections, number of individuals, and habitat-specific density estimates for Pinyon Jay for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
MG	ID	--	--	--	--	22

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Black-billed Magpie

(PIF Species of Regional Concern)



Although once fairly common in the Black Hills, Black-billed Magpie is now rare, especially at mid to higher elevations (Puttingil and Whitney 1964). In 2006, we observed a total of 18 Black-billed Magpies in two habitats, mixed-grass prairie and foothills riparian. Eleven of the 12 detections in foothills riparian were from one transect, FR11. We also detected Black-billed Magpies along this transect in 2002 and 2005, which were the only other years that we have surveyed this habitat.

Throughout the region, the population of Black-billed Magpies appears to be declining, along with the habitat it represents. Of note, Merlin and Lewis's Woodpecker use abandoned Black-billed Magpie nests. It is unlikely that Black-billed Magpie will be effectively monitored under MBBH, without additional effort focused on this species.

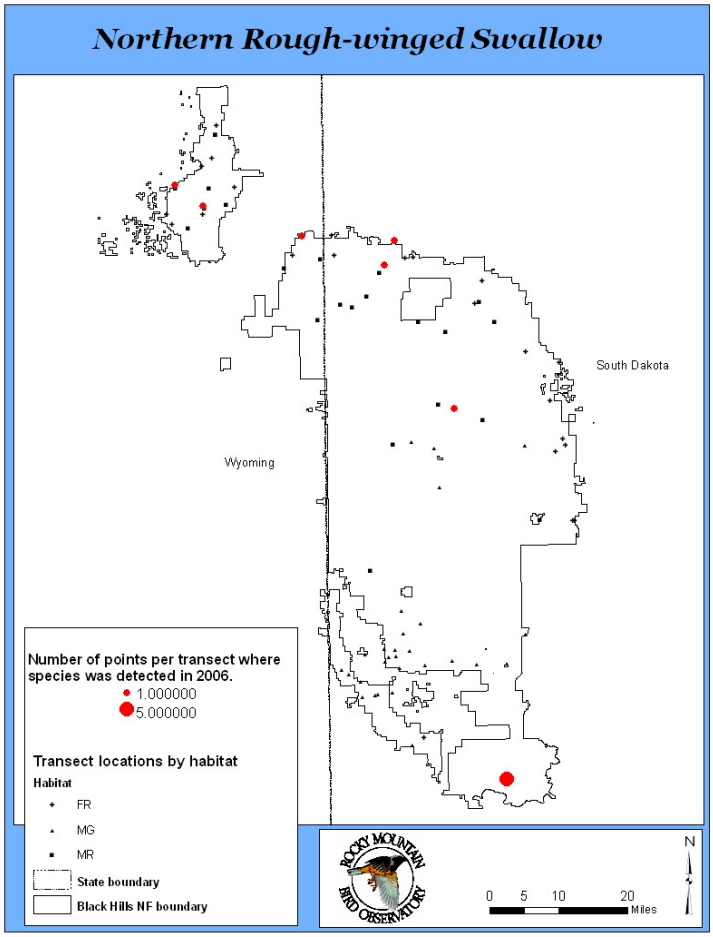
Total number of independent detections, number of individuals, and habitat-specific density estimates for Black-billed Magpie for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	12
MG	ID	--	--	--	--	6

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Northern Rough-winged Swallow

(PIF Species of Regional Concern)



Northern Rough-winged Swallows are uncommon in the Black Hills. In this region, the species tends to prefer lowland and grassland habitat. In 2006 as in 2005, Northern Rough-winged Swallows were recorded exclusively in riparian habitats. In 2006, we recorded 13 Northern Rough-winged Swallows. Eight individuals were observed along four foothills riparian transects and five were observed along montane riparian transects. On one of the foothills riparian transect, FR97, where we observed 4 birds this summer, we also observed this species in 2002 and 2005.

Northern Rough-winged Swallows nest in pairs, not in colonies as many other swallows do. They nest in abandoned, naturally occurring, or excavated tunnels, often along stream banks. Due to its restricted nesting habits and solitary breeding behavior, it is unlikely that Northern Rough-winged Swallow will be effectively monitored under MBBH without additional effort focused on this species.

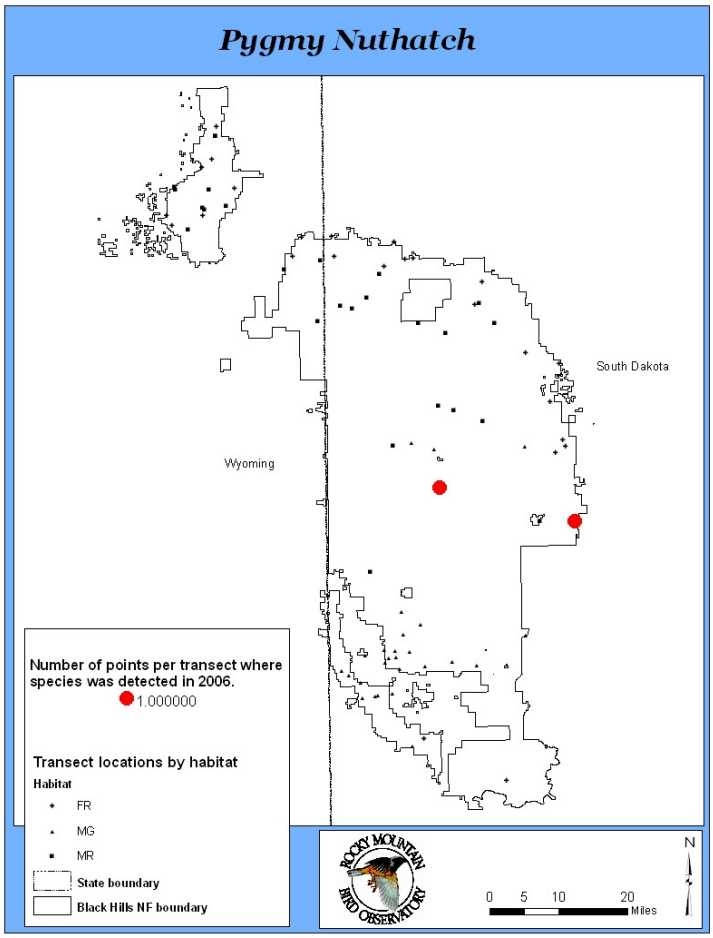
Total number of independent detections, number of individuals, and habitat-specific density estimates for Northern Rough-winged Swallow for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	12
MG	ID	--	--	--	--	6

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Pygmy Nuthatch

(BHNF Species of Local Concern)



Pygmy Nuthatch is a rare but regular, and apparently widespread, resident in the Black Hills. In 2006, we observed three Pygmy Nuthatches; two along a mixed-grass prairie transect, and one was along a foothills riparian transect.

Contrary to a recent published accounts (Tallman et al. 2002), data generated from MBBH (Panjabi 2001, 2003a) suggest this species is not restricted to only the eastern and southern edges of the Black Hills, as it has been recorded on point transects away from these areas in both the central and northwestern hills. Since the inception of MBBH in 2001, 13 Pygmy Nuthatches have been observed in total across a range of habitats.

Due to its rarity, localized nature, and unpredictable distribution, Pygmy Nuthatch will not likely be rigorously monitored using point transects under MBBH. Monitoring pairs or colonies at known nesting sites, which are few in number, could provide information on the persistence of localized populations. More focused research on the demography and habitat requirements of this species in the Black Hills is warranted, especially given its well-documented preference for ponderosa pine in other locations throughout the region.

Total number of independent detections, number of individuals, and habitat-specific density estimates for Pygmy Nuthatch for the MBBH monitoring project, 2006.

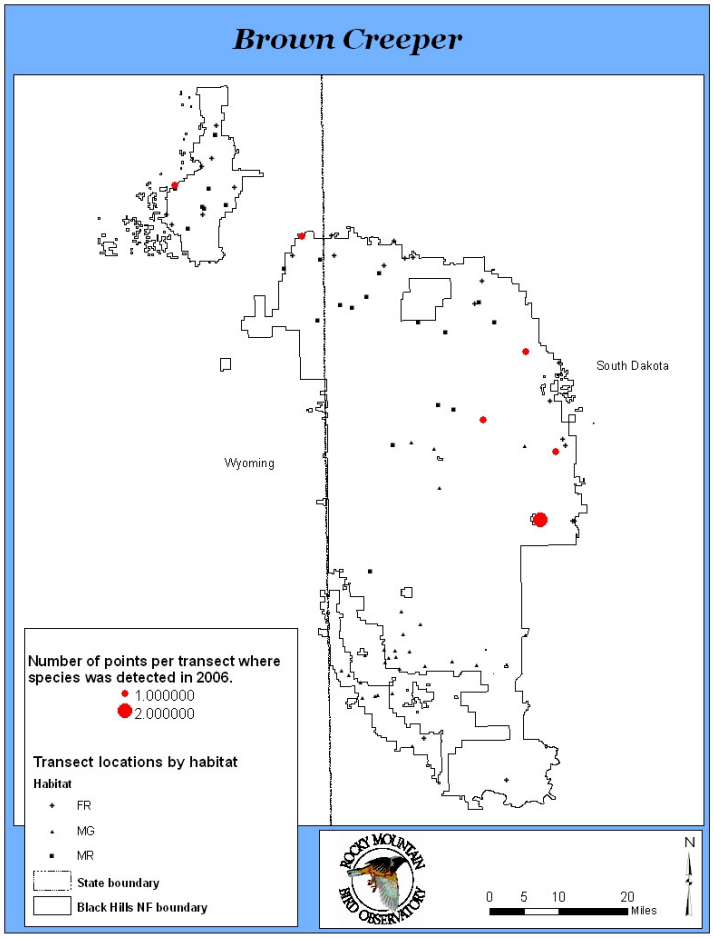
Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	1
MG	ID	--	--	--	--	2

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Brown Creeper

(BHNF Management Indicator Species)
(WY-PIF Level II Priority)

Brown Creeper occurs in low abundance in coniferous forests throughout the Black Hills, but its presence is strongly tied to mature and old-growth forest conditions. In 2006, we detected three Brown Creepers in foothills riparian and four in montane riparian. Surveys in previous years have shown that they occur in highest densities in late-successional pine stands, which typically contain a high proportion of mature and old-growth forest conditions (Panjabi 2001, 2003).



Brown Creeper should be effectively monitored through point transects under MBBH, particularly in ponderosa pine-north, white spruce, and late-successional ponderosa pine stands.

