Monitoring the Birds of the Black Hills: Year 2

Drawing by Michael L.P. Retter

Final Report

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Executive Summary

In 2002, Rocky Mountain Bird Observatory (RMBO), in conjunction with its funding partner, the Black Hills National Forest (BHNF), implemented Year 2 of *Monitoring the Birds of the Black Hills* (*MBBH*), as delineated by Panjabi et al. (2001). This program is designed to provide statistically rigorous, long-term population trend data on most diurnal, regularly breeding bird species in the Black Hills. In addition, it provides other information important for managing bird populations in the Black Hills, such as the geographic distribution and habitat associations of each species. This project supports the Black Hills National Forest's efforts to comply with requirements set forth in the National Forest Management Act and other statutes and regulations.

In 2002, we conducted 265 point-transect surveys, each consisting of up to 15 point-counts, in 10 habitat types within the Black Hills. Wet meadows, a habitat type sampled in 2001, was discontinued this year due to a lack of sites within the Black Hills that conformed to this type of habitat. Instead, additional effort was focused toward sampling high- and low-elevation riparian sites as two discrete habitat types in order to obtain more complete data on the birds found in these two types of riparian habitats. New sites within existing habitat types were added to the program in 2002 in order to append the current sampling effort where needed, while other sites were dropped, primarily because they did not conform to selection criteria.

We sampled bird communities at 3,402 point-count stations along these point-transects and observed a total of 126 bird species that were probably breeding in the area, many of which were recorded on few occasions. Refinements to the program in 2002 resulted in the habitat-stratified point-transects providing excellent results on 63 bird species (coefficients of variation of ≤50% in at least one habitat), including three BHNF Management Indicator Species (MIS) and three Region 2 Sensitive Species, indicating that these species should be effectively monitored under the current program. An additional 11 species, including one BHNF MIS, should be effectively monitored across several habitat types. This total represents approximately 59% of the breeding avifauna of the Black Hills; a 19% increase in coverage since last year. Depending on future funding, we will continue to strive to improve the current plan in order to further increase this coverage.

Several grassland bird species, particularly Grasshopper Sparrow, Lark Bunting, and Bobolink, were observed in unusually high numbers in the Black Hills this year, relative to 2001. The increased number of observations of these species may have been due to the severe drought affecting the western Great Plains that forced many birds to seek more suitable habitats outside of their normal breeding areas. If true, the abundance of these species in the Hills should return to more normal levels after drought conditions subside on the Great Plains.

Since the start of *MBBH*, we have documented the possible breeding of 23 species not previously reported to breed in the Black Hills (Black Hills National Forest 1989). One of the most exciting discoveries was that of Flammulated Owls in 2002. Although we cannot take credit for the original discovery of the species, members of the field crew observed several additional individuals of this species at locations away from the original sighting just south of Hanna. Other interesting finds this year included Yellow-billed Cuckoo, Winter Wren, Golden-winged Warbler, Northern Cardinal, and White-winged Crossbill, among others.

Introduction

The Black Hills host a unique avifauna and, as a region, plays a critical role in conserving populations of some bird species and subspecies. Long-term population monitoring provides essential information for the effective management and conservation of bird populations. In 2002, Rocky Mountain Bird Observatory (RMBO), in cooperation with its partner, the Black Hills National Forest (BHNF), implemented Year 2 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, will generate a wealth of ancillary data useful in managing birds (e.g., habitat associations and geographic distribution). This report details the findings from the second year of what is intended to be a long-term, cooperative effort to monitor bird populations in the Black Hills.

The Habitats

In coordination with U.S. Forest Service and other regional biologists, we selected 10 habitats in January of 2001 in which to initiate this bird monitoring effort (Panjabi et al., 2001). In order that most bird species would be adequately represented in the monitoring scheme, we selected habitats on the basis of the unique avifaunal components contributed by each habitat toward the total breeding bird community of the Black Hills. Property ownership and level of management interest in the habitat were also factors in our selection. Because not all habitats were included, we acknowledged that species occurring primarily in habitats other than those selected would not be well monitored under the current plan. However, given interest, we could allocate effort toward those species and/or habitats in the future.

In 2002, some changes were made to the original sampling scheme in order to improve the effectiveness of the program. The wet meadows habitat, designated under the original plan, was eliminated from the program after ground-truthing in 2001 revealed that most sites in this category were not actually wet meadows, but instead were dry, grassy clearings along valley bottoms that lacked significant attributes of wet meadows. Thus, sampling in this habitat did not contribute any additional species to the total number of species monitored under MBBH. While wet meadows do exist in the Black Hills, they appear to be restricted in size and localized in distribution and thus are not well suited to be sampled under the current plan.

In place of the wet meadows habitat, we decided to allocate additional effort toward the foothill riparian bird community. Based on data collected in 2001, it was apparent that riparian bird communities differed substantially between high and low elevation sites, and in general, we obtained rather poor data on low-elevation riparian species. Thus we split the original riparian classification into two habitats: foothill riparian and montane riparian. By treating these separately, it should be possible to obtain more complete data

on a greater number of species, and better enable us to monitor trends and distribution. Thus, in 2002, the habitats sampled under *MBBH* included aspen (AS), burn area (BU), foothill riparian (FR), late-successional ponderosa pine (LS), mixed-grass prairie (MG), montane riparian (MR), ponderosa pine, northern hills (PN), ponderosa pine, southern hills (PS), pine-juniper shrubland (SH), and white spruce (WS) (Figure 1).

Aspen

Aspen habitat (AS) consists of forest stands dominated by quaking aspen (*Populus tremuloides*) ranging in seral stage from 'shrub-seedling' to 'old-growth' (Buttery and Gillam 1983). Aspen stands are rarely monotypic; other tree species that typically occur within or adjacent to AS include ponderosa pine (*Pinus ponderosa*), white spruce (*Picea glauca*) and paper birch (*Betula papyrifera*). Stands of quaking aspen in the Black Hills are typically small and most host fewer than 15 count stations. Many aspen stands have a woody understory, consisting of a variety of shrubs including common juniper (*Juniperus communis*), beaked hazelnut (*Corylus cornuta*), gooseberry (*Ribes* spp.), and chokecherry (*Prunus virginiana*). Other stands have only an herbaceous understory.

Burn area

Burn Area habitat (BU) is located mostly within areas affected by the Jasper Fire, which burned approximately 83,000 acres in 2000 and thus is a two-year post-burn environment. The Jasper Burn Area is a mosaic of patches of charred, heat-killed, and live trees (mostly ponderosa pine) that ranged in seral stage from 'shrub-seedling' to 'mature' (Buttery and Gillam 1983) prior to being burned. In 2002, herbaceous and woody ground cover had resprouted in much of the Burn Area.

Ponderosa pine, northern hills

Ponderosa pine, northern hills (PN), or "pine-north," refers to the mesic forest dominated by ponderosa pine occurring north of the Mystic Ranger District. Although predominantly pine, this habitat incorporates natural ecotonal variation in the landscape, such as small groves of aspen or oak, drainages with birch and hazelnut, and riparian corridors. Nonetheless, transects in this habitat primarily sample pine forest. We separated the northern ponderosa pine habitat from the southern pine habitat because of structural and physiognomic differences that contribute to differences in the composition of the two bird communities. The northern hills receive more rainfall than do the southern hills, and the northern pine forest often supports an extensive under- and mid-story of bur oak (*Quercus macrocarpa*), aspen, paper birch, and/or other small deciduous trees. This deciduous component contributes to a bird community that is substantially different than in the south.

Ponderosa pine, southern hills

Ponderosa pine, southern hills (PS), or "pine-south," refers to the arid forest dominated by ponderosa pine occurring south of the Northern Hills Ranger District. Similar to pine-

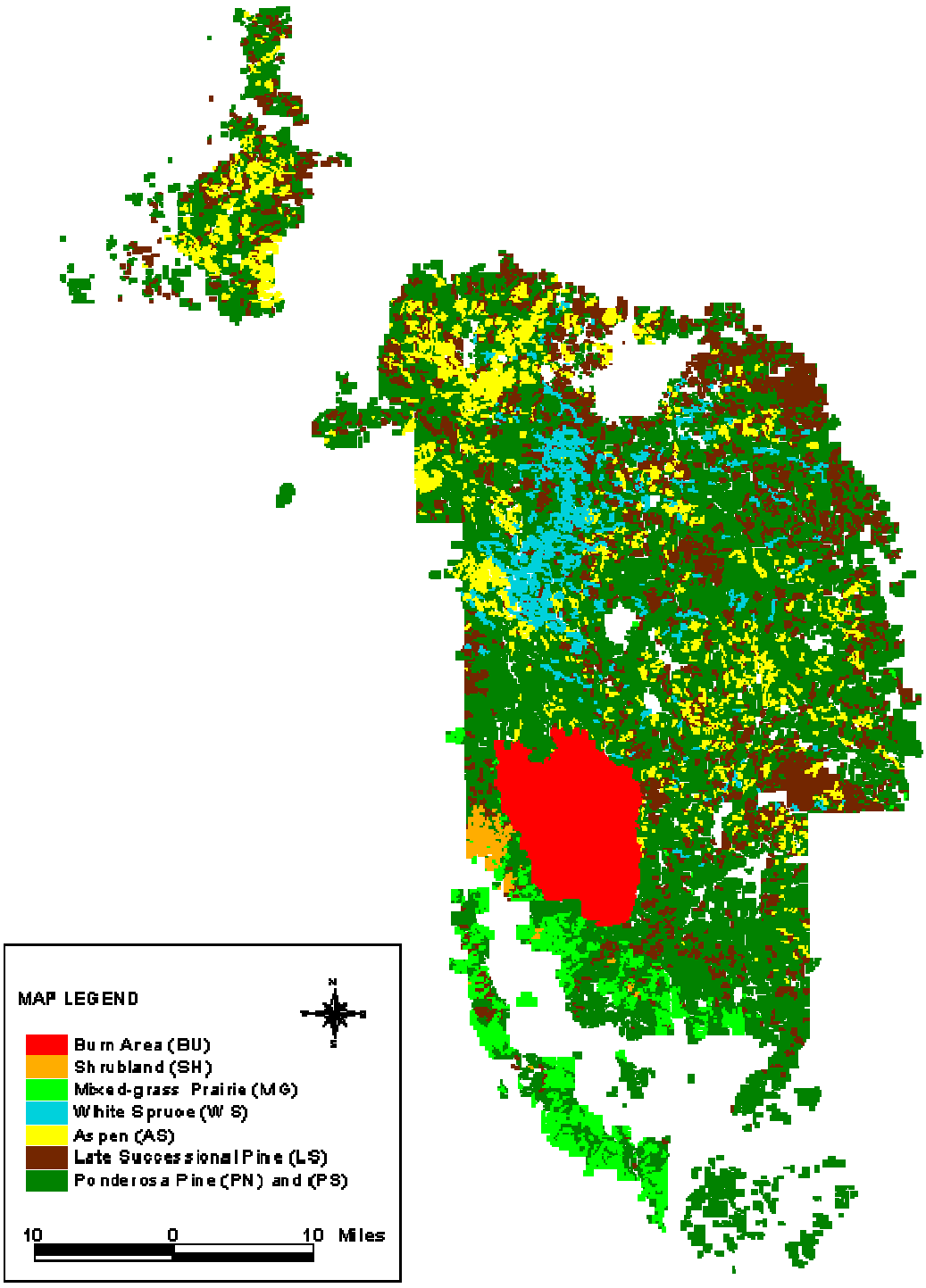


Figure 1. Distribution of habitats targeted for bird monitoring under *Monitoring the Birds of the Black Hills* (note: Foothills Riparian and Montane Riparian habitats not included).

north, this habitat incorporates natural variations in the landscape, such as small groves of aspen or oak, drainages with birch and hazelnut, and riparian corridors. Nonetheless, transects in this habitat primarily sample pine forest. The southern hills receive less rainfall than in the north, and the southern pine forest typically has a grassy understory, with little or no woody undergrowth. In some areas, the southern pine forest intergrades with native mixed-grass prairies forming a unique landscape not found elsewhere in the Black Hills.

Late-successional pine

Late-successional pine (LS) refers to stands of ponderosa pine where seral stage is classified as either 4c (mature, closed canopy) or 5 (old growth) (Buttery and Gillam 1983). These stands typically have more large-diameter trees, coarse fallen debris, and large-diameter standing snags than do earlier-successional stands (Buttery and Gillam 1983). Because certain bird species in the Black Hills may occur primarily in such late-successional stands, we sampled LS in order to generate sufficient data to allow us to monitor these species. Additionally, independent random sampling of LS should allow for comparisons of bird densities between LS and PN/PS forests, to assess whether some species are limited in their distribution to LS.

Mixed-grass prairie

Mixed-grass prairie (MG) 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 completely 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 moves away from the forest ecotone and into the more expansive prairies where trees are nearly absent.

Foothill riparian (FR)

Foothill riparian habitat (FR) refers to the wooded corridors along valley bottoms at lower elevations in the Black Hills. 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 and Russian olive (*Elaeagnus angustifolia*). Shrubs may include silver buffaloberry (*Shepherdia 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 grasses, is also prevalent.

Montane riparian

Montane riparian habitat (MR) refers to wooded corridors along valley bottoms at mid- to upper-elevations in the Black Hills. These habitats occur almost exclusively along flowing water. While some sites in this category lack an over-story component altogether, many contain well-developed under- and over-stories. Dominant over-story tree species typically include narrowleaf cottonwood, boxelder, ponderosa pine, bur oak, and/or white spruce. Associated tree species may include aspen, paper birch and ironwood (*Ostrya virginiana*). Willows (*Salix* spp.), alders (*Alnus* sp.) 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. This extensive shrub layer is the unifying characteristic among sites in this habitat type. Herbaceous vegetation, especially grasses, is also prevalent.

Pine-juniper shrubland

Pine-juniper shrubland (SH) refers to the arid habitats on canyon slopes and mesa tops in the southernmost Black Hills, particularly in the southwest. This habitat is dominated by mountain mahogany (*Cercocarpus montanus*) and skunkbrush sumac (*Rhus trilobata*) with a relatively sparse (but highly significant) component of Rocky Mountain juniper (*Juniperus scopulorum*) and ponderosa pine. Native grasses, such as blue grama, are also prevalent.

White Spruce

White spruce (WS) refers to coniferous forests dominated by white spruce, also known as Black Hills spruce. Often there is a significant component of ponderosa pine in this habitat and, to a lesser degree, aspen. White spruce stands typically occur at mid- to high elevations, especially in drainages and on cool north-facing slopes. Most of this habitat occurs in a semi-continuous belt extending through the north-central and western Black Hills, although isolated pockets exist further south. Stringers of white spruce also occur in moist, narrow canyons along the eastern edge of the Black Hills.

Methods

Field Personnel

Personnel that executed the field component of *MBBH* in 2002 consisted of nine skilled biologists with excellent aural and visual bird-identification skills. Each completed a five-day training program at the beginning of the season to ensure full understanding of the field protocol and compliance with our requirements for distance-estimation abilities (within 10% of true value).

Site Selection

In each of the 10 habitats, we aimed to establish permanent monitoring sites in 30 randomly selected stands (i.e., sites). USFS personnel identified potential stands using vegetation data layers from BHNF Geographic Information System (GIS) databases. All potential stands conformed to four selection criteria. All stands were: 1) located within the Black Hills, 2) representative of the targeted habitat type, 3) a minimum of 80 acres in size, and 4) accessible to the public within 3 miles of a road. Additional stands were randomly selected as back-up sites for stands that had to be replaced if ground-truthing revealed they did not meet one or more of the selection criteria.

Several sites were either added to or removed from the sampling scheme in each habitat in 2002 (Table 1). In most cases, sites were dropped because they were unrepresentative of the habitat they were intended to sample, or because they overlapped with another transect. New sites were added to the sampling scheme in order to compensate for sites that were dropped, or to append the current sampling effort in habitats with less than 30 sites. All sites in the riparian (RI) category from 2001 were transferred to the montane riparian (MR) category, with the exception of seven sites that were transferred to the foothill riparian (FR) category (RI24, RI33, RI34, RI39, RI95, RI97, RI99), and five sites that were dropped. Four sites were transferred from the former wet meadows (WM) category to the MR category (WM06, WM07, WM31, WM35), as the vegetation at these sites better represented MR. In all cases, the numerical suffix to the transect name was retained in the transfer (e.g., RI03 is now MR03, WM06 is now MR06, etc).

Table 1. Sites that were added to or deleted from the MBBH sampling scheme in 2002.

Habitats	Transects dropped in 2002	New transects added in 2002
Aspen	AS01, AS19, AS37	None
Burn area	BU29, BU36	BU99
Foothill riparian	N/A	FR01, FR02, FR03, FR04, FR05, FR06, FR07, FR08, FR09, FR10, FR11, FR12, FR15
Late-successional pine	LS05, LS45, LS48	LS03, LS08, LS27, LS99
Mixed-grass prairie	None	MG05, MG06, MG07, MG08, MG10, MG11, MG24, MG25, MG35, MG41, MG43, MG98, MG99
Montane riparian	RI13, RI15, RI22, RI24, RI92	MR86, MR97, MR88, MR89
Ponderosa pine-north	PN02, PN31	PN98, PN99
Ponderosa pine-south	PS25	PS96, PS97, PS98, PS99
Pine-juniper shrubland	SH02, SH04, SH05, SH08, SH11, SH12, SH18, SH19, SH20, SH21, SH22, SH24, SH25, SH28, SH35, SH41, SH43, SH45	SH86, SH87, SH88, SH89, SH90, SH91, SH92, SH93, SH94, SH95, SH96, SH97, SH98, SH99
White spruce	WS42, WS55	WS03, WS07, WS14, WS18, WS19, WS99

In some habitats we have not yet established our goal of 30 sites per habitat, although in a few of these we are very close. This shortfall is largely due to a shortage of potential

sites in these habitats, due to limited availability of the habitat itself and a lack of public access to some areas. Another factor is that GIS data are occasionally incorrect, especially in certain habitats where some stands are apparently misclassified, more limited in size than indicated, or highly interspersed with other habitat types. Thus, some sites that were selected through GIS have been dropped and, in the case of limited habitats, it has been difficult to find adequate replacement sites. Considerable effort was made in both 2001 and 2002 to locate additional sites on the ground in these habitats. While labor-intensive, this method has proven moderately successful and we have increased the number of sites in these habitats in this way.