Total number of independent detections, number of individuals, and habitat-specific density estimates for Brown Creeper for the MBBH monitoring project, 2006.

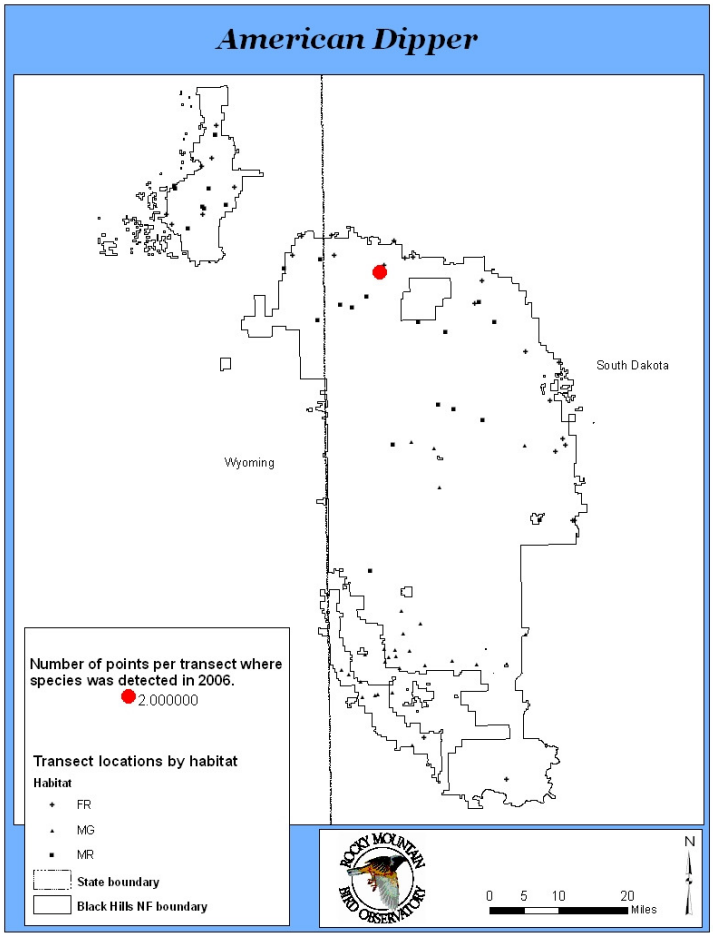
Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	3
MR	ID	--	--	--	--	4

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

American Dipper

(BHNF Species of Local Concern)
(WY-PIF Level II Priority)
(SDGFP Species of Greatest Conservation Need)

American Dipper occurs primarily along Spearfish creek in the Black Hills, where it relies wholly on aquatic insects (particularly larvae) that are sensitive to water quality. The American Dipper is thus an excellent indicator of overall stream health (Tyler and Ormerod 1994). In 2006, we observed three American Dippers all along one montane riparian transect, MR88. We also observed American Dippers along this transect when we surveyed it in 2002. SDGFP is currently monitoring this species in the Black Hills through a program that is distinct from MBBH.



Total number of independent detections, number of individuals, and habitat-specific density estimates for American Dipper for the MBBH monitoring project, 2006.

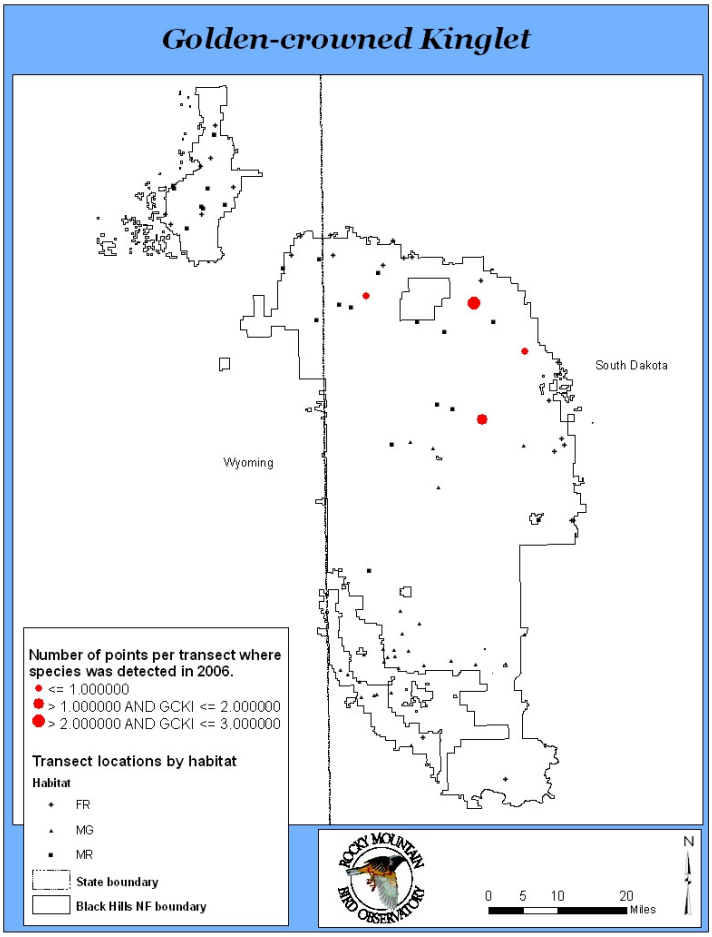
Habitat	D	LCL	UCL	CV	n	N
MR	ID	--	--	--	--	3

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Golden-crowned Kinglet

(BHNF Management Indicator Species)
(WY-PIF Level II Priority)

Golden-crowned Kinglet breeds almost exclusively in white spruce forests in the Black Hills. Observations of birds in other habitats reflect the prevalence of white spruce at sites within these habitats.



In 2006, we observed a total of seven Golden-crowned Kinglets along two foothills riparian transects and two montane riparian transects. In 2005, the number of detections of this species was much higher in these habitats, and we were able to calculate a density for Golden-crowned Kinglets in each.

Golden-crowned Kinglet should be effectively monitored through point transects in white spruce habitat, and possibly in foothills riparian, montane riparian, ponderosa pine-north habitats.

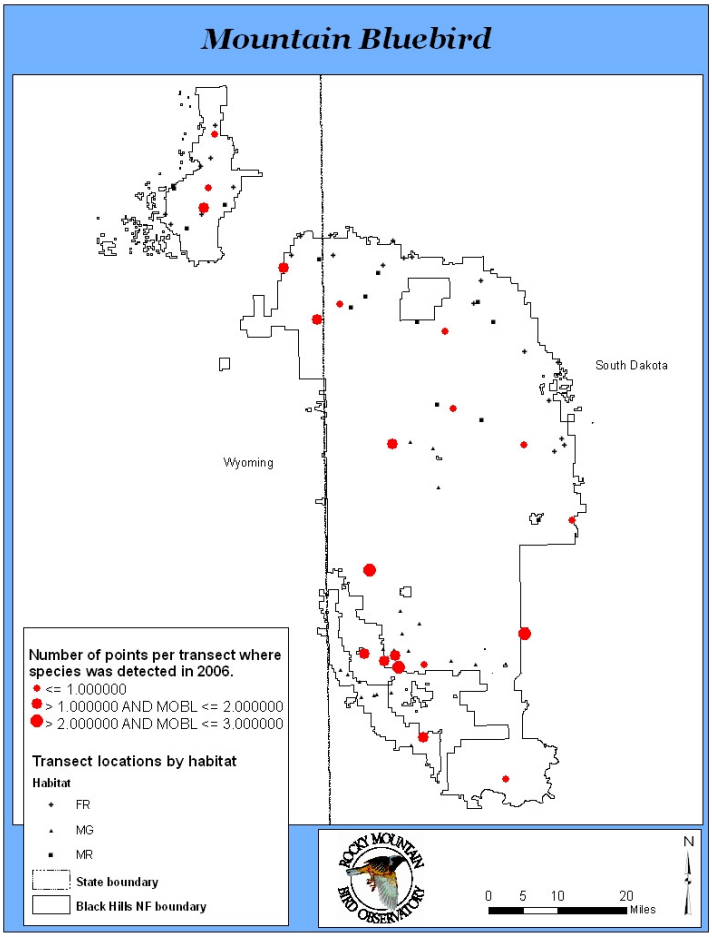
Total number of independent detections, number of individuals, and habitat-specific density estimates for Golden-crowned Kinglet for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	4
MR	ID	--	--	--	--	3

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Mountain Bluebird

(PIF Species of Regional Concern)



Mountain Bluebird occurs locally throughout the Black Hills, occupying burned areas, grasslands, shrublands, and other open areas. Of the habitats surveyed in 2006, density was greatest in mixed-grass prairie. The species also occurs in high abundance in the Jasper Burn. In 2005 we estimated the density of Mountain Bluebirds to be 25 birds/ km^2 in the Jasper Burn. We did not survey burned habitat in 2006 but the species' density has risen steadily each year until 2004. In 2004, we estimated the density of Mountain Bluebirds in the burned habitat to be about the same as in 2005. We anticipate the density of Mountain Bluebirds in the Jasper Burn will stabilize and decrease as the burn ages.

Mountain Bluebirds are secondary cavity nesters and require open landscapes for hunting, thus it is not surprising that they have responded positively to the Jasper burn. A rotational sampling frame that incorporates new burns would provide a means to monitor Mountain Bluebirds in burned habitat at the Forest level. Mountain Bluebirds should be effectively monitored under MBBH through point transects in mixed-grass prairie, as well as other habitats not surveyed in 2006.