National Park Service lands

In 2002, we added five point-transects on National Park Service lands in the Black Hills region. One site was added in pine-north in Devil's Tower National Monument, one in burn area in Jewel Cave, one in late-successional pine in Mount Rushmore National Memorial, and one each in mixed-grass prairie and foothill riparian in Wind Cave National Park. Data from these sites are included in the analyses and results in this report.

Point-transect Protocol

We conducted point-transects (Buckland et al. 1993) of up to 15 point-counts each, in order to sample bird populations in the habitats we selected for monitoring in the Black Hills. Each transect was surveyed by one observer following protocol established by Leukering (2000). All transect surveys were conducted in the morning, between ½-hour before sunrise and 11 AM, although 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, a random bearing that the transect would follow, and a random distance from the access point (between 0-400 m) 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 all remaining points. In many cases, the pre-selected bearing would eventually 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 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, the size and shape of the stand often pre-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 transect. All birds detected within the five-minute period were recorded on standardized forms. Fly-overs (birds flying over, but not using the immediate surrounding landscape) were recorded, but excluded from analyses. For each bird observed, we recorded species, sex, how it was detected (e.g., call, song, drumming, etc.), and radial distance (i.e., from observer to bird). Distances were measured using Bushnell® Yardage Pro 500™ laser rangefinders, whenever possible. The transect

intervals between count stations were treated as a line transect, and along these intervals we recorded individuals of a short list of low-density species (grouse, raptors, woodpeckers, and a few species from other taxonomic groups) and measured the distance and bearing to each from the transect line. We also recorded bearings and distances for the same low-density species when they were detected at count stations. Individual birds initially detected on points were not recorded between points.

Observers recorded weather 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. Distances between count stations were measured 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 100m of a road, the primary and secondary habitat types in the area, the seral stage and canopy closure of each habitat (Buttery and Gillam 1983), and the primary and secondary understory types (and percent coverage of each) within a 50 m radius of the point. These data were recorded prior to performing each bird count.

Data Analysis

We used program DISTANCE (Thomas et al. 1998-99) to analyze the data collected at point-counts. In this report, all density estimates (*D*) were generated by program DISTANCE using only data collected at count stations. The notation, concepts, and analysis methods of DISTANCE were developed by Buckland et al. (1993). As a general rule, we only performed DISTANCE analyses on species in each habitat for which there was a minimum of 20 observations (not including fly-overs and outliers), as recorded from count stations on point-transects. However, in a few cases where the number of observations was just shy of this cut-off, I performed such analyses to include the results in this report if the species was either of special interest, or if including the analysis was the most logical means of providing a comparison of density with other habitats in which it was observed in greater numbers. Although this is a relatively small sample size, I believe the density estimate produced by DISTANCE analysis is a more robust statistic for monitoring, even when based on a small number of observations, than simply the number of observations per unit effort. In all cases, the best effort was made to present as much information as possible on the greatest number of species for this report. However, the resultsfor species with low samples sizes should be interpreted with caution.

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.

Results

We conducted a total of 3,402 point-counts along 265 point-transects (Figure 2) in 10 different habitats. The numbers of point-transects per habitat varied, ranging from 17 in Mixed-grass Prairie to 32 in Montane Riparian (Table 2). We observed a total of 36,617 birds of 132 species on point-transects. Six species observed on point-transects were likely transient migrants on their way to other breeding destinations, and were not included in analyses. However, several additional species were observed off of point-transects that probably were breeding in the Black Hills, including Northern Saw-whet Owl, Flammulated Owl, Yellow-billed Cuckoo, Golden-winged Warbler, and Northern Cardinal. In total, we have documented 161 species since 2001 that have probably bred in the Black Hills (Appendix A). The numbers of species observed per habitat in 2002 varied, ranging from 39 in mixed-grass prairie to 100 in foothill riparian. In most habitats, many of the species observed were peripheral to that habitat and not well represented in the samples. Other species were observed in such low numbers that it was not possible to estimate density. A breakdown of the results, by habitat, follows. I also present the results at the species level in the section "Species Accounts."

Table 2. Survey effort, cumulative species totals, and average species richness per count in habitats surveyed in the Black Hills, 2002.

Habitat	# point-transects	# point-counts	# species	avg. species richness/count
Aspen	28	319	64	6.6
Burn area	30	428	63	6.6
Foothill riparian	20	259	100	7.9
Late-successional pine	29	369	69	6.4
Mixed-grass prairie	17	216	68	5.8
Montane riparian	32	414	82	8.0
Pine-north	31	391	66	6.9
Pine-south	30	406	71	5.9
Pine-juniper shrubland	20	241	65	8.8
White spruce	27	359	61	6.2

Aspen

We surveyed 28 point-transects in aspen stands and conducted 319 counts along those transects. We observed a total of 64 species (avg. richness = 6.6 species/count) and obtained robust density estimates (CV <50%) for 27 species (Table 3). Warbling Vireo occurred in greatest density relative to other species in this habitat. Aspen also supported greater densities of Red-naped Sapsucker, Warbling Vireo, Black-capped Chickadee, and Ovenbird than any other habitat we sampled in the Black Hills.

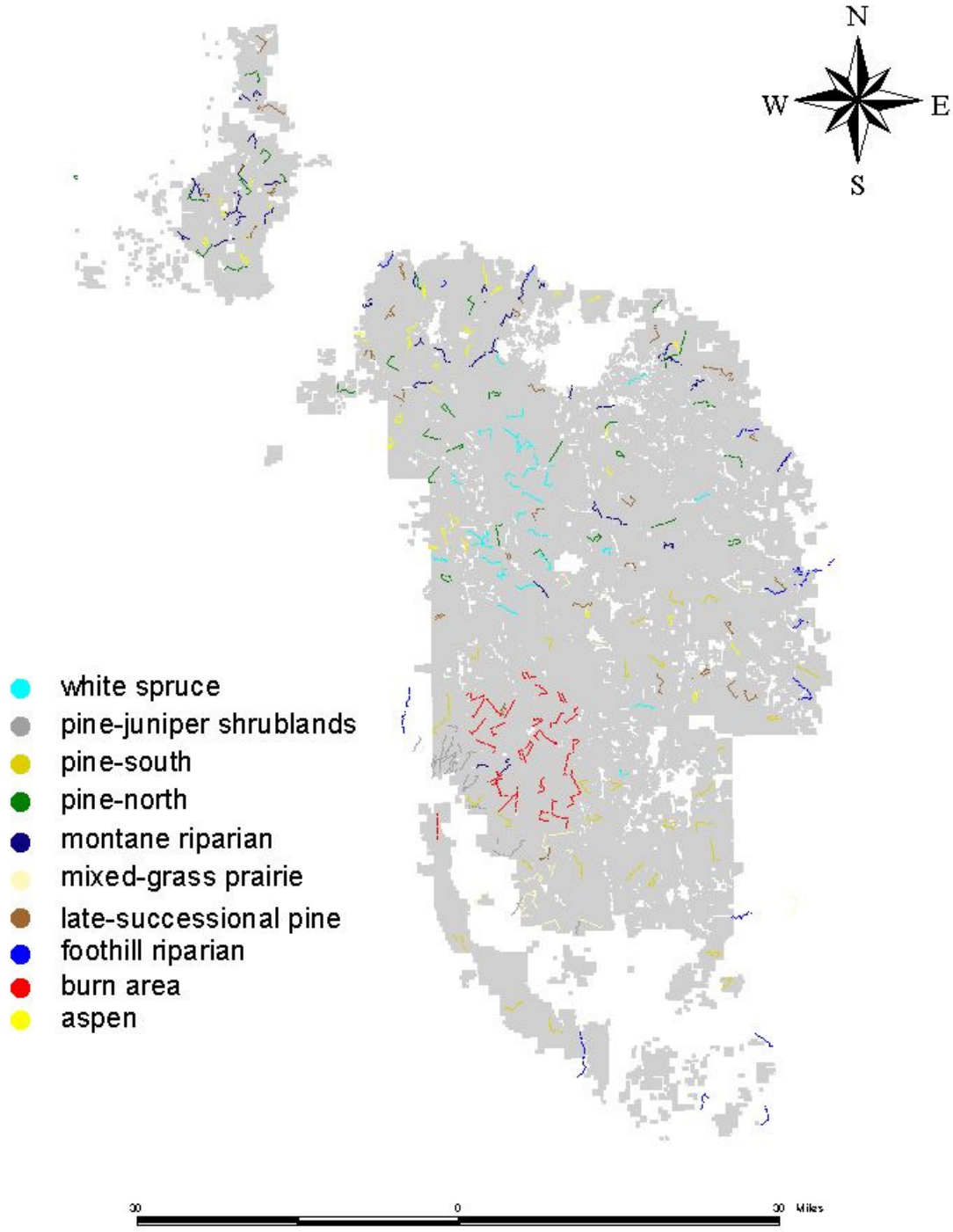


Figure 2. Distribution of habitat-specific point-transects in the Black Hills, 2002.

Table 3. Estimated densities of breeding bird species and numbers of individuals observed on point-transects in aspen stands in the Black Hills, 2002.

Common Name	D	LCL	UCL	CV(%)	N
Great Blue Heron	ID	--	--	--	2
Turkey Vulture	ID	--	--	--	1
Mallard	ID	--	--	--	5
Sharp-shinned Hawk	ID	--	--	--	1
Broad-winged Hawk	ID	--	--	--	1
Red-tailed Hawk	ID	--	--	--	3
Ring-necked Pheasant	ID	--	--	--	1
Ruffed Grouse	ID	--	--	--	17
Wild Turkey	ID	--	--	--	9
Mourning Dove	ID	--	--	--	9
Red-naped Sapsucker	10.43	6.86	15.86	21	52
Hairy Woodpecker	2.60	1.44	4.69	30	23
Black-backed Woodpecker	ID	--	--	--	1
Northern Flicker	ID	--	--	--	15
Western Wood-Pewee	ID	--	--	--	16
Dusky Flycatcher	36.66	29.70	45.26	11	167
Cordilleran Flycatcher	4.16	2.19	7.88	33	19
Plumbeous Vireo	4.17	2.31	7.55	31	22
Warbling Vireo	65.93	58.44	74.37	6	573
Red-eyed Vireo	4.92	2.74	8.83	30	17
Gray Jay	ID	--	--	--	15
Blue Jay	ID	--	--	--	4
American Crow	0.12	0.08	0.20	25	28
Violet-green Swallow	ID	--	--	--	2
Black-capped Chickadee	18.44	12.85	26.46	18	130
Red-breasted Nuthatch	13.52	9.80	18.64	16	141
White-breasted Nuthatch	ID	--	--	--	13
Brown Creeper	ID	--	--	--	7
Rock Wren	ID	--	--	--	1
Canyon Wren	ID	--	--	--	1
House Wren	ID	--	--	--	10
Winter Wren	ID	--	--	--	1
Golden-crowned Kinglet	ID	--	--	--	1
Ruby-crowned Kinglet	4.75	3.27	6.89	19	72
Eastern Bluebird	ID	--	--	--	2
Mountain Bluebird	ID	--	--	--	1
Townsend's Solitaire	4.53	2.78	7.37	25	53
Veery	ID	--	--	--	12
Swainson's Thrush	3.02	2.00	4.57	21	37
American Robin	8.36	6.45	10.84	13	122
Cedar Waxwing	ID	--	--	--	8
Tennessee Warbler	ID	--	--	--	10
Yellow Warbler	ID	--	--	--	8
Chestnut-sided Warbler	ID	--	--	--	1

Common Name	D	LCL	UCL	CV(%)	N
Black-throated Blue Warbler	ID	--	--	--	1
Yellow-rumped Warbler	16.85	13.24	21.44	12	186
American Redstart	10.61	6.92	16.26	22	41
Ovenbird	33.09	27.05	40.48	10	346
MacGillivray's Warbler	15.83	11.04	22.71	18	60
Common Yellowthroat	4.19	2.26	7.76	32	21
Western Tanager	2.20	1.38	3.50	24	37
Spotted Towhee	1.98	1.04	3.76	33	20
Chipping Sparrow	14.40	10.07	20.60	18	88
Vesper Sparrow	ID	--	--	--	3
Song Sparrow	ID	--	--	--	7
Dark-eyed Junco	13.24	10.60	16.55	11	141
Black-headed Grosbeak	6.32	3.66	10.91	28	59
Red-winged Blackbird	ID	--	--	--	11
Common Grackle	ID	--	--	--	1
Brown-headed Cowbird	8.20	5.12	13.14	24	52
Red Crossbill	21.34	11.69	38.97	31	116
White-winged Crossbill	ID	--	--	--	6
Pine Siskin	12.32	6.85	22.17	30	48
American Goldfinch	ID	--	--	--	5

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 D; ID=Insufficient data

Burn area (BU)

We surveyed 30 point-transects in burned areas and conducted 428 counts along those transects. All but one of the transects were within the 2000 Jasper Burn Area; the other was in the 2001 Elk Mountain Burn Area. We observed a total of 63 species (avg. richness was 6.6 species/count) and obtained robust density estimates (CV <50%) for 27 species (Table 4). Red Crossbill occurred in greatest density relative to other species in this habitat. Estimated densities of Hairy Woodpecker, Black-backed Woodpecker, Red-headed Woodpecker, Northern Flicker, Eastern Bluebird and Mountain Bluebird were higher in Burn Areas than in any other habitat we sampled in the Black Hills. Interestingly, burned areas continue to support many species of forest birds in densities similar to the surrounding southern Ponderosa Pine forest, and in a few cases (e.g. Dusky Flycatcher, American Robin), densities are higher in burns.

Table 4. Estimated densities of breeding bird species and numbers of individuals observed on point-transects in burned ponderosa pine forest (2-yr post burn) in the Black Hills, 2002.

Common Name	D	LCL	UCL	CV(%)	N
Turkey Vulture	ID	--	--	--	2
Canada Goose	ID	--	--	--	5
Mallard	ID	--	--	--	3
Cooper's Hawk	ID	--	--	--	1

Common Name	D	LCL	UCL	CV(%)	N
Northern Goshawk	ID	--	--	--	1
Red-tailed Hawk	ID	--	--	--	1
American Kestrel	ID	--	--	--	1
Ruffed Grouse	ID	--	--	--	1
Wild Turkey	ID	--	--	--	4
Mourning Dove	0.84	0.55	1.28	22	36
Great Horned Owl	ID	--	--	--	1
Common Nighthawk	ID	--	--	--	1
White-throated Swift	ID	--	--	--	4
Lewis's Woodpecker	ID	--	--	--	1
Red-headed Woodpecker	0.38	0.22	0.67	29	24
Red-naped Sapsucker	ID	--	--	--	3
Downy Woodpecker	ID	--	--	--	6
Hairy Woodpecker	10.53	7.82	14.18	15	171
Black-backed Woodpecker	6.91	4.50	10.62	22	71
Northern Flicker	1.28	0.86	1.91	21	57
Western Wood-Pewee	1.66	1.16	2.37	18	64
Least Flycatcher	ID	--	--	--	3
Dusky Flycatcher	9.75	6.95	13.67	17	111
Cordilleran Flycatcher	ID	--	--	--	3
Western Kingbird	ID	--	--	--	2
Plumbeous Vireo	6.93	4.90	9.79	18	52
Warbling Vireo	3.63	2.41	5.46	21	55
Gray Jay	5.37	2.76	10.43	35	30
Clark's Nutcracker	ID	--	--	--	4
American Crow	0.21	0.12	0.38	29	28
Violet-green Swallow	ID	--	--	--	12
Black-capped Chickadee	9.49	7.21	12.48	14	159
Red-breasted Nuthatch	5.25	3.93	7.01	15	103
White-breasted Nuthatch	4.74	3.16	7.11	21	53
Brown Creeper	ID	--	--	--	2
Rock Wren	ID	--	--	--	8
House Wren	ID	--	--	--	8
Eastern Bluebird	2.57	1.34	4.94	34	40
Mountain Bluebird	5.10	3.71	7.02	16	76
Townsend's Solitaire	6.18	4.94	7.73	11	190
Swainson's Thrush	ID	--	--	--	4
American Robin	19.22	15.66	23.59	10	400
Cedar Waxwing	ID	--	--	--	2
Virginia's Warbler	ID	--	--	--	4
Yellow-rumped Warbler	25.21	21.95	28.96	7	399
Ovenbird	ID	--	--	--	9
MacGillivray's Warbler	ID	--	--	--	4
Western Tanager	8.46	6.89	10.40	11	194
Spotted Towhee	ID	--	--	--	9
Chipping Sparrow	26.34	21.90	31.68	9	303

Common Name	D	LCL	UCL	CV(%)	N
Vesper Sparrow	2.36	1.55	3.60	22	61
Lark Sparrow	ID	--	--	--	1
Grasshopper Sparrow	ID	--	--	--	5
Song Sparrow	ID	--	--	--	12
Dark-eyed Junco	14.64	12.23	17.53	9	303
Red-winged Blackbird	ID	--	--	--	8
Western Meadowlark	ID	--	--	--	17
Common Grackle	ID	--	--	--	1
Brown-headed Cowbird	19.81	16.24	24.17	10	148
Cassin's Finch	ID	--	--	--	2
Red Crossbill	83.30	65.04	106.69	13	782
Pine Siskin	12.20	8.53	17.43	18	101
American Goldfinch	3.65	2.26	5.88	25	26

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 D; ID=Insufficient data

Foothill riparian (FR)

We established 20 point-transects in foothill riparian habitat and conducted 259 counts along those transects. We were somewhat hampered in establishing sites in this habitat due to the limited availability of low-elevation drainages that have the proper hydrology and topography to support this vegetation type, as well as the high proportion of private ownership in such areas. Nonetheless, we detected a total of 100 species (avg. richness = 7.9 species/count), the highest total number observed in any habitat, although some of these were not using the foothill riparian habitat and instead were recorded from adjacent habitats. We did not analyze data for species that were primarily using adjacent habitats. On the other hand, many of the species recorded were riparian obligates and were found almost solely within this habitat. We obtained robust density estimates (CV <50%) for 42 species (Table 5). Estimated density of Yellow Warbler was greater than that of any other species in this habitat. Estimated densities of Mallard, Mourning Dove, White-throated Swift, Western Wood-Pewee, Cordilleran Flycatcher, Eastern Kingbird, Red-eyed Vireo, Blue Jay, Canyon Wren, House Wren, Cedar Waxwing, Yellow Warbler, Yellow-breasted Chat, Lark Sparrow, Black-headed Grosbeak, Lazuli Bunting, Red-winged Blackbird, Common Grackle, Orchard Oriole, Bullock's Oriole, and American Goldfinch were greater in foothill riparian habitat than in any other habitat we surveyed in the Black Hills. Several other uncommon species that were observed too few times in order to estimate density, such as Least Flycatcher, Northern Rough-winged Swallow, Cliff Swallow, Brown Thrasher, and Black-and-white Warbler, were either only observed in foothill riparian, or were observed here in greater numbers than in any other habitat in the Black Hills.