Total number of independent detections, number of individuals, and habitat-specific density estimates for Mountain Bluebird for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	5
MG	14	11	19	18	171	218
MR	ID	--	--	--	4	31

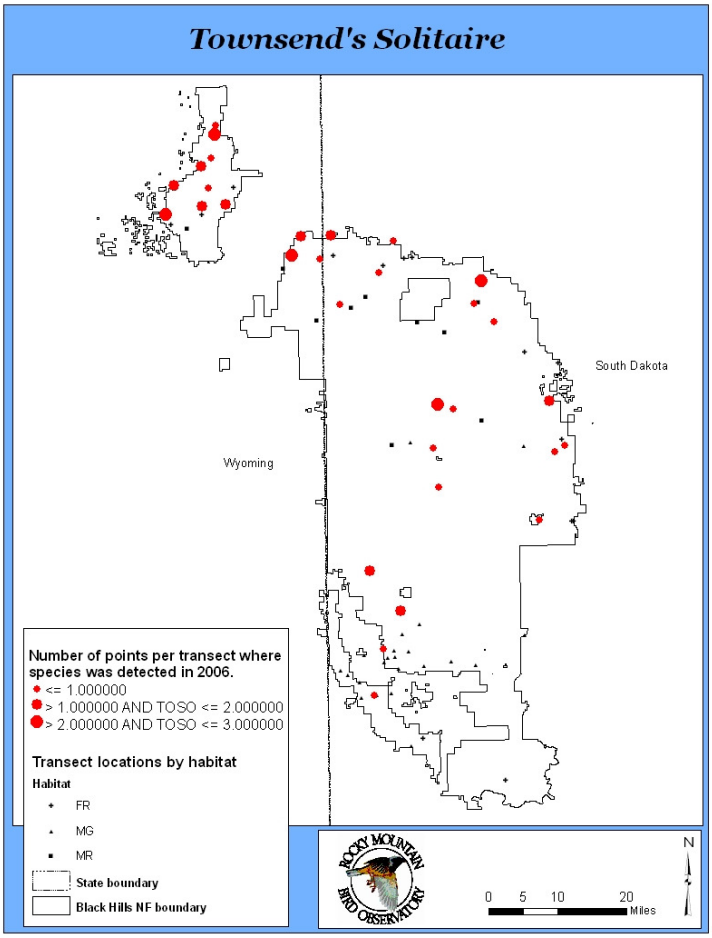
D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Townsend's Solitaire

(WY-PIF Level II Priority)

Townsend's Solitaire occurs throughout the Black Hills in low to moderate abundance. Of the habitats surveyed in 2006, estimated density was highest in montane riparian. In previous years, its density has been higher in other habitats that we did not survey this year, such as late-successional pine forests.

Townsend' Solitaire should be effectively monitored under MBBH through point-transects in range of habitats including some not surveyed in 2006 such as aspen, ponderosa pine, and pine-juniper shrublands.



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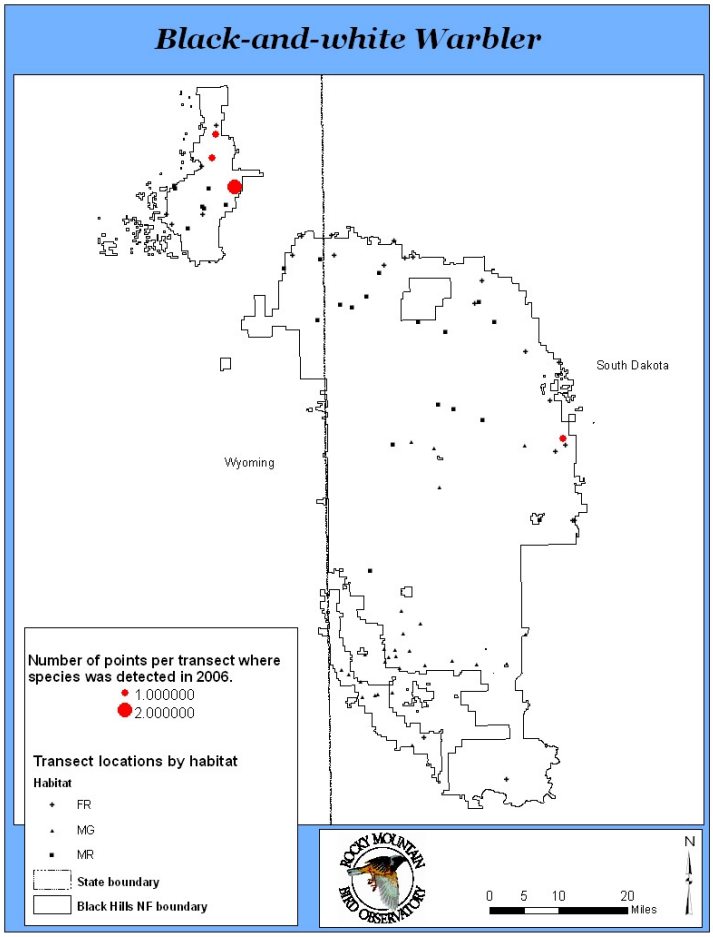
Total number of independent detections, number of individuals, and habitat-specific density estimates for Townsend's Solitaire for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	3.0	1.8	5.0	32	45	45
MG	ID	--	--	--	--	12
MR	3.6	2.4	5.5	26	57	59

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Black-and-white Warbler

(BHNF Species of Local Concern)



Black-and-white Warbler is a rare and local breeder, mainly at lower elevations in the eastern Black Hills and Bear Lodge Mountains (Panjabi 2001, 2003, 2004; Tallman et al. 2002). In 2006, six Black-and-white Warblers were recorded along three foothills riparian transects and one was recorded on a montane riparian transect. Black-and-white Warblers have been recorded along one of these foothills riparian transects, FR15, all three years of surveys.

In the Black Hills, Black-and-white Warblers are found primarily in bur oak woodlands and associated edges. Because these woodlands occur mainly in canyon bottoms at low elevations, much of its habitat in the Black Hills may be on private lands. However, several Black-and-white Warblers have been recorded each year on point transects on BHNF lands.

Black-and-white Warbler is too rare and local on the BHNF to be adequately monitored by point transects in any habitat. However, observations from the range of point transects in ponderosa pine, late-successional forest, aspen, montane riparian, and especially foothills riparian, should provide data to loosely track its status on the BHNF.

Total number of independent detections, number of individuals, and habitat-specific density estimates for Black-and-White Warbler for the MBBH monitoring project, 2006.

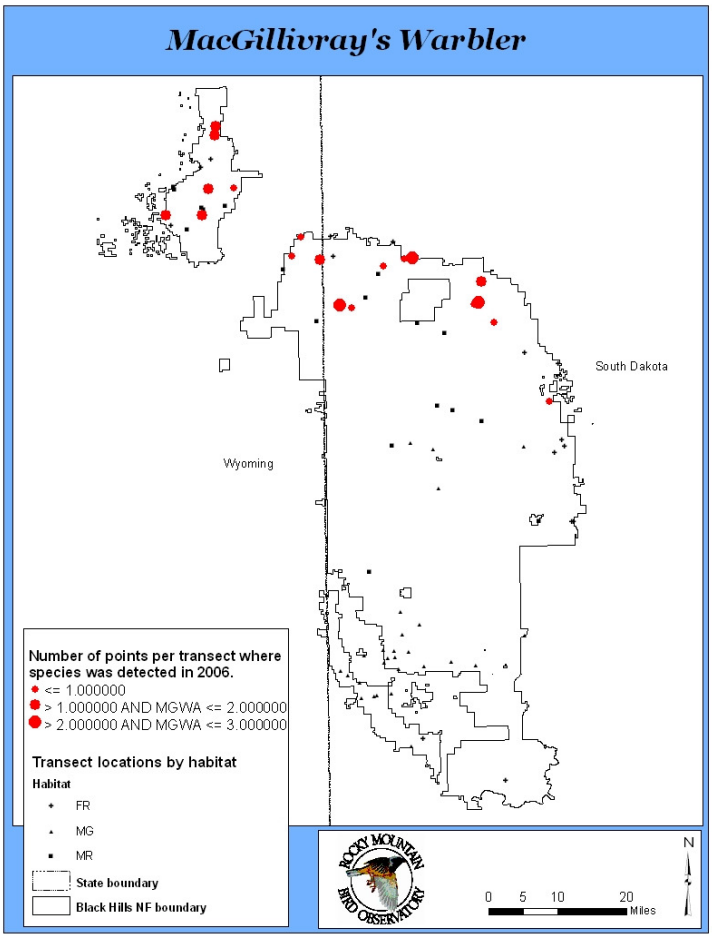
Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	6
MR	ID	--	--	--	--	1

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

MacGillivray's Warbler

(WY-PIF Level II Priority)

MacGillivray's Warblers range throughout much of the Black Hills, but they are fairly local outside of the northern hills. They are most abundant in the northwestern Black Hills and Bear Lodge Mountains.



MacGillivray's Warblers are found primarily in riparian habitats, where they can occur in moderately high density. They also occupy brushy clearings, especially with oaks, both within coniferous and broad-leaved forests. Of the habitats surveyed in 2006, density was highest in montane riparian.

MacGillivray's Warblers should be effectively monitored under MBBH through point-transects in a range of habitats, especially montane riparian and foothills riparian, as well as some habitats not surveyed in 2006.

Total number of independent detections, number of individuals, and habitat-specific density estimates for MacGillivray's Warbler for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	3.6	2.0	6.5	37	27	27
MR	12	7.1	19	30	75	75

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

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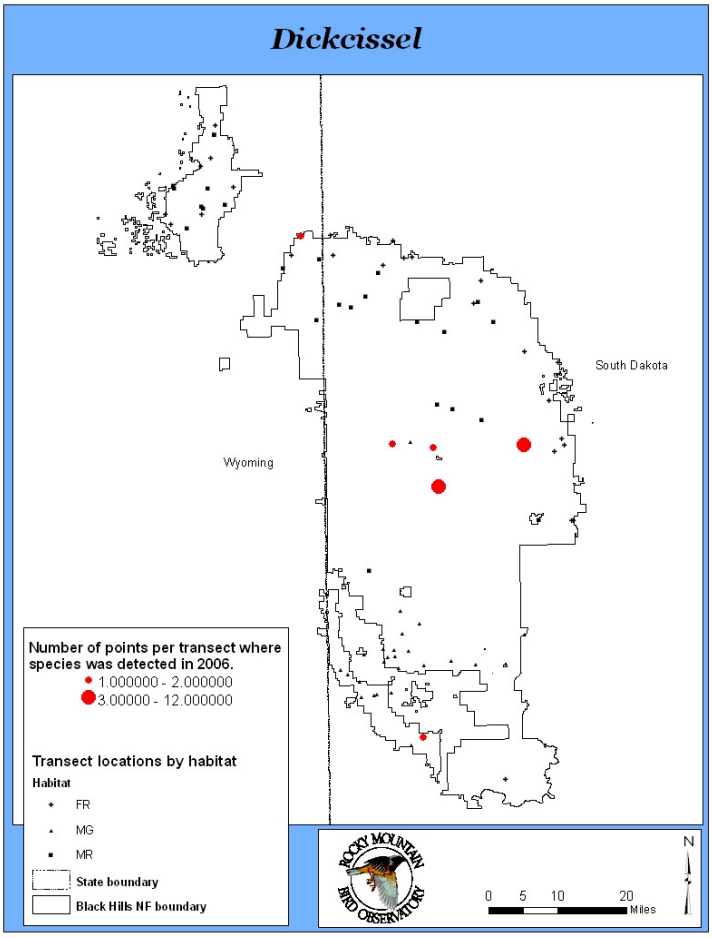
Dickcissel

(PIF Continental and Regional Stewardship Species)
(WY-PIF Level II Priority)
(USFWS Bird of Conservation Concern)

Dickcissel is a very nomadic species and may be common one year and then completely absent the next. In 2006, we detected two in foothills riparian, one in montane riparian, and 28 in mixed-grass prairie. We were able to provide a density estimate for mixed-grass prairie.

In its winter range in South America, this species is considered a pest because it eats seeds and crops that have been planted by farmers. During winter it is very gregarious and, unfortunately, easily killed in large numbers.



Total number of independent detections, number of individuals, and habitat-specific density estimates for Dickcissel for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	2
MG	2.4	0.8	7.4	74	28	28
MR	ID	--	--	--	--	1

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

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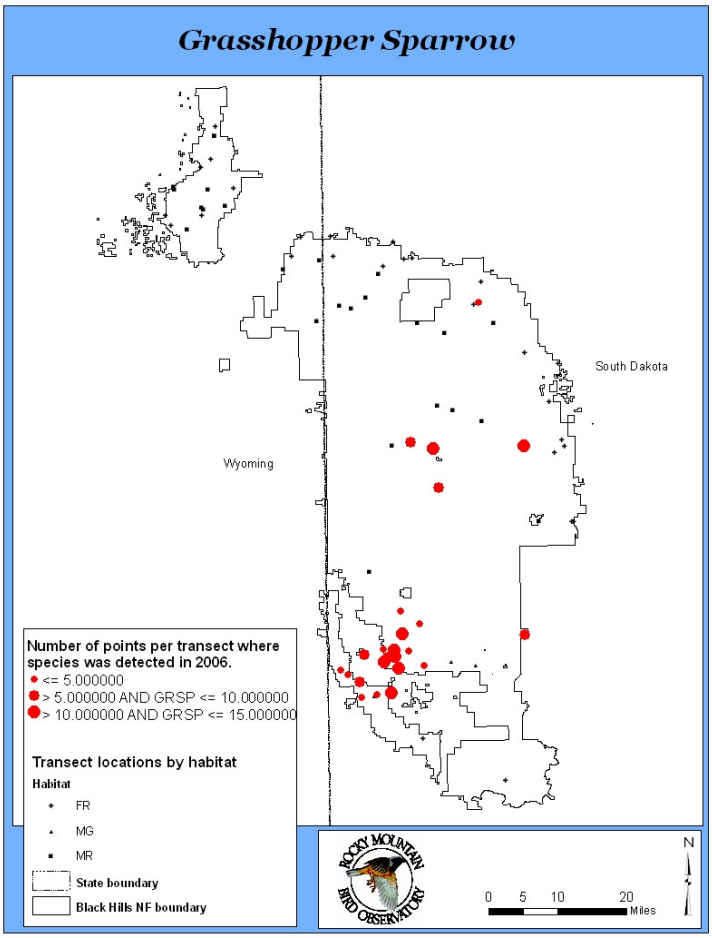
Grasshopper Sparrow

(Region 2 Sensitive Species)
(PIF High Overall Priority BCR17)
(WY-PIF Level II Priority)
(USFWS Bird of Conservation Concern)

Grasshopper Sparrow occurs widely in native mixed-grass prairies in the southern Black Hills and Elk Mountains, and locally further north to the central hills. While the species may occasionally occur in other types of grasslands (Panjabi 2003a), its presence in these areas appears to be sporadic. Grasshopper Sparrows can be locally abundant in some prairies, particularly where there is a greater proportion of tall grass.



In 2006, Grasshopper Sparrow was most abundant in mixed-grass prairie. We recorded more Grasshopper Sparrows in 2006 than in any previous year (380). We also detected one individual in montane riparian. Grasshopper Sparrow should be effectively monitored under MBBH in mixed-grass prairies.

Total number of independent detections, number of individuals, and habitat-specific density estimates for Grasshopper Sparrow for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
MG	56	41	78	19	375	380
MR	ID	--	--	--	--	1

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

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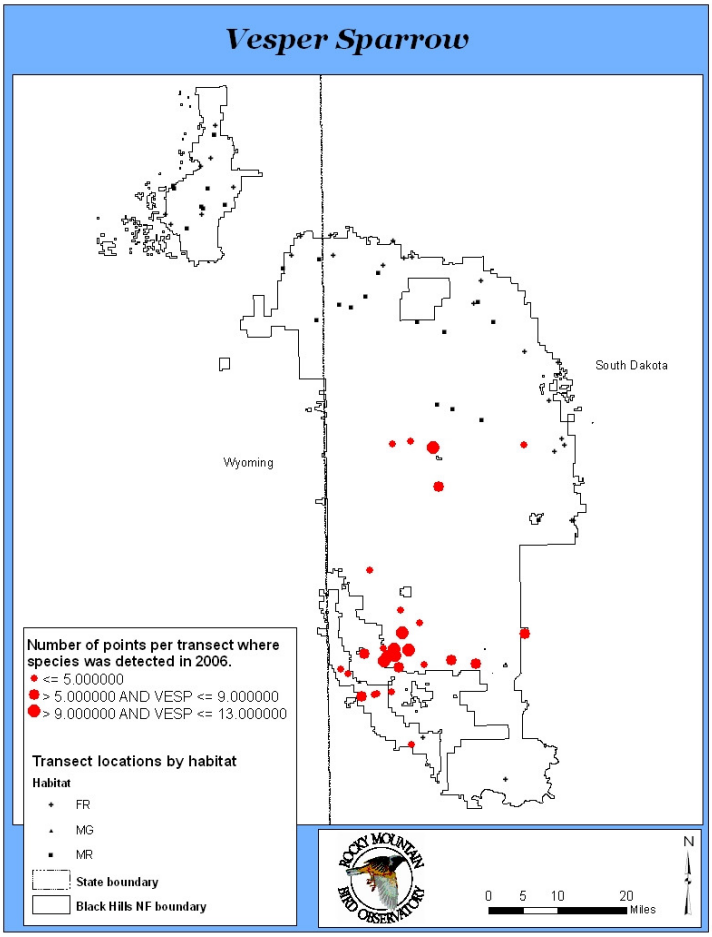
Vesper Sparrow

(PIF Species of Regional Concern)
(PIF Regional Stewardship Species)
(WY-PIF Level II Priority)

Vesper Sparrow occurs widely in the Black Hills, primarily in grassy openings, and especially in the native prairies of the southern and central hills. While the species does require grassland, it seems to be less common in wide-open prairies with no trees than in the prairie-forest ecotone. Densities of this species are highest in the mixed-grass prairie and the Jasper Burn as it changes to grassland.

Vesper Sparrows should be effectively monitored under MBBH through point-transects in mixed-grass prairie and other habitats not surveyed in 2006, including burned areas.



Total number of independent detections, number of individuals, and habitat-specific density estimates for Vesper Sparrow for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
MG	12	8.9	15	16	254	261
MR	ID	--	--	--	--	3

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

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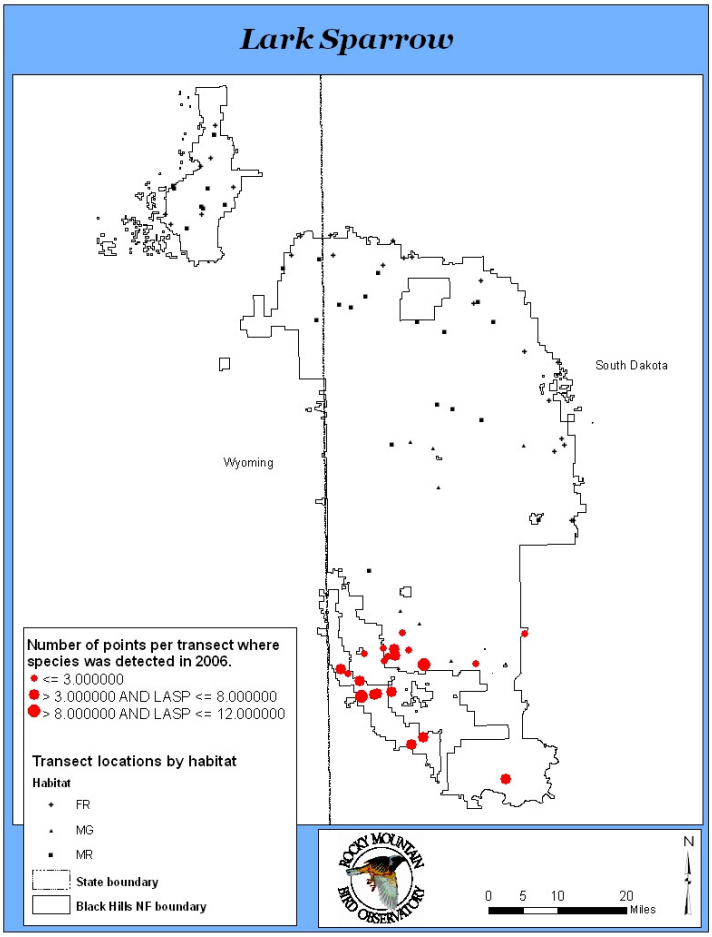
Lark Sparrow

(WY-PIF Level II Priority)

Lark Sparrow has a limited distribution in the Black Hills, occurring mainly in the southern portion of the survey area in foothills riparian and mixed-grass prairie habitats. It can be found in a variety of locations though including prairies, roadsides, farms, open woodlands, and mesas. Of the habitats surveyed in 2006, Lark Sparrow reached its highest density in mixed-grass prairie. All of the detections of Lark Sparrow in foothills riparian habitat were from two transects: FR11 and FR97. This species has been recorded previously in multiple years along these transects. This species is well-monitored under MBBH through point transects, especially in mixed-grass prairie habitat.



Total number of independent detections, number of individuals, and habitat-specific density estimates for Lark Sparrow for the MBBH monitoring project, 2006.