Table 5. Estimated densities of breeding bird species and numbers of individuals observed on point-transects in foothill riparian habitat in the Black Hills, 2002.

Common Name	D	LCL	UCL	CV(%)	N
Western Grebe	ID	--	--	--	1

Common Name	D	LCL	UCL	CV(%)	N
American Bittern	ID	--	--	--	1
Great Blue Heron	ID	--	--	--	5
Turkey Vulture	ID	--	--	--	28
Canada Goose	ID	--	--	--	9
Wood Duck	ID	--	--	--	5
Gadwall	ID	--	--	--	1
Mallard	8.16	4.11	16.19	36	35
Common Merganser	ID	--	--	--	9
Red-tailed Hawk	ID	--	--	--	5
Golden Eagle	ID	--	--	--	1
American Kestrel	ID	--	--	--	5
Prairie Falcon	ID	--	--	--	1
Ring-necked Pheasant	ID	--	--	--	1
Wild Turkey	ID	--	--	--	4
Killdeer	ID	--	--	--	11
Spotted Sandpiper	ID	--	--	--	2
Upland Sandpiper	ID	--	--	--	1
Franklin's Gull	ID	--	--	--	1
Rock Dove	ID	--	--	--	5
Mourning Dove	6.75	4.91	9.26	16	72
White-throated Swift	25.62	10.18	64.45	49	48
Belted Kingfisher	ID	--	--	--	8
Red-headed Woodpecker	ID	--	--	--	2
Red-naped Sapsucker	ID	--	--	--	1
Downy Woodpecker	ID	--	--	--	9
Hairy Woodpecker	ID	--	--	--	7
Northern Flicker	0.86	0.47	1.57	31	16
Western Wood-Pewee	6.95	4.71	10.26	20	58
Alder Flycatcher	ID	--	--	--	1
Least Flycatcher	ID	--	--	--	5
Dusky Flycatcher	11.41	7.56	17.21	21	50
Cordilleran Flycatcher	25.92	18.00	37.32	19	81
Eastern Phoebe	ID	--	--	--	1
Western Kingbird	ID	--	--	--	2
Eastern Kingbird	21.78	14.12	33.57	22	69
Plumbeous Vireo	ID	--	--	--	21
Warbling Vireo	19.34	13.50	27.70	18	94
Red-eyed Vireo	24.05	17.78	32.54	15	85
Blue Jay	1.29	0.71	2.36	31	17
Clark's Nutcracker	ID	--	--	--	3
Black-billed Magpie	ID	--	--	--	1
American Crow	0.27	0.14	0.53	35	20
Tree Swallow	ID	--	--	--	2
Violet-green Swallow	41.42	25.48	67.34	25	195
Northern Rough-winged Swallow	ID	--	--	--	7
Cliff Swallow	ID	--	--	--	5

Common Name	D	LCL	UCL	CV(%)	N
Barn Swallow	ID	--	--	--	10
Black-capped Chickadee	4.30	3.04	6.08	18	35
Red-breasted Nuthatch	ID	--	--	--	30
White-breasted Nuthatch	ID	--	--	--	9
Brown Creeper	ID	--	--	--	2
Rock Wren	1.01	0.55	1.87	32	25
Canyon Wren	1.09	0.68	1.77	25	29
House Wren	21.33	14.18	32.08	21	90
Golden-crowned Kinglet	ID	--	--	--	1
Ruby-crowned Kinglet	ID	--	--	--	12
Mountain Bluebird	ID	--	--	--	8
Townsend's Solitaire	ID	--	--	--	10
Swainson's Thrush	1.48	0.71	3.08	38	16
American Robin	19.45	15.15	24.98	13	120
Gray Catbird	ID	--	--	--	8
Brown Thrasher	ID	--	--	--	3
European Starling	ID	--	--	--	20
Cedar Waxwing	30.82	17.38	54.66	30	82
Virginia's Warbler	ID	--	--	--	1
Yellow Warbler	49.22	36.24	66.85	16	163
Yellow-rumped Warbler	4.61	2.85	7.46	25	24
Black-and-white Warbler	ID	--	--	--	4
American Redstart	20.31	14.20	29.04	18	59
Ovenbird	16.44	12.39	21.83	14	169
MacGillivray's Warbler	ID	--	--	--	8
Common Yellowthroat	27.43	17.80	42.27	22	80
Yellow-breasted Chat	10.94	7.37	16.24	20	71
Western Tanager	2.57	1.60	4.13	24	30
Spotted Towhee	15.35	11.20	21.04	16	98
Chipping Sparrow	8.30	5.64	12.22	20	50
Vesper Sparrow	ID	--	--	--	3
Lark Sparrow	14.78	9.32	23.46	24	49
Grasshopper Sparrow	ID	--	--	--	1
Song Sparrow	8.39	5.48	12.84	22	37
Dark-eyed Junco	3.62	2.05	6.37	29	24
Rose-breasted Grosbeak	ID	--	--	--	1
Black-headed Grosbeak	25.41	19.65	32.87	13	122
Lazuli Bunting	8.50	5.31	13.62	24	42
Indigo Bunting	ID	--	--	--	1
Dickcissel	ID	--	--	--	11
Red-winged Blackbird	18.89	12.61	28.30	21	139
Western Meadowlark	2.61	1.80	3.81	19	62
Yellow-headed Blackbird	ID	--	--	--	5
Brewer's Blackbird	ID	--	--	--	13
Common Grackle	19.91	11.60	34.20	28	52
Brown-headed Cowbird	17.69	12.34	25.37	18	66

Common Name	D	LCL	UCL	CV(%)	N
Orchard Oriole	7.55	3.29	17.34	43	17
Bullock's Oriole	7.15	3.53	14.47	37	16
House Finch	ID	--	--	--	11
Red Crossbill	8.58	3.71	19.83	45	70
Pine Siskin	ID	--	--	--	9
American Goldfinch	29.41	19.20	45.04	22	76
House Sparrow	ID	--	--	--	1

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 D; ID=Insufficient data

Late-successional pine (LS)

We surveyed 29 point-transects in late-successional pine stands and conducted 369 counts along those transects. We detected a total of 69 species (avg. richness = 6.4 species/count) and obtained robust density estimates (CV <50%) for 31 species (Table 6). Estimated density was highest for Dark-eyed Junco relative to that of other species in this habitat. Estimated densities of Townsend's Solitaire and Dark-eyed Junco were higher in Late-successional pine habitat than in other habitats surveyed in the Black Hills. Interestingly, densities of Chipping Sparrow, Brown-headed Cowbird, and Red Crossbill were substantially lower in late-successional pine relative to other habitats surveyed.

Late-successional pine stands were identified and delineated using BHNF GIS data, and great care was taken by observers to stay within the boundaries of these stands while surveying, as indicated on topographic maps. However, many of the stands, or parts thereof, were not late-successional pine habitat. Despite replacing unrepresentative transects from the 2001 sampling scheme with new sites, only 43% of the count stations in this habitat actually fell within forest that was classified by observers as late-successional habitat (seral stage 4c or 5, Buttery and Gillam 1983) in 2002. Observers reported that many of the stands identified on maps as late-successional pine habitat had recently been logged, suggesting that the BHNF GIS data used to identify these stands were outdated. Although differences in density are apparent for some species between this and other pine habitats, these differences would probably be more pronounced if a greater proportion of the count stations were actually located within late-successional pine habitat. In order to increase the value of the current monitoring effort in this habitat, it may be necessary to select additional late-successional pine stands using more current data or more refined selection criteria that will eliminate unrepresentative stands from the pool of potential sites.

Table 6. Estimated densities of breeding bird species and numbers of individuals observed on point-transects in late-successional pine forest in the Black Hills, 2002.

Common Name	D	LCL	UCL	CV(%)	N
Turkey Vulture	ID	--	--	--	5
Mallard	ID	--	--	--	2
Cooper's Hawk	ID	--	--	--	1

Common Name	D	LCL	UCL	CV(%)	N
Broad-winged Hawk	ID	--	--	--	4
Red-tailed Hawk	ID	--	--	--	5
Gray Partridge	ID	--	--	--	4
Ruffed Grouse	ID	--	--	--	9
Wild Turkey	ID	--	--	--	6
Mourning Dove	ID	--	--	--	11
Common Nighthawk	ID	--	--	--	7
White-throated Swift	ID	--	--	--	5
Red-headed Woodpecker	ID	--	--	--	3
Red-naped Sapsucker	1.70	1.08	2.68	23	24
Downy Woodpecker	ID	--	--	--	3
Hairy Woodpecker	2.56	1.81	3.64	18	50
Three-toed Woodpecker	ID	--	--	--	4
Black-backed Woodpecker	1.30	0.68	2.52	34	20
Northern Flicker	0.15	0.07	0.33	39	11
Western Wood-Pewee	1.82	1.09	3.04	26	40
Dusky Flycatcher	5.07	3.37	7.62	21	71
Cordilleran Flycatcher	7.84	5.37	11.45	19	49
Plumbeous Vireo	1.95	1.07	3.56	31	22
Warbling Vireo	17.52	13.07	23.48	15	199
Red-eyed Vireo	4.69	2.85	7.71	26	26
Gray Jay	3.37	2.03	5.59	26	28
Blue Jay	ID	--	--	--	12
Clark's Nutcracker	ID	--	--	--	3
American Crow	0.15	0.08	0.29	34	19
Violet-green Swallow	ID	--	--	--	7
Black-capped Chickadee	12.33	9.13	16.64	15	130
Red-breasted Nuthatch	14.21	11.67	17.30	10	250
White-breasted Nuthatch	2.55	1.36	4.77	32	22
Pygmy Nuthatch	ID	--	--	--	1
Brown Creeper	10.86	7.09	16.65	22	41
Rock Wren	ID	--	--	--	2
Canyon Wren	ID	--	--	--	7
House Wren	ID	--	--	--	6
Golden-crowned Kinglet	ID	--	--	--	11
Ruby-crowned Kinglet	5.52	3.99	7.64	17	78
Eastern Bluebird	ID	--	--	--	1
Mountain Bluebird	ID	--	--	--	7
Townsend's Solitaire	8.38	6.12	11.48	16	149
Veery	ID	--	--	--	5
Swainson's Thrush	2.75	1.87	4.05	20	56

Common Name	D	LCL	UCL	CV(%)	N
Hermit Thrush	ID	--	--	--	1
American Robin	12.54	10.02	15.69	11	202
Tennessee Warbler	ID	--	--	--	5
Orange-crowned Warbler	ID	--	--	--	1
Yellow Warbler	ID	--	--	--	10
Yellow-rumped Warbler	20.59	17.42	24.34	9	326
Black-and-white Warbler	ID	--	--	--	1
American Redstart	1.15	0.61	2.19	33	13
Ovenbird	19.52	15.24	24.99	13	268
MacGillivray's Warbler	1.99	1.15	3.44	28	20
Common Yellowthroat	ID	--	--	--	3
Western Tanager	7.64	6.09	9.59	12	136
Spotted Towhee	ID	--	--	--	10
Chipping Sparrow	10.37	7.84	13.71	14	106
Vesper Sparrow	ID	--	--	--	2
Song Sparrow	ID	--	--	--	6
Dark-eyed Junco	26.75	21.88	32.72	10	243
Black-headed Grosbeak	1.36	0.68	2.71	36	21
Red-winged Blackbird	ID	--	--	--	6
Brewer's Blackbird	ID	--	--	--	1
Brown-headed Cowbird	4.98	2.93	8.47	27	38
Cassin's Finch	ID	--	--	--	1
Red Crossbill	18.59	13.86	24.94	15	264
Pine Siskin	4.31	2.92	6.37	20	49
American Goldfinch	ID	--	--	--	1

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 D; ID=Insufficient data

Mixed-grass prairie (MG)

We surveyed 17 point-transects in mixed-grass prairie and conducted 216 counts along those transects. The relatively low number of sites surveyed is a result of a shortage of sites identified prior to the start of the field season, and a shortage in the availability of this habitat on Black Hills National Forest; much of this habitat in the Black Hills is in private ownership or only accessible through private land. Nonetheless, we detected a total of 68 species (avg. richness = 5.8 species/count), although many of these were recorded from adjacent forested habitats and were not using the grassland habitat, although they may have been using the forest/prairie edge. Although we surveyed mixed-grass prairies as a single habitat type, the avifauna differed considerably between sites that were adjacent to forest and sites that were far from any forests. In general, species such as Mountain Bluebird, Chipping Sparrow and Vesper Sparrow were more abundant in grasslands near forests, whereas species such as Upland Sandpiper (recorded

only in Wind Cave National Park) and Grasshopper Sparrow seemed to be more abundant in grasslands isolated from forests. Western Meadowlarks were common in both types. Our results reflect the averages across all sites in this category and thus may be slightly misleading for some species, as each is not likely to occur equally in both types of grasslands. Regardless, these statistics should be adequate for monitoring purposes. We obtained robust density estimates (CV <50%) for 11 species (Table 7). We did not attempt to analyze data from this habitat for species that do not use grasslands to at least some degree. Although Pinyon Jay and Clark's Nutcracker were recorded in greater numbers from this habitat, the high numbers observed are a result of birds observed flying over the grasslands or using adjacent habitats, and they were not using this habitat per se. Estimated density was greatest for Chipping Sparrow relative to that of other species in this habitat, although they occur only in grasslands with available trees. Estimated densities of Vesper Sparrow, Grasshopper Sparrow, and Western Meadowlark were greater in Mixed-grass Prairies than in other habitats we surveyed in the Black Hills. Other species, such as Sharp-tailed Grouse, Upland Sandpiper, and Horned Lark use only mixed-grass prairies, although they may have been recorded from adjacent habitats. Additional effort at more sites in this habitat should increase our ability to estimate density and detect trends for species in MG.

Table 7. Estimated densities of breeding bird species and numbers of individuals observed on point-transects in mixed-grass prairie grasslands in the Black Hills, 2002.