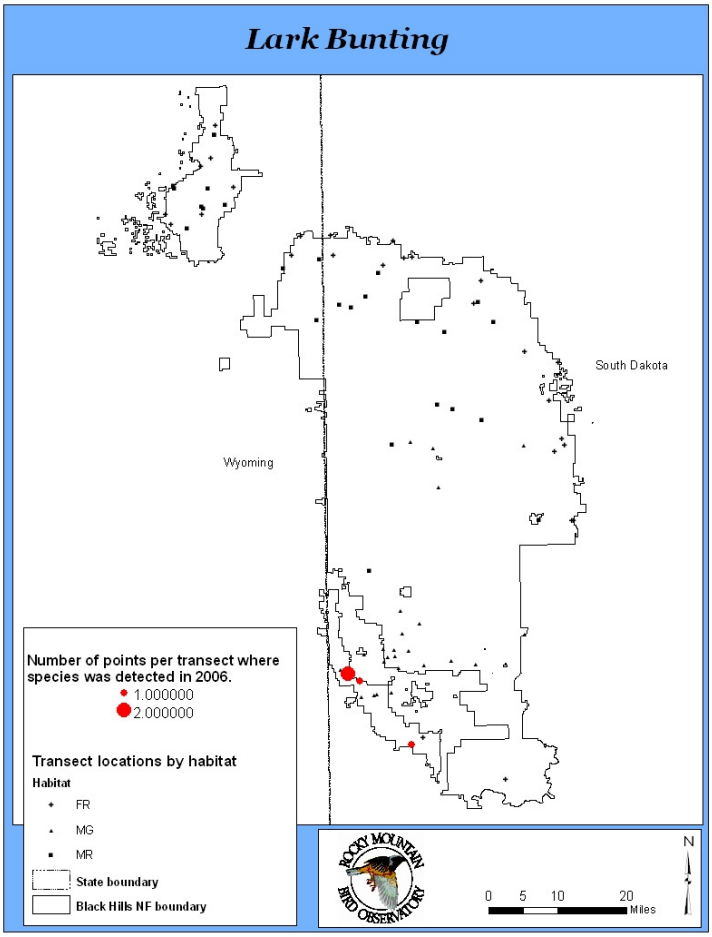
Habitat	D	LCL	UCL	CV	n	N
FR	ID	--	--	--	--	23
MG	9.7	6.2	15	27	117	139

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Lark Bunting

(PIF Species of Regional Concern)
(PIF Continental and Regional Stewardship Species)
(WY-PIF Level II Priority)
(SDGFP Species of Greatest Conservation Need)

Lark Bunting occurs sporadically in the Black Hills, primarily in the mixed-grass prairie. In 2006, we detected nine Lark Buntings along three mixed-grass prairie transects. This was more detections than in any other year of the MBBH surveys. In 2005, we detected five Lark Buntings in the Jasper burn, which was yet another sign that the fire has restored native grassland conditions in the area. This and other grassland species (e.g., Sharp-tailed Grouse, Grasshopper Sparrow) should further increase in this area as the burn area continues to succeed to grasslands.



Due to its local, uncommon and sporadic nature, it is unlikely that MBBH will effectively monitor Lark Bunting. Effective monitoring of Lark Buntings would best accomplished under a sampling framework that includes all available native grasslands in the Black Hills surveyed every year.

Total number of independent detections, number of individuals, and habitat-specific density estimates for Lark Bunting for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
MG	ID	--	--	--	--	9

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

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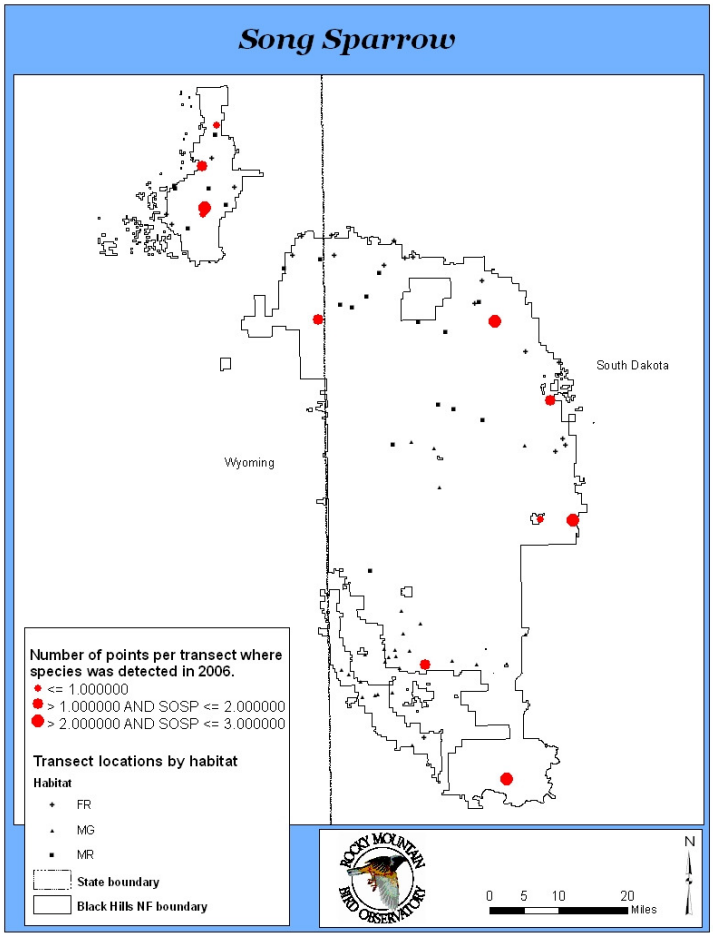
Song Sparrow

(BHNF Management Indicator Species)

Song Sparrow ranges throughout much of the Black Hills, but it is perhaps more abundant and widespread in the north, especially in dense streamside vegetation at middle elevations. Due to its strong association with shrubby willows along riparian areas, Song Sparrow is an excellent indicator of environmental change for this habitat.

In 2006, we detected 70 Song Sparrows in foothills riparian, five in mixed-grass prairie, and 217 in montane riparian. Song Sparrow is found in fairly high densities in riparian habitats in the Black Hills and it should be well-monitored under MBBH in these habitats.



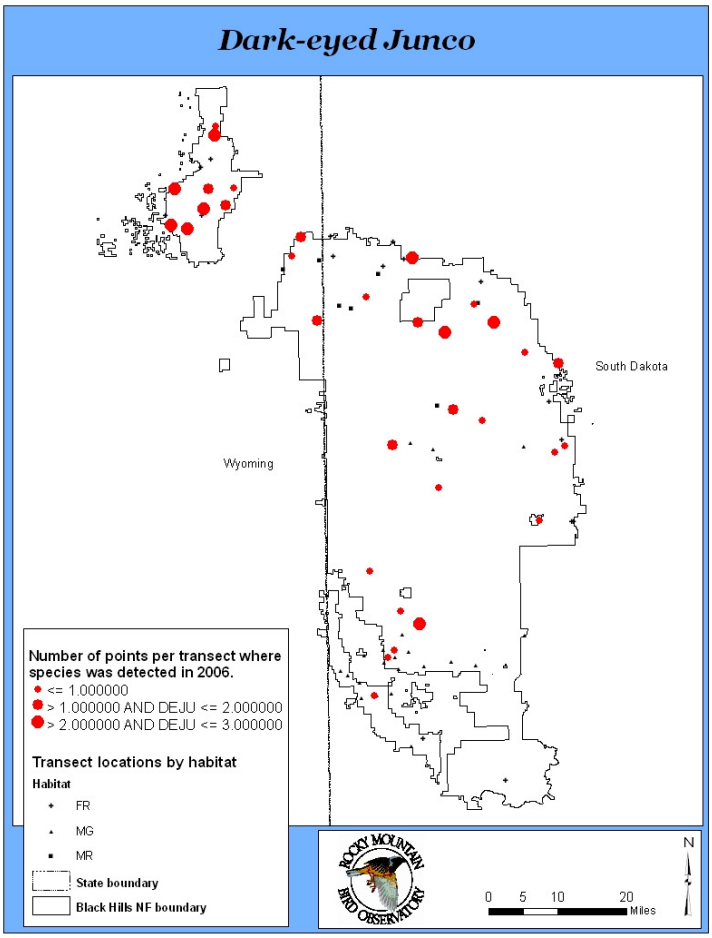
Total number of independent detections, number of individuals, and habitat-specific density estimates for Song Sparrow for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	15	8.1	29	40	70	70
MG	ID	--	--	--	--	5
MR	58	33	102	35	199	217

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Dark-eyed Junco

Subspecies endemic to the Black Hills
(SDGFP Species of Greatest Conservation Need)



The "white-winged" subspecies of the Dark-eyed Junco occurs widely in the Black Hills. It is generally fairly common to abundant in most wooded habitats. This year we detected 67 in foothills riparian, eight in mixed-grass prairie, and 92 in montane riparian. This distinctive endemic subspecies breeds nowhere else except in the Black Hills region, from northwestern Nebraska to southeastern Montana. The Black Hills contain the majority of habitat for this subspecies, and thus support almost its entire global population. Because of its highly adaptable nature, the white-winged subspecies of the Dark-eyed Junco is largely secure across its range. Dark-eyed Juncos should be effectively monitored under MBBH in a range of habitat types.

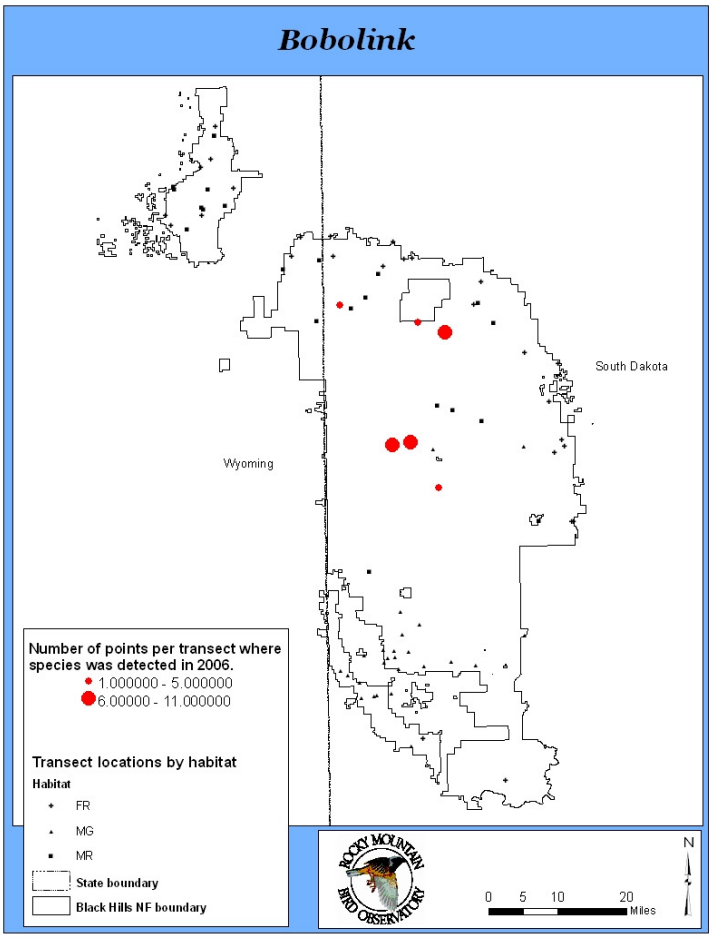
Total number of independent detections, number of individuals, and habitat-specific density estimates for Dark-eyed Junco for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	3.7	2.1	6.5	34	66	67
MG	ID	--	--	--	--	8
MR	3.9	2.1	7.1	37	91	92

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Bobolink

(WY-PIF Level II Priority)



Bobolinks nest primarily in hayfields, tall-grass meadows, and native prairie with tall grasses. The species occurs only locally in the Black Hills and is thus not well monitored through random sampling. In 2006, we detected enough Bobolinks to calculate a density estimate for this species in montane riparian habitat. In previous years we have observed the species regularly along two montane riparian transects, MR17 and MR21. This year, in addition to detecting Bobolinks along these transects, we also observed them for the first time along MR20 and MR35. Bobolinks are not considered a riparian species, but they are attracted to open areas with taller grasses that often result from moist riparian conditions. We also had a few detections along mixed-grass prairie transects.

Total number of independent detections, number of individuals, and habitat-specific density estimates for Bobolink for the MBBH monitoring project, 2006.

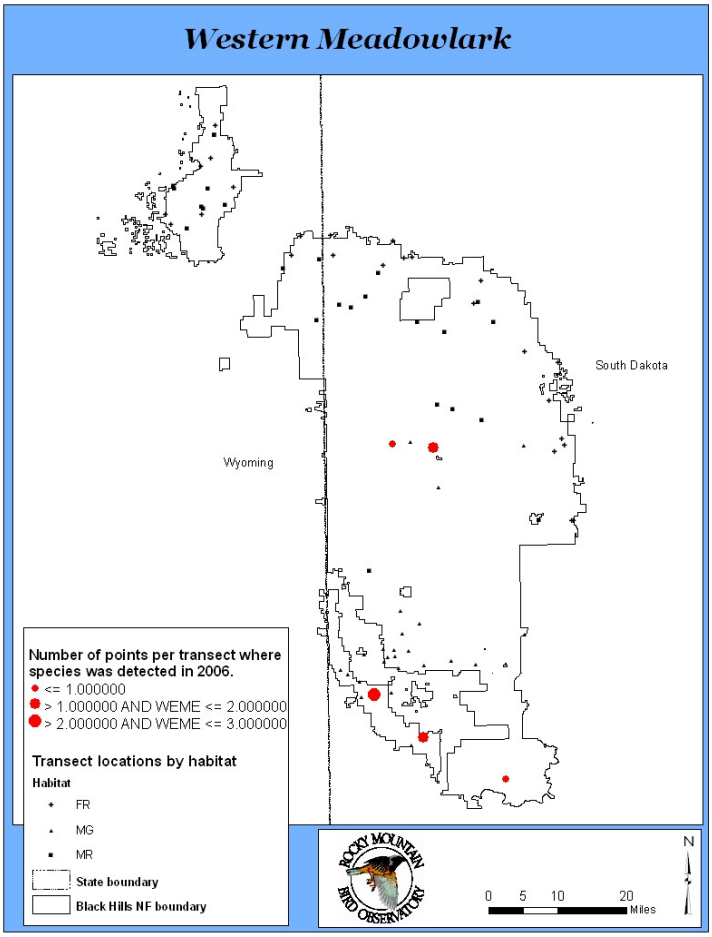
Habitat	D	LCL	UCL	CV	n	N
MG	ID	--	--	--	--	10
MR	2.4	1.0	5.9	56	46	51

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Western Meadowlark

(PIF Regional Stewardship Species)

Western Meadowlark occurs throughout the Black Hills, especially in the larger grasslands; however, it is most widespread in the southwest. Western Meadowlarks typically breed in native grasslands, semi-desert shrublands and sage shrublands. In 2006, the density of Western Meadowlarks was greatest in mixed-grass prairie. Western Meadowlark should be effectively monitored under MBBH in a range of habitats, including mixed-grass prairie and other habitats not surveyed in 2006.



Total number of independent detections, number of individuals, and habitat-specific density estimates for Western Meadowlark for the MBBH monitoring project, 2006.

Habitat	D	LCL	UCL	CV	n	N
FR	ID	---	---	---	---	4
MG	11	7.9	14	18	401	456
MR	ID	--	--	--	--	1

D = Density (birds/square kilometer); LCL = lower 95% confidence interval of the density; UCL = upper 95% confidence interval of the density; CV(%) = coefficient of variation of the density; n = number of independent detections; N = number of individuals; ID = insufficient data.

Discussion and Recommendations

Unique Values of Each Habitat

While the number of species and densities of birds vary across habitats, each habitat supports unique assemblages of birds and other attributes that contribute to the overall biological diversity in the Black Hills. Some highlights pertaining to each habitat surveyed in 2006 follow.

Foothills and Montane Riparian

Riparian systems in the western United States support a disproportionate segment of the avifauna, with a greater diversity of breeding birds than all other western habitats combined (Anderson and Ohmart 1977, Johnson et al. 1977, Johnson and Haight 1985). Similarly, riparian habitat in the Black Hills, both the foothills and montane riparian habitats, consistently provide habitat for a greater number and diversity of birds than any other habitat in the Black Hills. Riparian habitat also supports a number of sensitive species and species of conservation concern. In 2006, Black-billed Cuckoo and Hammond's Flycatcher were observed exclusively in foothills riparian habitat, and many other species were most abundant in this habitat including White-throated Swift and Cordilleran Flycatcher. Also in 2006, Alder Flycatcher, Broad-winged Hawk, American Dipper, and Lewis's Woodpecker were observed only in montane riparian habitat, and a few species of conservation concern including, Red-naped Sapsucker, Dusky Flycatcher, MacGillivray's Warbler, and Song Sparrow, reached their highest densities in montane riparian habitat.

In the Black Hills, many acres of riparian systems have been lost to urban and residential development, and mining and gravel operations have also converted many acres. In addition, the ecological integrity of much of the remaining riparian systems has been reduced by dams, declines in beaver populations, grazing, groundwater pumping and other anthropogenic factors (SDGFP 2005).

Given the importance of riparian habitat to so many species and its overall decline in size and quality, it is especially important to monitor this habitat for species declines, and maintain or restore the habitat whenever possible.

Mixed-grass Prairie

The mixed-grass prairie habitat supports relatively few species compared to riparian or other habitats in the Black Hills. However, the species it does support are unique, and many are found almost exclusively in mixed-grass prairie. This includes Upland Sandpiper, Grasshopper Sparrow, Horned Lark, Lark Bunting, Lark Sparrow, Sharp-tailed Grouse, Vesper Sparrow and Western Meadowlark. In 2006, we also recorded seven Long-billed Curlews in the mixed-grass prairie habitat. This was the first time we detected this species in the history of the MBBH program, and although the species is relatively common in prairie habitat outside of the Black Hills, it has not been reported to breed in the Black Hills. Mixed-grass prairies are also favored hunting areas for many raptors including

Red-tailed Hawk, Prairie Falcon, and Golden Eagle. In addition, several corvids including Pinyon Jays, Clark's Nutcracker, and Black-billed Magpie are most common in the open grasslands and scattered pine woodlands.

Monitoring Post-fire Bird Communities

Monitoring birds in the Jasper burn area has provided an interesting case study and for the first time has provided quantitative insight into the population dynamics of an entire bird community in a post-fire ponderosa pine forest in the Black Hills. Through this effort, we are learning which bird species respond positively or negatively to stand-replacement fires, in what densities post-fire specialists and non-specialists occupy burns, and how long burned areas provide suitable habitat for post-fire birds, particularly those of high management or conservation interest.

While it could prove useful to continue monitoring birds in the Jasper burn for many more years, eventually this area will no longer provide the conditions needed by those species we aim to monitor in this habitat, particularly Black-backed Woodpecker. In 2005, the density of Black-backed Woodpeckers declined and will probably continue to do so as the habitat changes and no longer provides the necessary resources. Therefore, as populations of this species shift with the availability of resources, so should the sampling effort. We suggest placing half of the current burn transects in burns less than six years old and retaining the other half in the Jasper Burn since other important species such as Lewis's Woodpecker prefer burns on the opposite end of the successional spectrum (and such areas appear to be used by Black-backs as well, albeit in much lower density). Because these species are primarily restricted to burns on the BHNF, a monitoring strategy that samples a greater spectrum of available sites in this habitat would yield trends that are inferable to the forest level, rather than being biased to one individual burn area, where we know that a species' population trend will rise and eventually fall with the natural succession of changes in that burn.

A strategy that retains some of the current burn transects in the Jasper burn and incorporates new transects in young burns as they become available, should effectively monitor Black-backed Woodpeckers, as well as other species associated with burned areas. In time, we should consider moving the remaining Jasper transects to new locations, but while this habitat is still providing useful data for many species, we should retain it in the sampling scheme. Furthermore, since all of the other habitats in the Black Hills have been surveyed biannually, and since new young burns are not always available each year, we suggest also moving the burned habitat to a biannual survey cycle.

Prospects for Population Monitoring

The habitat-stratified point transects produced excellent results with low coefficients of variation (≤ 50%) on 47 bird species, and moderate results (CV=50-75%) for another eight species in at least one habitat surveyed in 2006.