Common Name	D	LCL	UCL	CV(%)	N
Great Blue Heron	ID	--	--	--	1
Turkey Vulture	ID	--	--	--	11
Mallard	N/A	--	--	--	3
Red-tailed Hawk	ID	--	--	--	1
American Kestrel	ID	--	--	--	5
Sharp-tailed Grouse	ID	--	--	--	2
Wild Turkey	ID	--	--	--	7
Killdeer	ID	--	--	--	7
Spotted Sandpiper	ID	--	--	--	1
Upland Sandpiper	ID	--	--	--	19
Wilson's Snipe	ID	--	--	--	3
Mourning Dove	1.93	1.26	2.98	22	53
Common Nighthawk	ID	--	--	--	1
White-throated Swift	ID	--	--	--	1
Red-headed Woodpecker	N/A	--	--	--	2
Hairy Woodpecker	N/A	--	--	--	13
Black-backed Woodpecker	N/A	--	--	--	22
Northern Flicker	0.19	0.09	0.42	41	14
Western Wood-Pewee	N/A	--	--	--	1
Dusky Flycatcher	N/A	--	--	--	53
Western Kingbird	ID	--	--	--	1
Eastern Kingbird	ID	--	--	--	7
Plumbeous Vireo	N/A	--	--	--	40
Warbling Vireo	N/A	--	--	--	7
Gray Jay	N/A	--	--	--	3

Common Name	D	LCL	UCL	CV(%)	N
Pinyon Jay	N/A	--	--	--	41
Clark's Nutcracker	N/A	--	--	--	17
American Crow	0.21	0.15	0.31	19	29
Horned Lark	ID	--	--	--	4
Tree Swallow	ID	--	--	--	13
Violet-green Swallow	ID	--	--	--	18
Northern Rough-winged Swallow	ID	--	--	--	5
Bank Swallow	ID	--	--	--	1
Cliff Swallow	ID	--	--	--	1
Barn Swallow	ID	--	--	--	7
Black-capped Chickadee	N/A	--	--	--	31
Red-breasted Nuthatch	N/A	--	--	--	41
White-breasted Nuthatch	N/A	--	--	--	6
Rock Wren	ID	--	--	--	8
House Wren	N/A	--	--	--	1
Eastern Bluebird	ID	--	--	--	9
Mountain Bluebird	2.85	1.69	4.79	27	30
Townsend's Solitaire	N/A	--	--	--	15
American Robin	N/A	--	--	--	79
European Starling	ID	--	--	--	2
Yellow-rumped Warbler	N/A	--	--	--	104
Ovenbird	N/A	--	--	--	22
Common Yellowthroat	ID	--	--	--	1
Western Tanager	N/A	--	--	--	34
Spotted Towhee	5.07	3.09	8.33	26	40
Chipping Sparrow	24.17	18.15	32.19	15	125
Clay-colored Sparrow	N/A	--	--	--	1
Vesper Sparrow	15.37	12.09	19.55	12	214
Lark Sparrow	ID	--	--	--	7
Grasshopper Sparrow	14.67	9.83	21.90	21	62
Song Sparrow	N/A	--	--	--	1
Dark-eyed Junco	N/A	--	--	--	27
Black-headed Grosbeak	N/A	--	--	--	1
Lazuli Bunting	N/A	--	--	--	2
Red-winged Blackbird	0.76	0.36	1.59	39	25
Western Meadowlark	22.88	18.08	28.96	12	345
Brewer's Blackbird	ID	--	--	--	11
Common Grackle	ID	--	--	--	1
Brown-headed Cowbird	9.33	6.57	13.26	18	73
Orchard Oriole	N/A	--	--	--	1
Red Crossbill	N/A	--	--	--	775
Pine Siskin	N/A	--	--	--	5
American Goldfinch	N/A	--	--	--	29

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 D; ID=Insufficient data

Montane riparian (MR)

We surveyed 32 point-transects in montane riparian habitat and conducted 414 counts along those transects. We detected a total of 82 species (avg. richness = 8.0 species/count), although some of these were recorded primarily from adjacent habitats. We did not analyze data from this habitat for species that regularly do not use riparian habitats during the breeding season (e.g. Red-breasted Nuthatch). We obtained robust density estimates (CV <50%) for 38 species (Table 8). Estimated density was highest for American Redstart relative to that of other species in this habitat, although two other species, Dusky Flycatcher and Common Yellowthroat, occurred in similar densities. Estimated densities of American Robin, American Redstart, MacGillivray's Warbler, Common Yellowthroat, Song Sparrow, and Pine Siskin were greater in MR than in any other habitat we surveyed in the Black Hills. Of these, Song Sparrow is perhaps the species most indicative of montane riparian habitats in the Black Hills, as it occurs almost solely at sites with shrubby willows and flowing surface water.

Table 8. Estimated densities of breeding bird species and numbers of individuals observed on point-transects in montane riparian habitat in the Black Hills, 2002.

Common Name	D	LCL	UCL	CV(%)	N
Great Blue Heron	ID	--	--	--	13
Turkey Vulture	ID	--	--	--	19
Canada Goose	ID	--	--	--	2
Wood Duck	ID	--	--	--	8
Mallard	ID	--	--	--	12
Broad-winged Hawk	ID	--	--	--	1
Red-tailed Hawk	ID	--	--	--	9
Prairie Falcon	ID	--	--	--	2
Ruffed Grouse	ID	--	--	--	8
Wild Turkey	ID	--	--	--	2
Northern Bobwhite	ID	--	--	--	1
Spotted Sandpiper	ID	--	--	--	3
Wilson's Snipe	ID	--	--	--	5
Rock Dove	ID	--	--	--	1
Mourning Dove	0.38	0.19	0.73	34	20
Great Horned Owl	ID	--	--	--	1
White-throated Swift	2.44	1.07	5.56	44	54
Belted Kingfisher	ID	--	--	--	9
Lewis's Woodpecker	ID	--	--	--	2
Red-naped Sapsucker	3.13	1.78	5.49	29	45
Downy Woodpecker	ID	--	--	--	6
Hairy Woodpecker	2.21	1.22	4.01	31	23
Northern Flicker	0.72	0.42	1.24	28	25
Western Wood-Pewee	3.18	2.20	4.58	19	55
Alder Flycatcher	ID	--	--	--	1
Least Flycatcher	ID	--	--	--	3
Dusky Flycatcher	55.78	47.90	64.95	8	322
Cordilleran Flycatcher	18.21	13.56	24.45	15	100

Common Name	D	LCL	UCL	CV(%)	N
Plumbeous Vireo	ID	--	--	--	17
Warbling Vireo	52.21	45.81	59.50	7	469
Red-eyed Vireo	13.81	9.80	19.47	18	76
Gray Jay	ID	--	--	--	7
Blue Jay	0.70	0.33	1.52	40	20
Clark's Nutcracker	ID	--	--	--	8
American Crow	0.16	0.10	0.26	25	29
Tree Swallow	ID	--	--	--	15
Violet-green Swallow	35.31	19.68	63.34	30	126
Northern Rough-winged Swallow	ID	--	--	--	2
Barn Swallow	ID	--	--	--	8
Black-capped Chickadee	10.68	8.17	13.96	14	119
Red-breasted Nuthatch	ID	--	--	--	122
White-breasted Nuthatch	1.14	0.73	1.79	23	18
Brown Creeper	ID	--	--	--	6
Rock Wren	ID	--	--	--	11
Canyon Wren	ID	--	--	--	10
House Wren	4.31	1.95	9.52	41	19
American Dipper	ID	--	--	--	3
Golden-crowned Kinglet	ID	--	--	--	4
Ruby-crowned Kinglet	15.03	11.16	20.24	15	160
Mountain Bluebird	ID	--	--	--	5
Townsend's Solitaire	1.96	1.30	2.95	21	35
Veery	2.87	1.96	4.22	20	67
Swainson's Thrush	4.39	2.87	6.71	22	63
American Robin	40.21	33.64	48.07	9	339
Gray Catbird	ID	--	--	--	12
Cedar Waxwing	8.13	3.98	16.61	37	27
Tennessee Warbler	ID	--	--	--	10
Yellow Warbler	5.92	3.25	10.77	31	22
Yellow-rumped Warbler	11.35	8.53	15.10	15	134
Black-and-white Warbler	ID	--	--	--	2
American Redstart	58.19	48.16	70.30	10	256
Ovenbird	24.26	19.80	29.72	10	270
MacGillivray's Warbler	32.78	26.01	41.30	12	129
Common Yellowthroat	50.35	37.80	67.06	15	152
Western Tanager	6.32	4.65	8.59	16	69
Spotted Towhee	10.48	7.17	15.33	19	60
Chipping Sparrow	12.05	9.34	15.55	13	133
Vesper Sparrow	ID	--	--	--	13
Grasshopper Sparrow	ID	--	--	--	4
Song Sparrow	42.47	32.56	55.39	14	171
Dark-eyed Junco	9.02	6.90	11.80	14	103
Black-headed Grosbeak	12.75	9.32	17.45	16	105
Lazuli Bunting	ID	--	--	--	5
Bobolink	ID	--	--	--	15

Common Name	D	LCL	UCL	CV(%)	N
Red-winged Blackbird	5.75	3.75	8.81	22	68
Brewer's Blackbird	ID	--	--	--	5
Common Grackle	ID	--	--	--	5
Brown-headed Cowbird	16.42	11.75	22.96	17	80
Bullock's Oriole	ID	--	--	--	3
Red Crossbill	20.21	13.12	31.11	22	165
Pine Siskin	30.89	22.30	42.77	17	130
American Goldfinch	ID	--	--	--	6

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 D; ID=Insufficient data

Ponderosa pine, northern hills (PN)

We surveyed 31 point-transects in ponderosa pine, northern hills (pine-north) habitat and conducted 391 counts along those transects. We detected a total of 66 species (avg. richness = 6.9 species/count) and obtained robust density estimates (CV <50%) for 30 species (Table 9). Red Crossbill occurred in highest density relative to that of other species in this habitat, although Yellow-rumped Warbler occurred in similar density. Estimated densities of Red-breasted Nuthatch and Yellow-rumped Warbler were higher in pine-north than in other habitats we surveyed.

Because pine-north habitat has a considerable deciduous component of aspen, oak, and other broad-leaved trees, many bird species associated with deciduous habitats are found here in fairly high density. This fact is reflected in the average species richness at each count station, which is higher in pine-north than in pine-south, and the high densities of bird species such as Dusky Flycatcher, Warbling Vireo, American Redstart and others that are typically associated with broad-leaved deciduous vegetation.

Table 9. Estimated densities of breeding bird species and numbers of individuals observed on point-transects in ponderosa pine (northern hills) in the Black Hills, 2002.

Common Name	D	LCL	UCL	CV(%)	N
Great Blue Heron	ID	--	--	--	1
Turkey Vulture	ID	--	--	--	3
Hooded Merganser	ID	--	--	--	1
Sharp-shinned Hawk	ID	--	--	--	1
Cooper's Hawk	ID	--	--	--	1
Red-tailed Hawk	ID	--	--	--	3
Ruffed Grouse	ID	--	--	--	16
Wild Turkey	ID	--	--	--	8
Rock Dove	ID	--	--	--	6
Mourning Dove	ID	--	--	--	9
Common Nighthawk	ID	--	--	--	1
White-throated Swift	ID	--	--	--	36
Broad-tailed Hummingbird	ID	--	--	--	1
Red-naped Sapsucker	7.14	4.89	10.40	19	46

Downy Woodpecker	ID	--	--	--	1
Hairy Woodpecker	3.28	2.19	4.92	21	38
Black-backed Woodpecker	ID	--	--	--	1
Northern Flicker	0.47	0.21	1.08	42	14
Western Wood-Pewee	6.12	4.58	8.19	15	91
Dusky Flycatcher	25.33	20.36	31.52	11	158
Cordilleran Flycatcher	4.51	2.56	7.94	29	21
Eastern Kingbird	ID	--	--	--	1
Plumbeous Vireo	1.08	0.61	1.91	30	11
Warbling Vireo	36.50	31.22	42.67	8	384
Red-eyed Vireo	2.92	1.29	6.61	42	18
Gray Jay	1.01	0.50	2.05	36	19
Blue Jay	ID	--	--	--	8
American Crow	0.12	0.06	0.23	34	17
Violet-green Swallow	ID	--	--	--	9
Black-capped Chickadee	11.25	8.70	14.54	13	123
Red-breasted Nuthatch	19.66	16.18	23.89	10	281
White-breasted Nuthatch	3.22	2.05	5.04	23	29
Brown Creeper	6.32	3.88	10.30	25	26
Rock Wren	ID	--	--	--	2
House Wren	ID	--	--	--	6
Golden-crowned Kinglet	ID	--	--	--	5
Ruby-crowned Kinglet	9.67	7.17	13.02	15	114
Mountain Bluebird	ID	--	--	--	6
Townsend's Solitaire	8.33	6.59	10.53	12	124
Veery	ID	--	--	--	9
Swainson's Thrush	2.35	1.54	3.57	22	50
American Robin	17.31	14.06	21.30	11	270
Cedar Waxwing	ID	--	--	--	1
Tennessee Warbler	ID	--	--	--	4
Yellow Warbler	ID	--	--	--	4
Yellow-rumped Warbler	40.37	35.71	45.64	6	413
Black-and-white Warbler	ID	--	--	--	1
American Redstart	4.45	2.57	7.68	28	31
Ovenbird	18.16	15.27	21.59	9	261
MacGillivray's Warbler	5.38	3.21	9.01	27	30
Common Yellowthroat	ID	--	--	--	8
Western Tanager	8.54	6.66	10.95	13	111
Spotted Towhee	ID	--	--	--	9
Chipping Sparrow	26.00	19.76	34.21	14	174
Vesper Sparrow	ID	--	--	--	1
Grasshopper Sparrow	ID	--	--	--	1
Song Sparrow	ID	--	--	--	5
Dark-eyed Junco	25.20	19.72	32.20	13	214
Black-headed Grosbeak	1.65	0.80	3.41	38	16
Red-winged Blackbird	ID	--	--	--	10
Brown-headed Cowbird	9.93	7.55	13.05	14	75
Cassin's Finch	ID	--	--	--	1

Red Crossbill	41.16	25.55	66.31	25	319
White-winged Crossbill	ID	--	--	--	1
Pine Siskin	23.41	17.03	32.20	16	91
American Goldfinch	ID	--	--	--	6

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 D; ID=Insufficient data

Ponderosa pine, southern hills (PS)

We surveyed 30 point-transects in ponderosa pine, southern hills (pine-south) and conducted 406 counts along those transects. We detected a total of 71 species (avg. richness = 5.9 species/count) and obtained robust density estimates (CV <50%) for 26 species (Table 10). Red Crossbill occurred in highest density relative to that of other species in this habitat. Pine-south supports fairly high densities of Plumbeous Vireo, Black-capped Chickadee, Yellow-rumped Warbler, Western Tanager, Chipping Sparrow, and Red Crossbill, although higher densities of these species exist in other habitats.

Table 10. Estimated densities of breeding bird species and numbers of individuals observed on point-transects in ponderosa pine forest (southern hills) in the Black Hills, 2002.

Common Name	**D**	**LCL**	**UCL**	**CV(%)**	**N**
Turkey Vulture	ID	--	--	--	6
Mallard	ID	--	--	--	7
Sharp-shinned Hawk	ID	--	--	--	1
Northern Goshawk	ID	--	--	--	3
Red-tailed Hawk	ID	--	--	--	1
Golden Eagle	ID	--	--	--	1
American Kestrel	ID	--	--	--	2
Merlin	ID	--	--	--	1
Wild Turkey	ID	--	--	--	9
Mourning Dove	1.35	0.83	2.17	25	37
Common Nighthawk	ID	--	--	--	4
White-throated Swift	ID	--	--	--	5
Broad-tailed Hummingbird	ID	--	--	--	1
Red-headed Woodpecker	ID	--	--	--	1
Red-naped Sapsucker	ID	--	--	--	7
Downy Woodpecker	ID	--	--	--	4
Hairy Woodpecker	2.65	1.67	4.20	24	30
Black-backed Woodpecker	ID	--	--	--	6
Northern Flicker	0.24	0.14	0.43	29	17
Western Wood-Pewee	1.37	0.81	2.32	27	23
Dusky Flycatcher	4.39	2.79	6.91	23	55
Cordilleran Flycatcher	ID	--	--	--	6
Plumbeous Vireo	7.68	6.07	9.72	12	102
Warbling Vireo	6.01	4.32	8.37	17	78

Common Name	D	LCL	UCL	CV(%)	N
Red-eyed Vireo	ID	--	--	--	4
Gray Jay	3.88	2.23	6.76	29	35
Blue Jay	ID	--	--	--	1
Clark's Nutcracker	ID	--	--	--	9
American Crow	0.33	0.19	0.58	29	33
Violet-green Swallow	ID	--	--	--	14
Cliff Swallow	ID	--	--	--	1
Black-capped Chickadee	16.05	12.44	20.71	13	185
Red-breasted Nuthatch	16.25	13.87	19.02	8	269
White-breasted Nuthatch	4.58	3.23	6.49	18	56
Brown Creeper	4.39	2.24	8.61	35	18
Rock Wren	ID	--	--	--	13
Canyon Wren	ID	--	--	--	2
House Wren	ID	--	--	--	2
Golden-crowned Kinglet	ID	--	--	--	3
Ruby-crowned Kinglet	ID	--	--	--	13
Eastern Bluebird	ID	--	--	--	5
Mountain Bluebird	0.91	0.42	1.99	40	16
Townsend's Solitaire	5.60	4.49	6.99	11	177
Swainson's Thrush	ID	--	--	--	1
American Robin	11.62	8.91	15.16	14	208
Tennessee Warbler	ID	--	--	--	3
Yellow Warbler	ID	--	--	--	2
Chestnut-sided Warbler	ID	--	--	--	1
Yellow-rumped Warbler	33.29	29.15	38.03	7	425
Ovenbird	8.92	7.14	11.14	11	197
MacGillivray's Warbler	ID	--	--	--	5
Common Yellowthroat	ID	--	--	--	3
Western Tanager	7.91	6.22	10.06	12	150
Spotted Towhee	1.50	0.81	2.77	32	19
Chipping Sparrow	32.47	24.38	43.25	15	236
Vesper Sparrow	0.71	0.41	1.25	29	18
Lark Sparrow	ID	--	--	--	14
Song Sparrow	ID	--	--	--	2
Dark-eyed Junco	16.18	13.15	19.89	11	195
Black-headed Grosbeak	ID	--	--	--	1
Red-winged Blackbird	ID	--	--	--	17
Western Meadowlark	ID	--	--	--	11
Common Grackle	ID	--	--	--	4
Brown-headed Cowbird	9.80	7.53	12.74	13	129
Bullock's Oriole	ID	--	--	--	2
Cassin's Finch	ID	--	--	--	1
House Finch	ID	--	--	--	1
Red Crossbill	90.87	72.78	113.47	11	1184

Common Name	D	LCL	UCL	CV(%)	N
Pine Siskin	8.24	4.79	14.19	28	35
American Goldfinch	ID	--	--	--	14

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 D; ID=Insufficient data

Pine-juniper shrubland (SH)

We surveyed 20 point-transects in pine-juniper shrubland and conducted 241 counts along those transects. We were limited in establishing additional sites in this habitat by a shortage of correctly identified potential sites from the GIS database, the limited availability of this habitat on the landscape, and lack of public access to some areas where this habitat exists. We detected 65 species and obtained robust density estimates (CV <50%) for 26 of these (Table 11). Average species richness was 8.8 species/count, the highest of any habitat surveyed in the Black Hills. Estimated density was highest for Chipping Sparrow relative to that of other species in this habitat. Estimated densities of Dusky Flycatcher, Plumbeous Vireo, Violet-green Swallow, White-breasted Nuthatch, Rock Wren, Virginia's Warbler, Western Tanager, Spotted Towhee, and Chipping Sparrow were higher in pine-juniper shrublands than in other habitats surveyed.

Pine-juniper shrubland is an important bird habitat in the Black Hills. It is the only habitat where Virginia's Warbler occurs, and it is the primary habitat for Spotted Towhee. In addition to the previously listed species, Pinyon Jay and Clark's Nutcracker are probably most abundant in this habitat as well, although too few were observed within this habitat alone to estimate density. It is also the only habitat where Blue-gray Gnatcatcher has been observed, a species that is probably a relative newcomer to the Black Hills. Because pine-juniper shrublands support so many species at their highest densities, and support some that are largely restricted to this habitat, it contributes a significant and unique component to the overall bird diversity in the Black Hills.

Table 11. Estimated densities of breeding bird species and numbers of individuals observed on point-transects in pine-juniper shrublands in the Black Hills, 2002.

Common Name	D	LCL	UCL	CV(%)	N
Turkey Vulture	ID	--	--	--	22
Canada Goose	ID	--	--	--	19
Red-tailed Hawk	ID	--	--	--	6
American Kestrel	ID	--	--	--	1
Prairie Falcon	ID	--	--	--	3
Wild Turkey	ID	--	--	--	13
Killdeer	ID	--	--	--	1
Rock Dove	ID	--	--	--	3
Mourning Dove	6.40	4.65	8.81	16	83
Common Nighthawk	ID	--	--	--	6
White-throated Swift	22.02	12.86	37.69	28	129
Broad-tailed Hummingbird	ID	--	--	--	1
Lewis's Woodpecker	ID	--	--	--	1

Common Name	D	LCL	UCL	CV(%)	N
Red-headed Woodpecker	ID	--	--	--	1
Hairy Woodpecker	ID	--	--	--	4
Black-backed Woodpecker	ID	--	--	--	2
Northern Flicker	0.19	0.09	0.42	40	9
Western Wood-Pewee	ID	--	--	--	7
Dusky Flycatcher	57.43	50.74	65.01	6	365
Cordilleran Flycatcher	ID	--	--	--	1
Western Kingbird	ID	--	--	--	2
Eastern Kingbird	ID	--	--	--	2
Plumbeous Vireo	9.72	7.40	12.78	14	83
Warbling Vireo	4.04	2.44	6.68	26	27
Gray Jay	ID	--	--	--	6
Pinyon Jay	ID	--	--	--	6
Clark's Nutcracker	ID	--	--	--	16
American Crow	0.33	0.16	0.68	38	14
Horned Lark	ID	--	--	--	1
Violet-green Swallow	48.84	31.10	76.68	23	147
Northern Rough-winged Swallow	ID	--	--	--	3
Black-capped Chickadee	15.36	11.52	20.49	15	83
Red-breasted Nuthatch	10.95	8.29	14.47	14	88
White-breasted Nuthatch	6.07	3.79	9.72	24	45
Rock Wren	2.29	1.44	3.63	24	31
Canyon Wren	ID	--	--	--	9
House Wren	ID	--	--	--	6
Blue-gray Gnatcatcher	ID	--	--	--	2
Mountain Bluebird	ID	--	--	--	15
Townsend's Solitaire	2.20	1.28	3.77	28	27
American Robin	4.70	3.00	7.37	23	39
Cedar Waxwing	ID	--	--	--	2
Virginia's Warbler	22.90	16.83	31.15	16	75
Yellow Warbler	ID	--	--	--	7
Yellow-rumped Warbler	31.96	25.46	40.12	12	160
Ovenbird	11.88	9.47	14.90	12	161
Yellow-breasted Chat	ID	--	--	--	2
Western Tanager	12.90	10.61	15.68	10	154
Spotted Towhee	56.57	49.23	65.00	7	364
Chipping Sparrow	72.78	61.55	86.07	9	245
Clay-colored Sparrow	ID	--	--	--	1
Field Sparrow	ID	--	--	--	1
Vesper Sparrow	1.88	1.15	3.07	25	34
Lark Sparrow	ID	--	--	--	16
Grasshopper Sparrow	ID	--	--	--	2
Song Sparrow	ID	--	--	--	1
Dark-eyed Junco	5.81	4.05	8.33	18	60
Black-headed Grosbeak	ID	--	--	--	1
Lazuli Bunting	ID	--	--	--	1

Common Name	D	LCL	UCL	CV(%)	N
Western Meadowlark	1.58	1.02	2.43	22	35
Brewer's Blackbird	ID	--	--	--	3
Brown-headed Cowbird	18.27	13.77	24.24	14	77
Red Crossbill	53.11	35.16	80.21	21	314
Pine Siskin	ID	--	--	--	18
American Goldfinch	9.37	5.55	15.82	27	34

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 D; ID=Insufficient data

White spruce (WS)

We surveyed 27 point-transects in white spruce forest and conducted 359 counts along those transects. We detected 61 species (avg. richness = 6.2 species/count) and obtained robust density estimates (CV <50%) for 24 of these (Table 12). Estimated density was highest for Red Crossbill relative to that of other species in this habitat. Estimated densities of Three-toed Woodpecker, Gray Jay, Brown Creeper, Golden-crowned Kinglet, Ruby-crowned Kinglet, Swainson's Thrush, and Red Crossbill were higher in white spruce habitat than in other habitats we surveyed. At least two species, Three-toed Woodpecker and Golden-crowned Kinglet, both Region 2 Sensitive Species, are largely restricted to this habitat in the Black Hills. Two rare species, Winter Wren and White-winged Crossbill, are also associated primarily with white spruce stands. With the exception of the Jasper Burn Area, densities of Hairy Woodpecker and Northern Flicker are slightly higher in white spruce stands than in other forest types. All three species of *Accipiter* hawks (Sharp-shinned, Cooper's, and North Goshawk) were recorded in white spruce. Thus, white spruce contributes substantially to overall bird diversity and supports several species at their highest densities in the Black Hills.

Table 12. Estimated densities of breeding bird species and numbers of individuals observed on point-transects in white spruce forests in the Black Hills, 2002.

Common Name	D	LCL	UCL	CV(%)	N
Great Blue Heron	ID	--	--	--	1
Turkey Vulture	ID	--	--	--	3
Mallard	ID	--	--	--	1
Sharp-shinned Hawk	ID	--	--	--	1
Cooper's Hawk	ID	--	--	--	1
Northern Goshawk	ID	--	--	--	1
Red-tailed Hawk	ID	--	--	--	8
Ruffed Grouse	ID	--	--	--	11
Wild Turkey	ID	--	--	--	5
Mourning Dove	ID	--	--	--	5
White-throated Swift	ID	--	--	--	13
Red-naped Sapsucker	2.14	1.17	3.91	31	16
Hairy Woodpecker	3.69	2.47	5.51	21	35
Three-toed Woodpecker	1.80	1.15	2.79	23	22
Northern Flicker	1.23	0.71	2.13	28	19

Common Name	D	LCL	UCL	CV(%)	N
Western Wood-Pewee	ID	--	--	--	8
Dusky Flycatcher	3.05	1.73	5.41	29	27
Cordilleran Flycatcher	10.13	7.82	13.13	13	77
Warbling Vireo	10.74	7.41	15.56	19	66
Gray Jay	9.42	5.92	14.99	24	49
Blue Jay	ID	--	--	--	3
Clark's Nutcracker	ID	--	--	--	5
American Crow	0.13	0.07	0.24	31	21
Violet-green Swallow	ID	--	--	--	19
Barn Swallow	ID	--	--	--	1
Black-capped Chickadee	10.30	7.95	13.35	13	83
Red-breasted Nuthatch	13.30	10.59	16.71	12	178
White-breasted Nuthatch	ID	--	--	--	8
Pygmy Nuthatch	ID	--	--	--	1
Brown Creeper	14.90	10.49	21.16	18	43
Rock Wren	ID	--	--	--	1
Canyon Wren	ID	--	--	--	1
Winter Wren	ID	--	--	--	1
Golden-crowned Kinglet	18.49	13.01	26.28	18	72
Ruby-crowned Kinglet	43.89	37.58	51.28	8	459
Mountain Bluebird	ID	--	--	--	2
Townsend's Solitaire	3.07	2.28	4.14	15	60
Veery	ID	--	--	--	1
Swainson's Thrush	19.41	15.61	24.14	11	218
American Robin	29.27	24.77	34.58	9	306
Cedar Waxwing	ID	--	--	--	2
Yellow-rumped Warbler	33.48	27.63	40.57	10	233
American Redstart	ID	--	--	--	1
Ovenbird	ID	--	--	--	4
MacGillivray's Warbler	ID	--	--	--	10
Common Yellowthroat	ID	--	--	--	9
Western Tanager	ID	--	--	--	2
Chipping Sparrow	19.51	15.64	24.34	11	136
Vesper Sparrow	ID	--	--	--	3
Song Sparrow	5.45	3.14	9.45	28	26
Dark-eyed Junco	22.78	18.26	28.41	11	162
Bobolink	ID	--	--	--	2
Red-winged Blackbird	ID	--	--	--	6
Western Meadowlark	ID	--	--	--	1
Brown-headed Cowbird	2.77	1.28	6.01	40	16
Cassin's Finch	ID	--	--	--	2
Red Crossbill	96.55	61.11	152.55	24	354
White-winged Crossbill	ID	--	--	--	5
Pine Siskin	28.02	21.68	36.21	13	147
American Goldfinch	ID	--	--	--	1

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 D; ID=Insufficient data

SPECIES ACCOUNTS

In this section I present brief accounts for each bird species in the Black Hills for which there were sufficient data for analysis or that are of management interest. In general, this includes all species for which there were at least 20 observations within a habitat type ($n \geq 20$) as recorded from count stations (excluding flyovers and outliers). In a few cases I have performed analyses with sample sizes that are just shy of this cut-off, mainly to provide comparisons with densities in habitats where species occur regularly, but in low abundance. For each species I provide: habitat-specific density estimates (*D*), expressed in #birds/km^2; 95% confidence intervals around *D*; the coefficient of variation (CV) on *D* (expressed as a percent); and the number of observations (*n*) used to estimate *D*. In cases where there were insufficient data to estimate density, *n* reflects the total number of *all* observations of the species in that habitat (including flyovers and outliers). Where possible, I provide graphical comparisons of the relative density of each species among the habitats in which it occurred.

I also provide geographic distribution maps depicting the locations of observations for each species and the relative abundance in which each was observed. The relative abundance scale used in the maps is based on the average number of birds observed per point-count *along each transect*. Therefore, the location of the dots do not necessarily indicate the precise location at which the species was observed, but rather the mid-point of the transect on which the species was observed. The abundance scale used on the various maps is constant among species, allowing for easy comparisons.

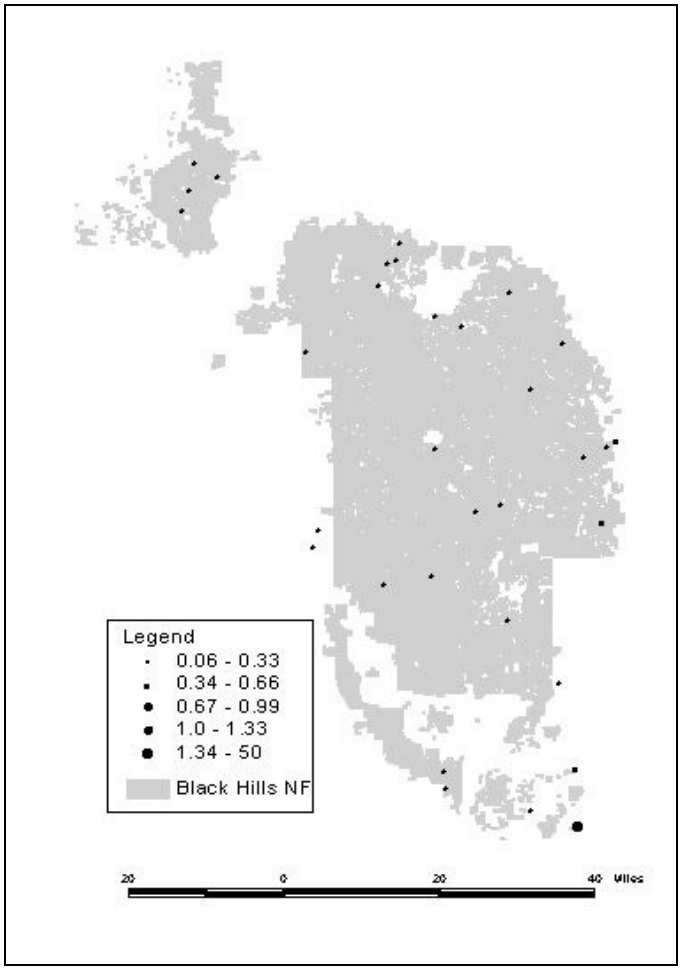
Several species that occur in the Black Hills have been given special management designations by the U.S. Forest Service, Black Hills National Forest, the U.S. Fish and Wildlife Service (USFWS), or Partners In Flight (PIF), an international coalition of scientists, managers, industry professionals, and non-profit organizations that collaborate on bird conservation in the Americas. These designations include the "Region 2 Sensitive Species", "BHNF Management Indicator Species (MIS)", "Bird of Conservation Concern 2002" (U.S. Fish and Wildlife Service 2002), "PIF Continental Watch List" (Rich et al. 2003), and the "PIF Regional" or "Overall Conservation Priority" (Partners In Flight Species Assessment Database 2001) for the Prairies and Badlands Bird Conservation Region (BCR17), in which the Black Hills occur. Where appropriate, I include these designations after the name of the bird species in each account.

Although 132 species were observed on point-transects in the Black Hills in 2002, many were observed so infrequently that meaningful interpretations of their abundance and distribution are not possible at this time. However, for certain rare or uncommon species that are of management interest (e.g., most raptors, woodpeckers), I provide the raw count data for each habitat and map locations of where they were observed, because I believe any information on low-density, localized, or rare species is valuable. However, caution should be used in interpreting this information as it is based on a small number of observations.

In a few cases, I provide comparisons with earlier accounts by Pettingill and Whitney (1965), Grinnell (1875), and other authors. These comparisons provide a historical perspective in which to interpret the current findings.

Mallard

Mallard occurs widely throughout the Black Hills on ponds, lakes and creeks. Of the habitats we surveyed, average density of Mallards was greatest in FR. Although randomized terrestrial transect surveys are probably not the best method for monitoring this species in the Black Hills, our results suggest it should be effectively monitored under *MBBH* by point-transects in FR.



Abundance (avg. # birds/point-count) and breeding distribution of Mallard in the Black Hills, 2002.

Habitat-specific density estimates for Mallard in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV (%)	N
AS	ID	--	--	--	5
BU	ID	--	--	--	3
FR	8.16	4.11	16.19	36	35
LS	ID	--	--	--	2
MG	ID	--	--	--	3
MR	ID	--	--	--	12
PS	ID	--	--	--	7
WS	ID	--	--	--	1

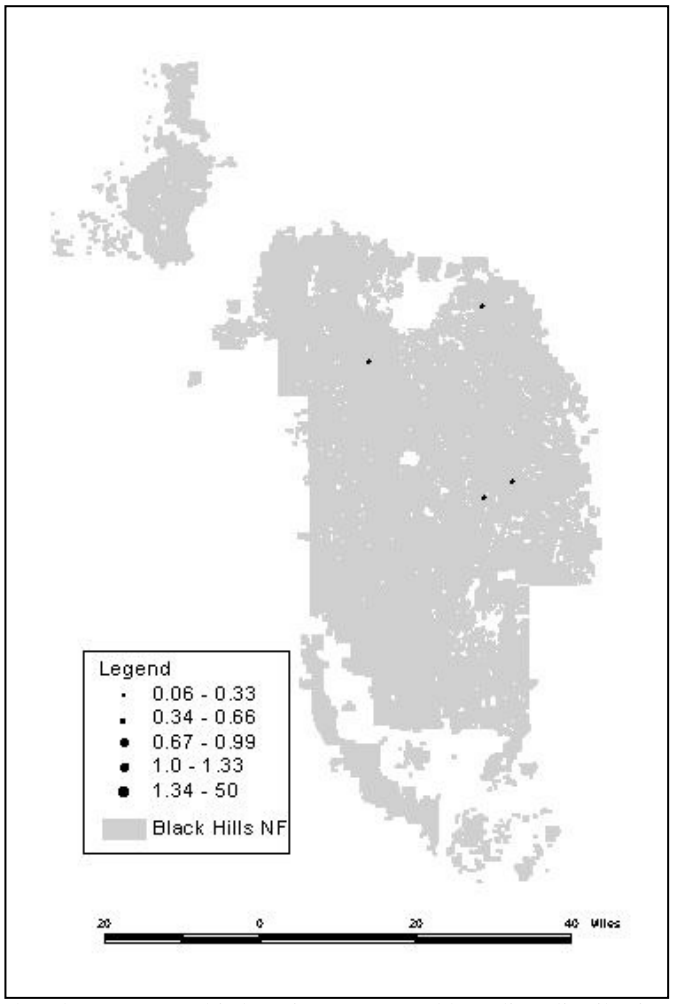
D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Sharp-shinned Hawk

It is difficult to assess the present distribution, abundance and use of habitats by Sharp-shinned Hawk in the Black Hills, as only four individuals were observed on point-transects in 2002. Grinnell described this species as "abundant" throughout the region, although he did not provide accounts of specific observations in the Black Hills. Pettingill and Whitney (1965) described Sharp-shinned Hawk as "probably fairly common," although they cite relatively few observations to support this statement. Cary (1901) reported that Sharp-shinned Hawk was "said to be common" and described a nest of this species in the southwestern Black Hills.