We should be able to detect habitat-specific population trends for these species within our maximum target of 30 years. For many species, the population may be more effectively monitored in a habitat not surveyed this year. These 55 species represent about 44% of *all species* observed in the three habitats surveyed in 2006, but they represent almost 80% of all *individual birds* observed. The other 56% of species (~20% of birds observed) fall into one of the following categories below:

1) Birds that are adequately monitored in one of the other habitats covered by MBBH (e.g., Golden-crowned Kinglet in White Spruce)
2) Low-density, highly localized species (e.g., Golden Eagle)
3) Low-density, widespread species (e.g., Northern Goshawk)
4) Irregular species (e.g., Bobolink);
5) Vagrant breeders (e.g., Northern Parula)
6) Species that occur mainly outside the Black Hills in the low foothills or on the Great Plains (e.g., Long-billed Curlew);
7) Nocturnal species (e.g., Northern Saw-whet Owl);
8) Wetland-obligate species (e.g., Sora); and
9) Species that are readily detectable only prior to late May (e.g., Ruffed Grouse).

Species in the aforementioned groups (other than the first category) could be monitored through additional effort using one or more of the following survey techniques:

1) Additional point transects in existing habitats;
2) Censusing small but localized populations;
3) Censusing birds at nesting sites (e.g., colonies, eyries, etc);
4) Species-specific call-response surveys;
5) Nocturnal surveys;
6) Wetland surveys; and
7) Early-season (i.e., winter/spring) surveys.

For species with small populations, such as Golden Eagle and Prairie Falcon, monitoring could be achieved by locating active nests and visiting a subset during the spring and summer as necessary to evaluate the outcome of each. Nests would first be located by consulting with local biologists, birders, and other experts, and then as part of the field effort, additional suitable habitat could be searched to locate previously unrecorded nests. Ultimately, the majority of active nests would be included in the monitoring scheme and a random subset would be visited each year to check for occupancy and outcome.

For some rare species, such as Black-billed Cuckoo, a brief call-response survey could be used to detect the presence and breeding status of this or other similar species across the areas already covered by the habitat-stratified point transects. A high-powered, yet easily portable playback system would be required for each

observer, but otherwise, relatively few additional expenses would be incurred.

Because of the already extensive point-transect effort undertaken each year, implementing additional field techniques to target other high-priority species can be done cost-effectively. Rocky Mountain Bird Observatory is open to discussing these options with our Black Hills partners.

Acknowledgements

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Appendix A. List of all bird species observed in the Black Hills from 2001-2006, with management designation and species totals.

	Special Management Designation[2]					Total #individuals observed per habitat[4], 2005			Total #individuals observed per year (in all habitats surveyed[5])					
Common Name[1]	USFS	PIF	USFWS	SDGFP	status[3]	FR	MR	MG	2001	2002	2003	2004	2005	2006
Canada Goose					B	--	--	--	OT	35	2	2	1	--
Wood Duck					B	--	--	--	6	13	--	--	1	--
Gadwall					PB	--	--	--	--	1	--	--	--	--
Mallard					B	3	7	--	--	--	5	8	22	10
Blue-winged Teal					PB	--	--	--	OT	--	--	1	--	--
Northern Shoveler					PB	--	--	--	OT	OT	--	--	--	--
Ring-necked Duck					PB	--	--	--	2	--	--	--	--	--
Hooded Merganser					TM	--	--	--	--	1	--	--	--	--
Common Merganser					B	--	--	1	8	9	--	--	9	1
Gray Partridge					B	--	--	--	1	4	--	--	--	--
Ring-necked Pheasant					B	--	--	--	15	2	--	--	--	--
Ruffed Grouse	MIS				B	1	--	--	45	62	15	6	4	1
Sharp-tailed Grouse		CS, RS, WY-1			B			4	--	2	--	25	1	4
Wild Turkey					B	20	12	21	118	67	43	47	29	53
Northern Bobwhite					B	--	--	1	--	1	--	--	--	1
Pied-billed Grebe					PB	--	--	--	1	--	--	--	--	--
Western Grebe					PB	--	--	--	OT	1	--	--	--	--
American White Pelican				SoGCN	TM	--	--	--	--	--	--	20	--	--
Double-crested Cormorant					PB	--	--	--	OT	--	--	--	--	--
American Bittern		WY-I			B	--	--	--	1	1	--	--	--	--
Great Blue Heron					B	2	11	--	14	23	18	4	12	13
Turkey Vulture					B	22	9	17	84	98	15	44	88	48
Osprey				SoGCN	B	--	--	--	2	OT	--	--	4	--
Northern Harrier	R2SS	RC			B	1	--	--	1	OT	--	--	--	1
Sharp-shinned Hawk	SOLC				B	--	--	--	2	4	3	6	3	--
Cooper's Hawk	SOLC				B	1	1	--	10	4	3	9	9	2
Northern Goshawk	R2SS	RC, WY-I		SoGCN	B	2	1	--	14	5	8	10	15	3
Unidentified Accipiter					--	--	--	--	--	--	2	3	--	--
Broad-winged Hawk	SOLC				B	--	3	--	3	6	--	24	19	3
Red-tailed Hawk					B	14	5	19	47	42	32	45	57	38

	Special Management Designation[2]					Total #individuals observed per habitat[4], 2005			Total #individuals observed per year (in all habitats surveyed[5])					
Common Name[1]	USFS	PIF	USFWS	SDGFP	status[3]	FR	MR	MG	2001	2002	2003	2004	2005	2006
Golden Eagle		RC	BCC-BCR17		B	2	2	2	1	2	1	--	2	6
American Kestrel					B	3	2	7	8	14	11	23	20	12
Merlin		WY-II			B				--	1	--	OT	--	--
Prairie Falcon			BCC-BCR17		B	2	1	3	2	6	2	6	9	6
Unidentified Falcon						--	--	--	1	1	--	--	--	--
Unidentified Raptor						--	--	--	6	4	1	--	--	--
Sora					B		2		OT	OT	--	--	--	2
American Coot					B	--	--	1	OT	OT	--	--	--	1
Killdeer					B	--	--	2	9	19	1	10	4	2
Solitary Sandpiper					TM	--	--	--	--	OT	--	--	--	--
Spotted Sandpiper					B	--	1	--	OT	6	4	OT	--	1
Upland Sandpiper		WY-I	BCC-BCR17		B	--	--	12	4	20	--	19	--	12
Long-billed Curlew	R2SS	WY-I	BCC-BCR17	SoGCN	VB									
Pectoral Sandpiper					TM	--	--	--	25	--	--	--	--	--
Wilson's Snipe					B	--	8	--	15	8	6	--	5	8
Franklin's Gull		WY-I			TM	--	--	--	--	1	--	--	--	--
California Gull					PB	--	--	--	OT	--	--	--	--	--
Rock Pigeon					B	8		2	9	9	4	1	8	10
Mourning Dove					B	77	23	95	217	365	118	278	166	195
Black-billed Cuckoo		RC, WY-II	BCC-BCR17		B	1	--	--	2	OT	--	--	--	1
Yellow-billed Cuckoo	R2SS	WY-II			B	--	--	--	--	OT	--	--	--	--
Flammulated Owl	R2SS	CWL			B	--	--	--	--	OT	--	--	--	--
Eastern Screech-Owl		WY-II			B	--	--	--	--	--	--	--	--	--
Great Horned Owl					B	1	2	1	3	2	2	2	2	4
Burrowing Owl	R2SS	RC, WY-I	BCC-BCR17	SoGCN	B	--	--	--	--	OT	--	1	--	--
Long-eared Owl					B	--	--	--	1	--	OT	--	--	--
Northern Saw-whet Owl	SOLC				B	--	--	--	1	OT	OT	1	--	--
Unidentified Owl						--	--	--	1	--	--	--	--	--
Common Nighthawk					B	2	1	39	27	20	8	36	34	42
Common Poorwill					B	--	--	--	OT	OT	OT	--	--	--

	Special Management Designation[2]					Total #individuals observed per habitat[4], 2005			Total #individuals observed per year (in all habitats surveyed[5])					
Common Name[1]	USFS	PIF	USFWS	SDGFP	status[3]	FR	MR	MG	2001	2002	2003	2004	2005	2006
Chimney Swift					B	--	--	--	OT	--	--	--	1	--
White-throated Swift		CC, CWL, WY-II			B	179	21	3	124	261	93	157	440	203
Broad-tailed Hummingbird		WY-II			B	--	1	----	--	3	2	OT	6	1
Belted Kingfisher					B	--	--	--	29	17	10	OT	21	--
Lewis's Woodpecker	R2SS	CC, RC, CWL, WY-II	BCC-BCR17	SoGCN	B	--	7	--	3	4	9	4	8	7
Red-headed Woodpecker		CC, RC, CWL			B	--	5	5	25	38	50	55	66	10
Unidentified Sapsucker						--	--	--	--	--	--	--	--	--
Red-naped Sapsucker		WY-II	BCC-BCR17		B	30	88	--	400	222	245	212	210	118
Downy Woodpecker					B	9	15	2	34	29	25	21	38	26
Hairy Woodpecker					B	32	35	26	353	468	444	363	386	93
American Three-toed Woodpecker	R2SS	WY-II		SoGCN	B	--	--	--	12	27	44	8	47	--
Black-backed Woodpecker	MIS, R2SS	RC, WY-II		SoGCN	B	2	1	--	24	132	75	68	45	3
Black-backed or Three-toed Woodpecker						--	--	--	--	7	1	--	--	--
Northern Flicker					B	34	88	58	240	236	225	267	430	180
Unidentified Woodpecker						--	--	--	164	96	77	52	--	--
Western Wood-Pewee					B	66	93	36	182	360	373	361	379	195
Alder Flycatcher					TM	--	2	--	--	2	1	--	1	2
Least Flycatcher					B	9	1	--	5	11	6	6	14	10
Hammond's Flycatcher		WY-II			VB	3	--	--	--	--	OT	OT	6	3
Dusky Flycatcher		WY-II			B	111	236	12	1186	1407	723	720	933	359
Cordilleran Flycatcher		WY-II			B	209	132	1	298	364	325	100	454	342
Eastern Phoebe					B	--	--	--	3	1	--	3	4	--
Say's Phoebe		RS			B	--	1	2	1	--	--	1	--	3
Cassin's Kingbird		WY-II			B	--	--	--	OT	OT	--	1	--	--
Western Kingbird					B	1	--	3	6	7	5	21	9	4
Eastern Kingbird					B	19	2	11	37	79	8	35	16	32
Unidentified Flycatcher						--	--	--	5	1	--	1	--	--

	Special Management Designation[2]					Total #individuals observed per habitat[4], 2005			Total #individuals observed per year (in all habitats surveyed[5])					
Common Name[1]	USFS	PIF	USFWS	SDGFP	status[3]	FR	MR	MG	2001	2002	2003	2004	2005	2006
Loggerhead Shrike	R2SS	RC, WYII			B	--	--	--	2	--	--	--	--	--
Plumbeous Vireo		WY-II			B	42	31	9	347	385	230	167	273	82
Warbling Vireo					B	213	353	8	1888	1960	960	1076	1591	574
Red-eyed Vireo					B	86	36	--	218	228	102	35	216	122
Unidentified Vireo						--	--	--	1	--	--	--	--	--
Gray Jay					B	4	7	5	273	197	204	129	135	16
Blue Jay					B	33	19	--	109	65	34	22	39	52
Pinyon Jay		CC, RC, CWL			B	--	--	24	13	47	7	56	3	24
Clark's Nutcracker					B	--	--	4	32	65	10	31	34	4
Black-billed Magpie		RC			B	12	--	6	2	1	--	26	2	18
American Crow					B	35	43	62	310	260	194	181	142	140
Horned Lark					B			38	7	4	--	11	--	38
Tree Swallow					B	1	17	4	14	30	8	6	7	22
Violet-green Swallow					B	229	158	19	241	568	162	269	394	406
Northern Rough-winged Swallow		RC			B	8	5	--	1	17	--	13	9	13
Bank Swallow					B	--	--	2	2	1	--	10	--	2
Cliff Swallow					B	17	--	6	21	7	--	28	3	23
Barn Swallow					B	5	14	10	11	26	5	11	11	29
Unknown Swallow						--	--	--	--	--	--	8	--	--
Black-capped Chickadee					B	167	143	93	948	1120	672	483	940	403
Red-breasted Nuthatch					B	145	140	76	1418	1520	817	469	1013	361
White-breasted Nuthatch					B	90	36	21	215	263	335	162	232	147
Pygmy Nuthatch	SOLC	WY-II			B	1	--	2	3	2	--	1	4	3
Brown Creeper	MIS	WY-II			B	3	4		154	143	135	97	131	7
Rock Wren					B	14	14	52	31	102	44	197	160	80
Canyon Wren					B	31	9	3	17	59	21	18	27	43
House Wren					B	15	28	22	65	147	74	135	178	65
Winter Wren					B	--	--	--	--	2	1	--	3	--
American Dipper	SOLC	WY-II		SoGCN	B	--	3	--	OT	3	4	OT	5	3
Golden-crowned Kinglet	MIS	WY-II			B	4	3	--	131	99	224	55	344	7
Ruby-crowned Kinglet					B	50	147	1	595	912	716	219	1005	198
Blue-gray Gnatcatcher					B	--	--	--	2	2	1	15	--	--
Eastern Bluebird					B	1	2	--	49	57	57	74	63	3

	Special Management Designation[2]					Total #individuals observed per habitat[4], 2005			Total #individuals observed per year (in all habitats surveyed[5])					
Common Name[1]	USFS	PIF	USFWS	SDGFP	status[3]	FR	MR	MG	2001	2002	2003	2004	2005	2006
Mountain Bluebird		RC			B	5	31	219	159	169	116	292	333	255
Unidentified Bluebird						--	--	--	5	--	54	7	--	--
Townsend's Solitaire		WY-II			B	45	62	12	739	850	783	544	610	119
Veery					B	23	40	--	65	94	104	28	73	63
Swainson's Thrush					B	147	128	1	515	448	507	170	405	276
Hermit Thrush					VB	--	15	--	2	1	1	4	2	15
American Robin					B	324	471	105	2065	2129	1670	1006	1926	900
Gray Catbird					B	19	41	--	38	20	27	2	43	60
Brown Thrasher					B	--	1	--	8	3	3	5	--	1
European Starling					B	--	3	6	2	22	--	21	43	9
Cedar Waxwing					B	29	44	--	65	131	61	51	62	73
Golden-winged Warbler					VB	--	--	--	--	OT	--	--	2	--
Tennessee Warbler					TM	--	--	--	--	32	--	3	--	--
Orange-crowned Warbler					VB	--	--	--	--	1	--	--	--	--
Virginia's Warbler		CWL			B	--	--	--	44	80	2	185	6	--
Northern Parula					VB	--	--	--	2	--	1	--	1	--
Yellow Warbler					B	57	18	1	97	218	35	61	114	76
Chestnut-sided Warbler					B	--	--	--	7	2	2	--	3	--
Magnolia Warbler					VB	--	--	--	1	--	--	--	5	--
Black-throated Blue Warbler					VB	--	--	--	--	1	--	--	--	--
Yellow-rumped Warbler					B	130	130	95	2151	2471	1831	872	1676	355
Black-and-white Warbler	SOLC				B	6	1	--	8	8	2	4	6	7
American Redstart					B	240	156	--	485	407	242	97	609	396
Ovenbird					B	290	259	14	1677	1719	838	952	1192	563
Mourning Warbler					VB	--	--	--	OT	--	--	--	--	--
MacGillivray's Warbler		WY-II			B	28	77	--	356	267	206	103	222	105
Common Yellowthroat					B	63	163	2	217	278	219	45	321	228
Hooded Warbler					VB	--	--	1	OT	OT	--	--	5	1
Yellow-breasted Chat					B	22	1	--	24	73	4	62	29	23
Western Tanager					B	129	76	57	827	921	856	545	697	262
Spotted Towhee					B	117	65	37	385	632	152	452	221	219
Chipping Sparrow					B	133	189	294	1264	1626	1523	1345	1999	616
Clay-colored Sparrow					TM	--	--	--	OT	2	--	4	1	--
Field Sparrow					B	--	--	--	2	1	1	5	--	--

	Special Management Designation[2]					Total #individuals observed per habitat[4], 2005			Total #individuals observed per year (in all habitats surveyed[5])					
Common Name[1]	USFS	PIF	USFWS	SDGFP	status[3]	FR	MR	MG	2001	2002	2003	2004	2005	2006
Vesper Sparrow		RC, RS, WY-II			B	--	3	261	197	362	131	394	204	264
Lark Sparrow		WY-II			B	23	--	139	25	86	21	114	46	162
Lark Bunting		RC, CS, RS, WY-II		SoGCN	B	--	--	9	2	OT	--	2	5	9
Grasshopper Sparrow	MIS, R2SS	RC, CS, RS, CWL WY-II	BCC-BCR17		B	1	381	--	6	75	--	121	--	382
Song Sparrow	MIS				B	70	217	5	237	268	258	38	396	292
White-crowned Sparrow					TM	--	--	--	--	--	1	--	--	--
Dark-eyed Junco				SoGCN	B	70	104	22	1639	1500	1320	936	1335	196
Unidentified Sparrow						--	--	--	1	1	--	12	--	--
Northern Cardinal					VB	--	--	--	--	OT	1	--	--	--
Rose-breasted Grosbeak					B	--	--	--	2	1	1	--	1	--
Black-headed Grosbeak					B	123	65	2	240	326	116	53	261	190
Blue Grosbeak					B	--	--	--	1	--	--	--	--	--
Lazuli Bunting					B	21	8	1	13	50	13	20	19	30
Indigo Bunting					B	1	2	--	4	1	--	--	--	3
Dickcissel		CC, RC, CWL WY-II	BCC-BCR17		B	2	1	28	3	11	--	--	--	31
Bobolink		WY-II			B		54	10	--	17	10	6	11	64
Red-winged Blackbird					B	6	92	6	234	299	84	34	133	104
Western Meadowlark		RS			B	4	1	456	104	475	44	892	197	461
Yellow-headed Blackbird					B	--	--	--	--	5	--	1	--	--
Brewer's Blackbird					B	--	24	14	26	33	13	74	21	38
Common Grackle					B	--	--	5	59	64	6	12	4	5
Brown-headed Cowbird					B	66	83	28	731	831	591	496	694	177
Orchard Oriole					B	4	--	--	27	18	1	25	6	4
Bullock's Oriole					B	9	--	--	19	21	--	7	15	9
Cassin's Finch					B		1	--	21	7	4	4	12	1
House Finch					B	2	--	--	1	12	--	1	1	2
Red Crossbill					B	51	89	88	2863	5306	1140	1823	935	228
White-winged Crossbill					B	--	--	--	13	12	14	--	15	--
Pine Siskin					B	59	172		804	654	165	38	520	231

Common Name[1]	Special Management Designation[2]				status[3]	Total #individuals observed per habitat[4], 2005			Total #individuals observed per year (in all habitats surveyed[5])					
	USFS	PIF	USFWS	SDGFP		FR	MR	MG	2001	2002	2003	2004	2005	2006
Lesser Goldfinch					B	2	--	--	--	--	OT	--	--	2
American Goldfinch					B	54	36	29	140	212	76	66	132	119
Evening Grosbeak					B			2	9	--	--	OT	1	2
Unidentified Finch						--	--	--	2	--	--	--	--	--
House Sparrow					B	--	--	--	2	1	--	--	--	--
Unidentified bird species						--	--	--	5	6	--	--	--	--

[1] Common names are from the A.O.U. Check-list of North American Birds, Seventh Edition (2003).

[2] Special management designations: USFS=United States Forest Service, MIS=Black Hills National Forest Management Indicator Species, R2 SS=US Forest Service Region 2 Sensitive Species, SOLC=Species of Local Concern; PIF=Partners In Flight (from the Species Assessment Database version 2005 found at www.rmbo.org, for BCR17 and in order of priority from highest to lowest) CC=Continental Concern Species, RC=Regional Concern Species, CS=Continental Stewardship Species, RS = Regional Stewardship Species, CWL = Continental Watch List, WY-I= Wyoming Partners In Flight Level I Priority (Conservation Action), WY-II= Wyoming Partners In Flight Level II Priority (Monitoring); USFWS=U.S. Fish and Wildlife Service, BCC-BCR17= Bird of Conservation Concern for Bird Conservation Region 17; SDGFP=South Dakota Dept. of Game, Fish, and Parks, SoGCN=Species of Greatest Conservation Need (South Dakota Comprehensive Wildlife Conservation Plan 2005).

[3] Residency status: B=(probably) breeds; VB=vagrant, possibly breeding; TM=transient migrant

[4] Habitats: BU=burn areas; FR=foothills riparian; MR=mid-elevation riparian; PN=ponderosa pine (north); PS=ponderosa pine (south); WS=white spruce

[5] The number and types of habitats surveyed each year may vary. OT=species detected off transect only, through casual observation.