Although *Accipiter* hawks have low detectability, it appears that Sharp-shinned Hawk presently occurs in very low density in the Black Hills, and it is probably less abundant now than in earlier times, given the intensity of survey effort and low number of observations. Additional focused efforts, possibly involving call-response surveys, could help better determine the status of this species in the Black Hills.



Abundance (avg. # birds/point-count) and breeding distribution of Sharp-shinned Hawk in the Black Hills, 2002.

Habitat-specific density estimates for Sharp-shinned Hawk in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	ID	--	--	--	1
PN	ID	--	--	--	1
PS	ID	--	--	--	1
WS	ID	--	--	--	1

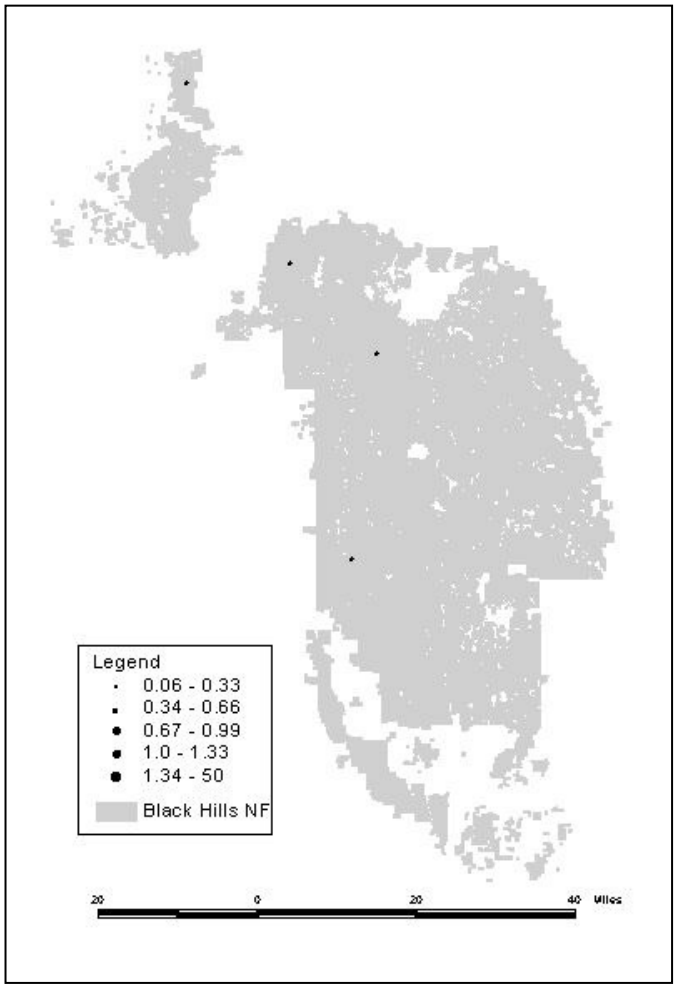
D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Cooper's Hawk

Although Cooper's Hawk appears to occur widely in the Black Hills, only four individuals were observed on point-transects, making it difficult to assess its distribution and habitat use. Pettingill and Whitney (1965) described this species as "probably uncommon to rare" in the Black Hills. This situation probably remains true today.

Point-transects may provide a means to track the status of Cooper's Hawk, although additional effort, probably involving call-response surveys, would be needed to better determine its status and effectively monitor its population in the Black Hills.



Abundance (avg. # birds/point-count) and breeding distribution of Cooper's Hawk in the Black Hills, 2002.

Habitat-specific density estimates for Cooper's Hawk in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
BU	ID	--	--	--	1
LS	ID	--	--	--	1
PN	ID	--	--	--	1
WS	ID	--	--	--	1

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

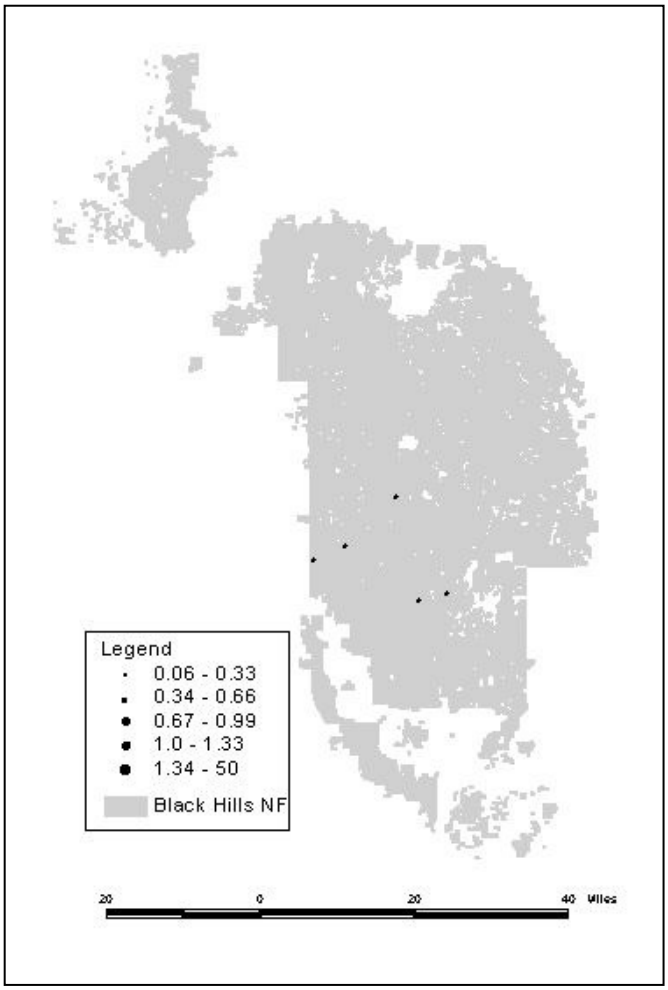
Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Northern Goshawk

(Region 2 Sensitive Species)
(BHNF Management Indicator Species)

Northern Goshawk probably occurs widely in the Black Hills, although it is rare to uncommon throughout. Only five individuals were observed in 2002, too few to accurately determine its status and distribution or estimate density in any habitat.

Interestingly, Northern Goshawk has been observed in greater numbers than other *Accipiter* hawks during the two years of this program. Thus, it may be the most abundant *Accipiter* breeding in the Black Hills. With point-transect data from a few more years, a more accurate picture of habitat use and population size may emerge. However, while point-transects may provide a means to track the status of this species, effective monitoring will likely require more intensive efforts, probably involving call-response surveys.



Abundance (avg. # birds/point-count) and breeding distribution of Northern Goshawk in the Black Hills, 2002.

Habitat-specific density estimates for Northern Goshawk in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
BU	ID	--	--	--	1
PS	ID	--	--	--	3
WS	ID	--	--	--	1

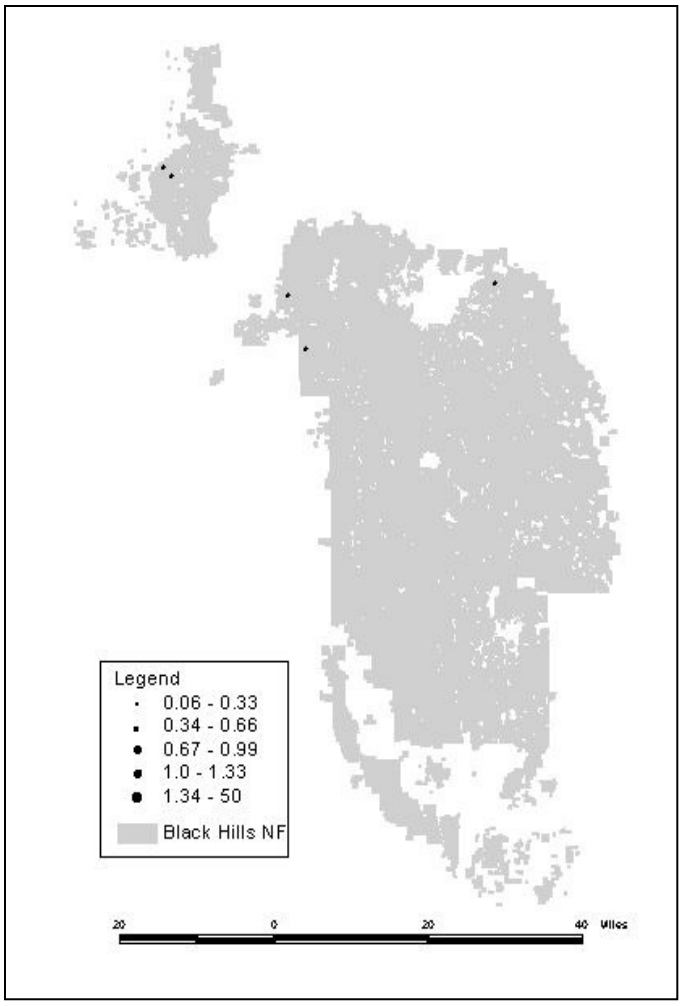
D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Broad-winged Hawk

Broad-winged Hawk occurs in low abundance in the northern and eastern Black Hills, and rarely in other parts. As with most raptors, Broad-winged Hawk was observed in too low numbers to estimate density in any habitat. However, as four of the six individuals observed were recorded in late-successional pine stands, these older stands could be important areas for nesting.

Point-transects may provide a means to track this species, but more intensive effort involving call-response surveys would likely be need to effectively monitor this species in the Black Hills.



Abundance (avg. # birds/point-count) and breeding distribution of Broad-winged Hawk in the Black Hills, 2002.

Habitat-specific density estimates for Broad-winged Hawk in the Black Hills, 2002.

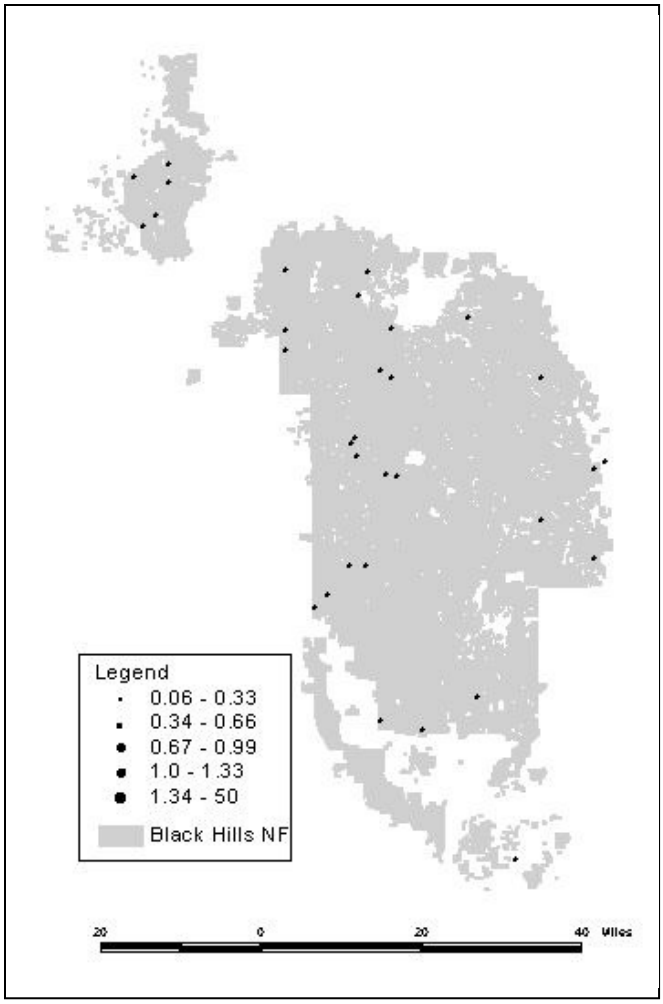
Habitat	D	LCL	UCL	CV(%)	N
AS	ID	--	--	--	1
LS	ID	--	--	--	4
MR	ID	--	--	--	1

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Red-tailed Hawk

Red-tailed Hawk occurs in low abundance throughout the Black Hills, and although uncommon, it is probably the most widespread and abundant raptor in the region. As with most other raptors, Red-tailed Hawk was not observed often enough in any single habitat to estimate density. However, it should be possible under the current program to effectively monitor this species through point-transects *across all habitats combined* in the Black Hills.



Abundance (avg. # birds/point-count) and breeding distribution of Red-tailed Hawk in the Black Hills, 2002.

Habitat-specific density estimates for Red-tailed Hawk in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	ID	--	--	--	3
BU	ID	--	--	--	1
FR	ID	--	--	--	5
LS	ID	--	--	--	5
MG	ID	--	--	--	1
MR	ID	--	--	--	9
PN	ID	--	--	--	3
PS	ID	--	--	--	1
SH	ID	--	--	--	6
WS	ID	--	--	--	8

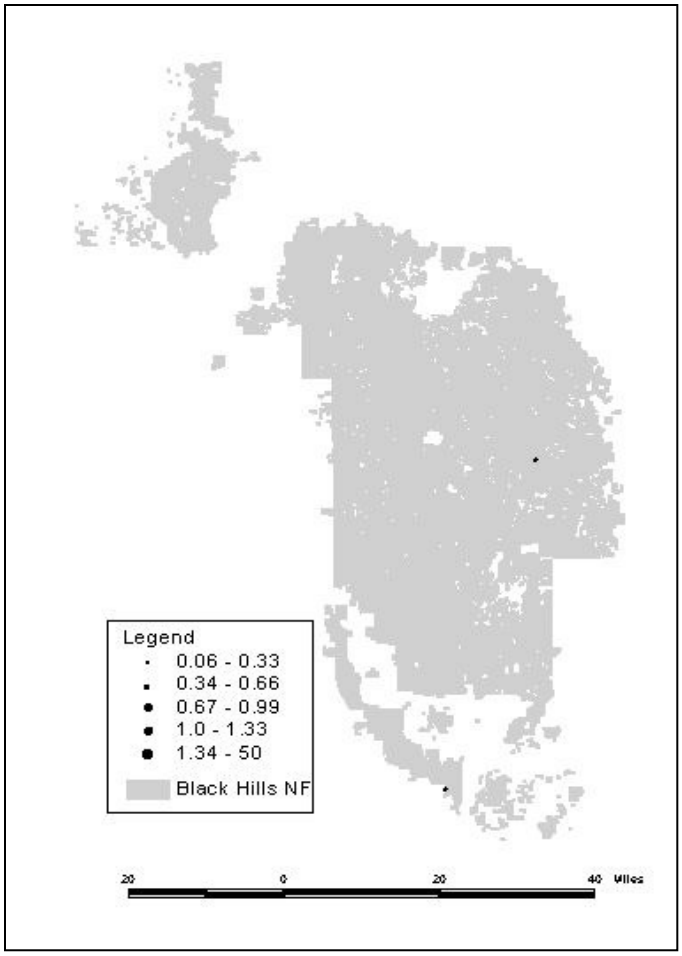
D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Golden Eagle

(USFWS Bird of Conservation Concern 2002)

Golden Eagle occurs locally in the Black Hills, especially in areas with remote, high cliffs suitable for nesting. Although we recorded this species at only two sites, a few additional individuals were observed in other locations outside of standardized surveys. This species will not be effectively monitored through point-transects. Instead, focused effort should be made to locate all nests in the Black Hills, and monitor them in the spring to determine its status and outcome. This effort will likely prove to be the most effective means of monitoring this species.



Abundance (avg. # birds/point-count) and breeding distribution of Golden Eagle in the Black Hills, 2002.

Habitat-specific density estimates for Golden Eagle in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
FR	ID	--	--	--	1
PS	ID	--	--	--	1

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

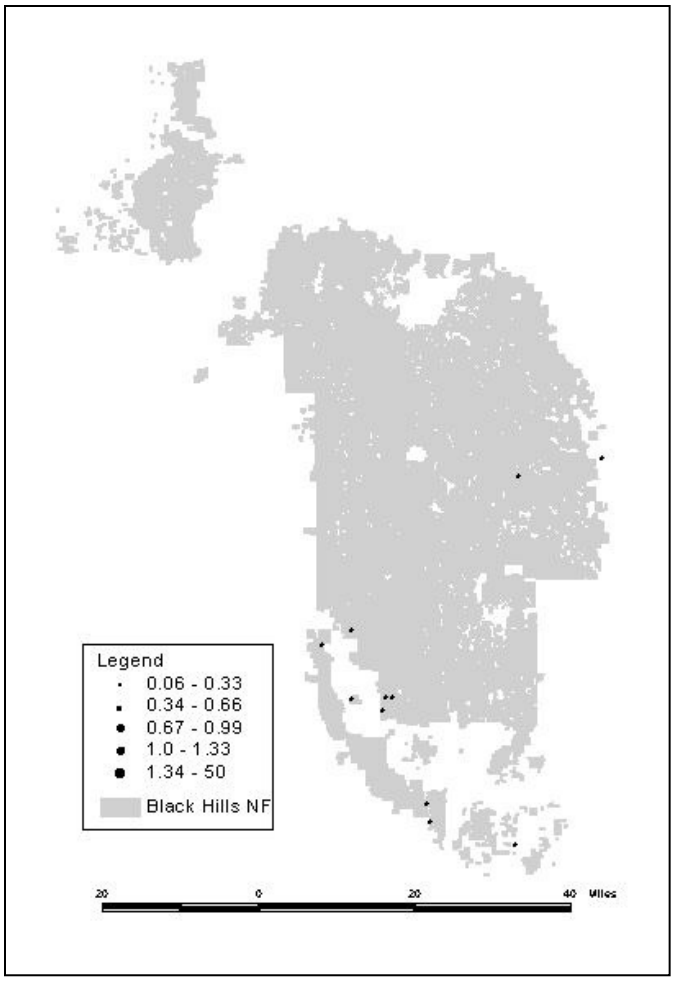
Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

American Kestrel

In the Black Hills, American Kestrel is limited to open-country areas, especially in the south. They are probably more abundant in the surrounding prairie, again especially in the south, as they were frequently observed while driving along roads in this region. We did not detect American Kestrels in sufficient numbers to estimate density in any habitat. However, density is undoubtedly low.

Our findings are inconsistent with accounts by earlier observers who described American Kestrel species as a common or abundant breeder in the region (Grinnell 1878, Cary 1901, Pettingill and Whitney 1965). This species has probably declined in the Black Hills, perhaps due to the encroachment of forests into open areas and a shortage of large snags for nesting.

Point-transects may provide a means to track the status of this species, but will likely prove insufficient for monitoring. Additional effort would be needed to better assess the status of this species.



Abundance (avg. # birds/point-count) and breeding distribution of American Kestrel in the Black Hills, 2002.

Habitat-specific density estimates for American Kestrel in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
BU	ID	--	--	--	1
FR	ID	--	--	--	5
MG	ID	--	--	--	5
PS	ID	--	--	--	2
SH	ID	--	--	--	1

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Merlin

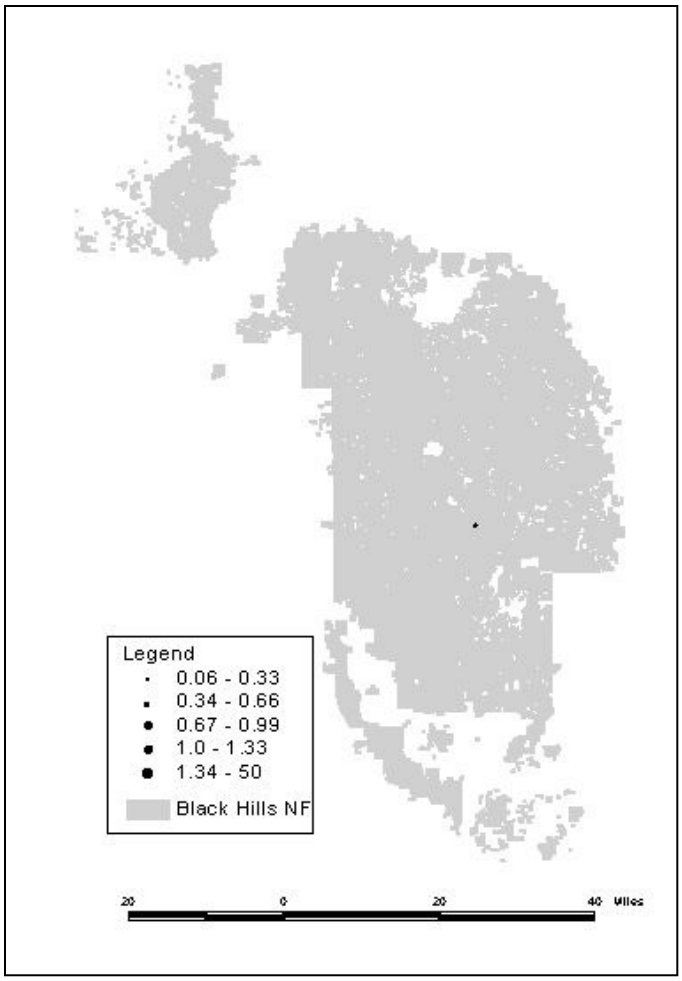
(Region 2 Sensitive Species)

A single Merlin was recorded on point-transects in the Black Hills in 2002. This species is reported to nest here, but this is the first individual observed by members of the field crew since the start of the program in 2001. The Black Hills constitute the southeastern edge of the Merlin's breeding range in the western U.S., and the species appears to be very rare and local here. Effective monitoring of this species in the Black Hills can likely only be accomplished through locating and monitoring nests.

Habitat-specific density estimates for Merlin in the Black Hills, 2002

Habitat	D	LCL	UCL	CV(%)	N
PS	ID	--	--	--	1

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data



Abundance (avg. # birds/point-count) and breeding distribution of Merlin in the Black Hills, 2002.

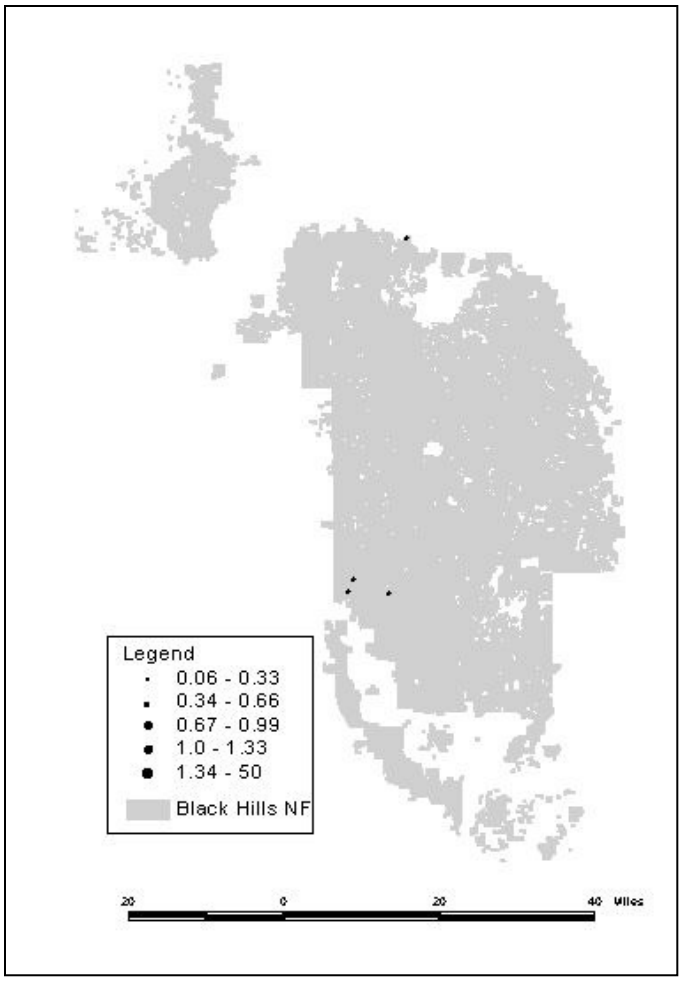
Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Prairie Falcon

(USFWS Bird of Conservation Concern 2002)
(PIF High Overall Priority)

Prairie Falcon occurs locally in the Black Hills, mainly around the perimeter, where high cliffs provide suitable nesting sites adjacent to open grasslands for hunting. We observed six individuals in 2002, most in the southwest. Two active nests were found in 2002, one in Spearfish Canyon and one in Redbird Canyon. An active nest found in Hell Canyon in 2001 was not active this year.

Point-transects may provide a means to track the status of this species in the Black Hills, but will likely be insufficient for monitoring. Effectively monitoring will likely best be accomplished through locating and monitoring nests.



Abundance (avg. # birds/point-count) and breeding distribution of Prairie Falcon in the Black Hills, 2002.

Habitat-specific density estimates for Prairie Falcon in the Black Hills, 2002.

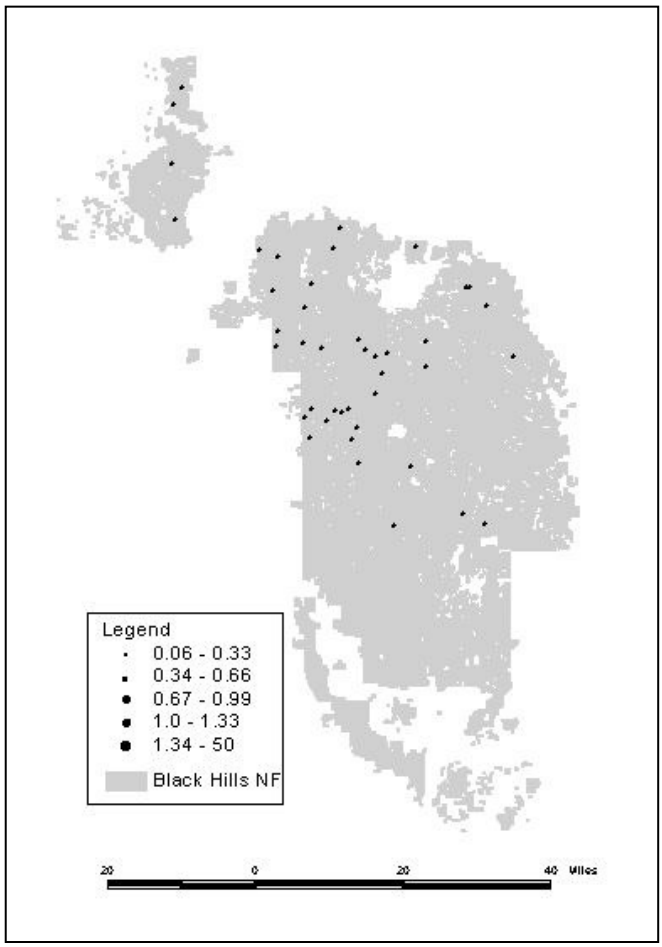
Habitat	D	LCL	UCL	CV(%)	N
FR	ID	--	--	--	1
MR	ID	--	--	--	2
SH	ID	--	--	--	3

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Ruffed Grouse

Ruffed Grouse occurs widely in the northern Black Hills, although in low abundance. The species was not observed in sufficient numbers to estimate density in any one habitat type, although more individuals were observed in Aspen than in other types. However, caution should be used in interpreting raw numbers. With slightly more effort in some habitats, especially Aspen, it may be possible to estimate density with more reasonable precision.

This species should be effectively monitored under *MBBH* through point-transects *across several habitats* in the Black Hills, although additional efforts may be needed.



Abundance (avg. # birds/point-count) and breeding distribution of Ruffed Grouse in the Black Hills, 2002.

Habitat-specific density estimates for Ruffed Grouse in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	ID	--	--	--	17
BU	ID	--	--	--	1
LS	ID	--	--	--	9
MR	ID	--	--	--	8
PN	ID	--	--	--	16
WS	ID	--	--	--	11

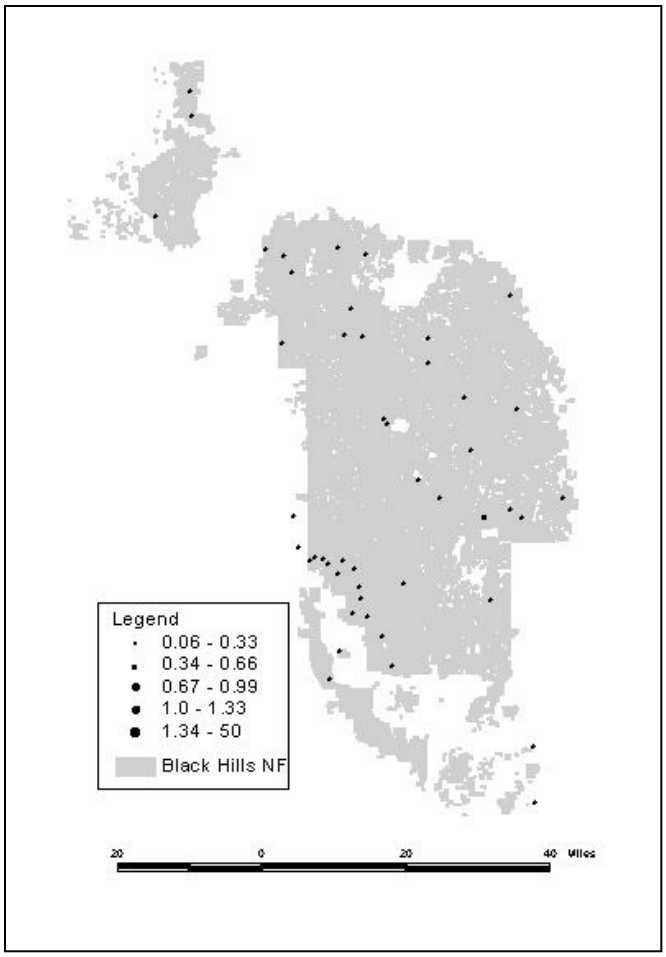
D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Wild Turkey

(BHNF Management Indicator Species)

Wild Turkey occurs in much of the Black Hills, but because males largely stop vocalizing by the end of May, the species often goes undetected on our surveys. Although the population may appear to have a slight concentration in the southwest, this is likely due to the earlier seasonal timing of survey effort in the Pine-Juniper Shrubland habitat. Additional effort earlier in the spring would likely yield better information on this species. However, Wild Turkeys should be effectively monitored under *MBBH* through point-transects *across all habitat types*.



Abundance (avg. # birds/point-count) and breeding distribution of Wild Turkey in the Black Hills, 2002.

Habitat-specific density estimates for Wild Turkey in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	ID	--	--	--	9
BU	ID	--	--	--	4
FR	ID	--	--	--	4
LS	ID	--	--	--	6
MG	ID	--	--	--	7
MR	ID	--	--	--	2
PN	ID	--	--	--	8
PS	ID	--	--	--	9
SH	ID	--	--	--	13
WS	ID	--	--	--	5

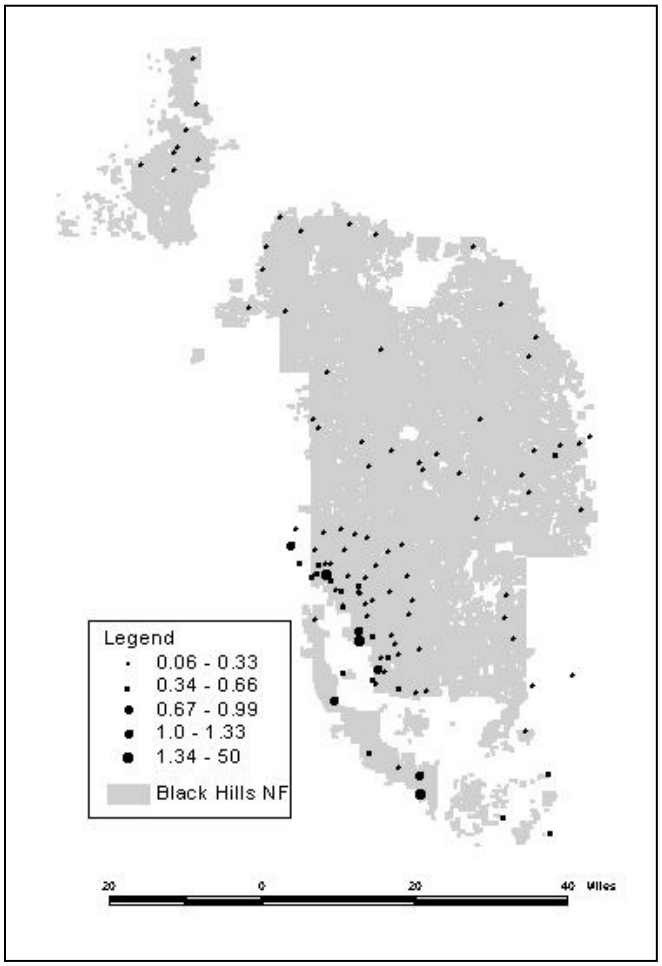
D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Mourning Dove

Mourning Dove occurs widely in the Black Hills, mainly at low elevations, in low to moderate density. It is perhaps most numerous in the southwest. Mourning Dove density is greatest in FR and SH, reflecting its preference for lower elevation habitats.

This species should be effectively monitored under *MBBH* through point-transects in a range of habitats, especially FR and SH.

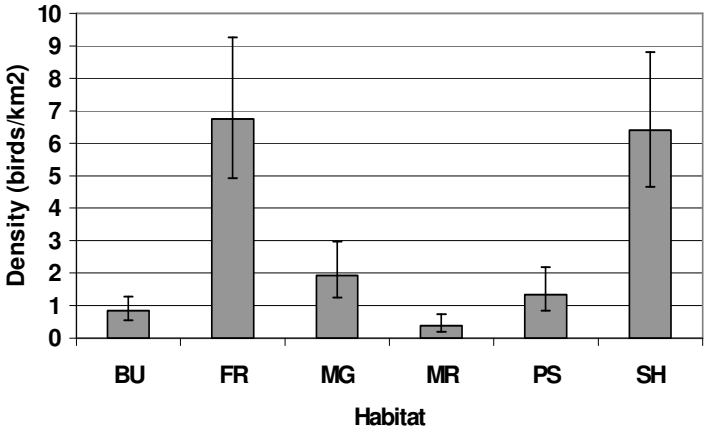


Abundance (avg. # birds/point-count) and breeding distribution of Mourning Dove in the Black Hills, 2002.

Habitat-specific density estimates for Mourning Dove in the Black Hills, 2002

Habitat	D	LCL	UCL	CV(%)	N
BU	0.84	0.55	1.28	22	36
FR	6.75	4.91	9.26	16	72
MG	1.93	1.26	2.98	22	53
MR	0.38	0.19	0.73	34	20
PS	1.35	0.83	2.17	25	37
SH	6.40	4.65	8.81	16	83

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data



Relative abundance of Mourning Dove among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Yellow-billed Cuckoo

(Region 2 Sensitive Species)
(USFWS Bird of Conservation Concern 2002)

At least three Yellow-billed Cuckoos were observed in bur oak woodland along Beaver Creek, near the confluence with Fawn Creek, on BHNF lands in the Bearlodge Mountains. These birds were not observed during a point transect, but were observed by Nicholas Block (a technician on the *MBBH* field crew) while returning to his car after a survey. These are the first reports of Yellow-billed Cuckoo by any member of the *MBBH* field crew since the start of the program in 2001. Mr. Block described the habitat where the cuckoos were found as mature bur oak woodland along the creek with unusually large diameter trees, spaced relatively far apart, and with a well-defined understory. It is uncertain whether the birds observed belong to the western subspecies *Coccycus americanus occidentalis* (which has been extirpated from much of the western U.S. and is now being petitioned for ESA listing), or whether they are part of the more widespread eastern population (which is also declining). In any case, this species is undoubtedly rare in the Black Hills, but apparently does occur in this part of the Bearlodge Mountains, and possibly elsewhere.

Flammulated Owl

(Region 2 Sensitive Species)
(USFWS Bird of Conservation Concern 2002)
(PIF Continental Watch List 2003)

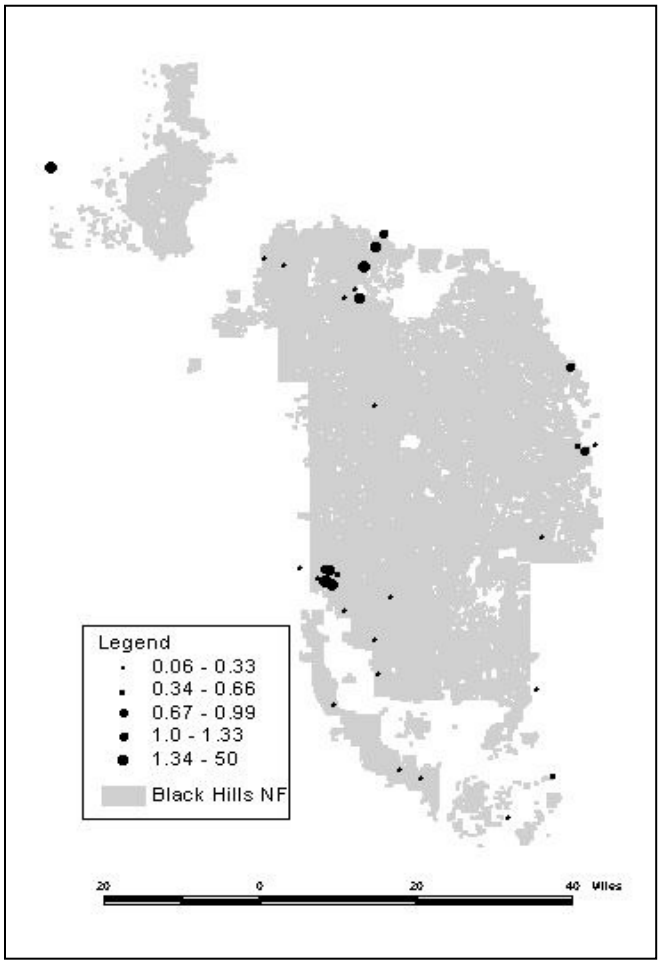
At least two, and possibly three, Flammulated Owls were observed by members of the *MBBH* field crew in the northern Black Hills in 2002. The species was first observed by Bill Given, of Denver, Colorado, in late May while scouting out areas for a potential field survey of owls in the Black Hills. After his initial sighting, members of the *MBBH* field crew searched for the owls in the area where they were first reported, but to no avail. However, they later found them in an area about ½ mile away from the original sighting along FR209, south of Hanna. These birds were heard calling from an area of ponderosa pine and white spruce, and were heard by multiple observers over a period of more than 3 weeks.

These sightings are the first confirmed reports of this migratory species in the Black Hills, and represent a significant range extension of several hundred miles from the nearest known breeding population. These observations also represent the first accepted state record for South Dakota. A previous report of this species was made by Joel Tigner, a bat expert who caught a small dark-eyed owl in a mist-net in the southern Black Hills in the early 1990's that he thought was a Flammulated Owl, but was not sure. If his report was in fact correct, it is likely that this species occurs across a wide area in the Black Hills, as the two reports are from opposite ends of the National Forest. A Black Hills-wide nocturnal survey effort could reveal the true extent of this species' distribution in the Black Hills.

White-throated Swift

(PIF Continental Watch List 2003)
(PIF High Regional Priority)

White-throated Swift is locally common in the Black Hills, particularly at lower elevations around the perimeter of the national forest, where high cliffs provide suitable nesting sites. We found White-throated Swifts in greatest density in FR and SH, where such cliffs are available nearby. This species should be effectively monitored under MBBH by point-transects in FR and SH.

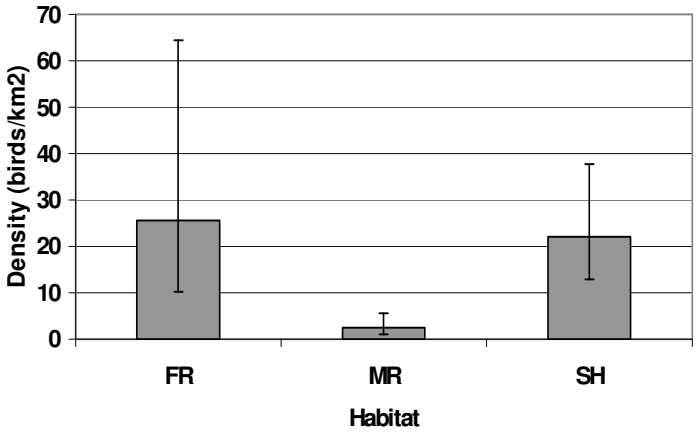


Abundance (avg. # birds/point-count) and breeding distribution of White-throated Swift in the Black Hills, 2002.

Habitat-specific density estimates for White-throated Swift in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV (%)	N
FR	25.62	10.18	64.45	49	48
MR	2.44	1.07	5.56	44	54
SH	22.02	12.86	37.69	28	129

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data



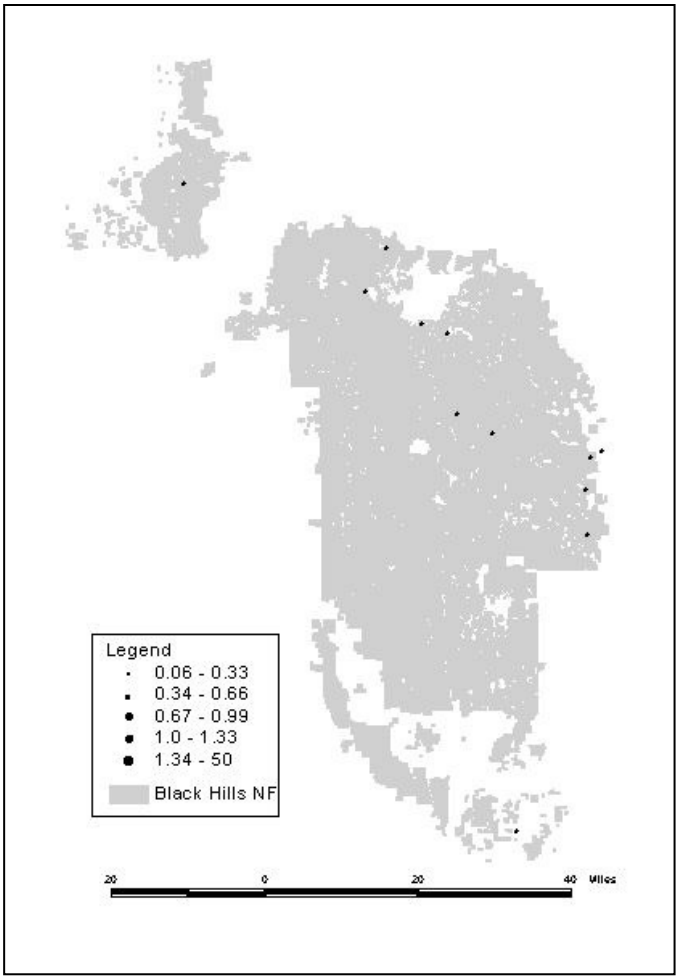
Relative abundance of White-throated Swift among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Belted Kingfisher

Belted Kingfisher occurs locally along streams in the Black Hills, primarily in the north and east, although it is generally rare to uncommon. We recorded Belted Kingfisher exclusively along streams, although not enough individuals were observed to estimate density with reasonable precision in either FR or MR.

Belted Kingfishers are good indicators of overall stream health, as they depend primarily on small fish hatched in the stream. The species was formerly reported as a "common permanent resident" in the Black Hills (Pettingill and Whitney 1965).
Point-transects may provide a means to track the status of this species in the Black Hills, but additional effort would probably be needed for effective monitoring.



Abundance (avg. # birds/point-count) and breeding distribution of Belted Kingfisher in the Black Hills, 2002.

Habitat-specific density estimates for Belted Kingfisher in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
FR	ID	--	--	--	8
MR	ID	--	--	--	9

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Lewis's Woodpecker

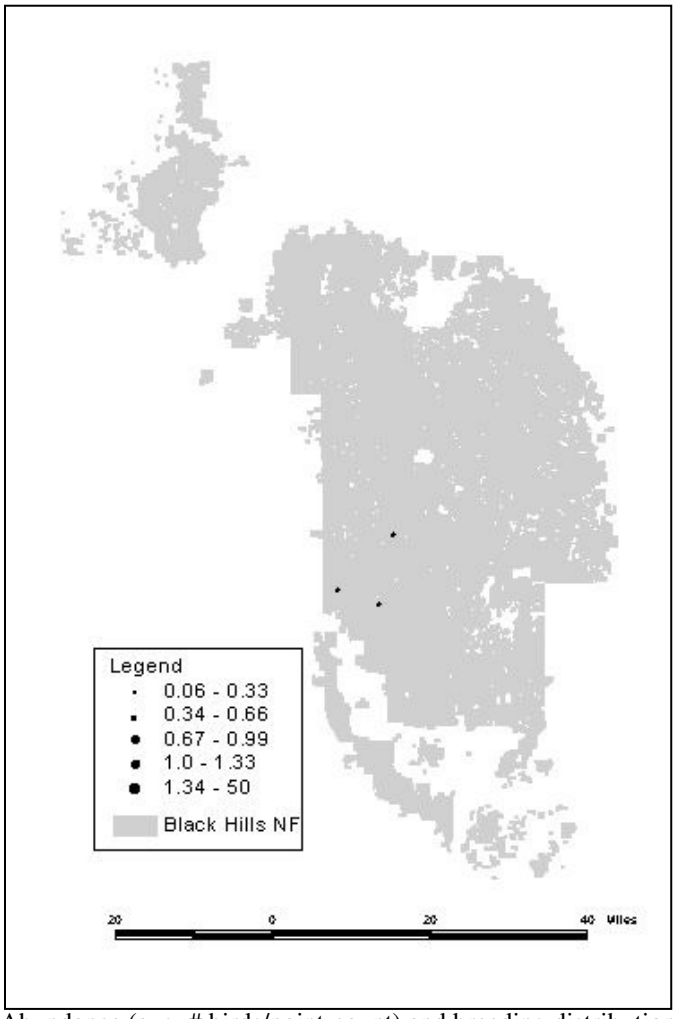
(Region 2 Sensitive Species)
(PIF Continental Watch List 2003)
(PIF High Overall Priority)
(USFWS Bird of Conservation Concern 2002)

The Black Hills represent the most northeasterly extent of the range of Lewis's Woodpecker. In 2002, we observed four Lewis's Woodpecker at three locations. Thus, Lewis's Woodpecker is quite rare in the Black Hills.

By some accounts, Lewis's Woodpecker was never common in the Black Hills (Grinnell 1875, Pettingill and Whitney 1965). However, Cary (1901), who studied the avifauna of the southwestern Black Hills, stated that it was "common in the Hills" and was "partial to burnt timber on the sides of canyons". Pettingill and Whitney (1965) also stated that it prefers "burned-over areas" and "edges of pine forests and streamside cottonwoods with considerable dead growth". It appears that the species may be dependent on burned areas in the Black Hills in association with burns.

It is possible that the Jasper Burn and other recent fires may provide suitable habitat for Lewis's Woodpecker in the future. However, because they primarily use older burns, these areas may not be suitable for some time.

Because so few Lewis's Woodpeckers were observed, it seems point-transects will be inadequate to monitor this species at present. However, point-transects in burn areas could eventually prove useful to monitoring this species in the Black Hills in the future.



Abundance (avg. # birds/point-count) and breeding distribution of Lewis's Woodpecker in the Black Hills, 2002.

Habitat-specific density estimates for Lewis's Woodpecker in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
BU	ID	--	--	--	1
MR	ID	--	--	--	2
SH	ID	--	--	--	1

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

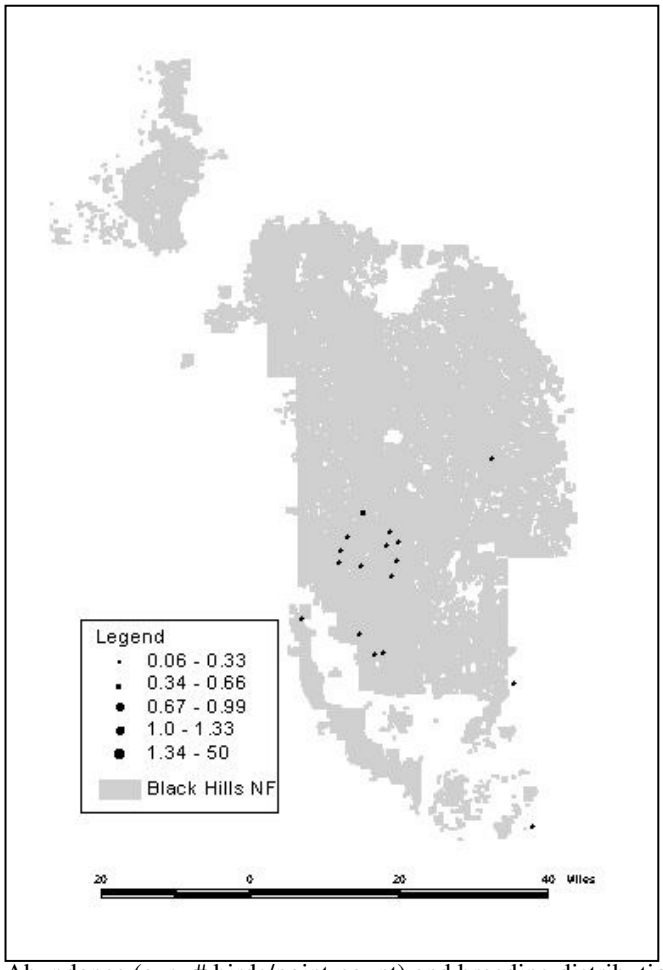
Red-headed Woodpecker

(PIF Continental Watch List 2003)
(PIF High Regional Priority)
(USFWS Bird of Conservation Concern 2002)

Red-headed Woodpecker occurs locally in the Black Hills, where it is generally uncommon. At present, it occurs primarily in the Jasper Burn Area; nearly all individuals observed in 2002 were recorded from this area. Outside of the Jasper Burn Area, Red-headed Woodpecker was recorded primarily from burns adjacent to sites in other habitats surveyed. Thus, the distribution on Red-headed Woodpecker in the Black Hills is largely tied to the availability of burned pine forests.

Red-headed Woodpecker was formerly more common in the Black Hills. Grinnell (1875) described it as "especially abundant" in the Black Hills and Cary (1901) reported it to be "the most abundant woodpecker in the Hills". This species has undoubtedly declined in the Black Hills.

Red-headed Woodpecker should be effectively monitored under MBBH through point-transects in BU. Additional point-transects in new burns would further increase our knowledge of the distribution and size of this species' population in the Black Hills.



Abundance (avg. # birds/point-count) and breeding distribution of Red-headed Woodpecker in the Black Hills, 2002.

Habitat-specific density estimates for Red-headed Woodpecker in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV (%)	N
BU	0.38	0.22	0.67	29	24
FR	ID	--	--	--	2
LS	ID	--	--	--	3
MG	ID	--	--	--	2
PS	ID	--	--	--	1
SH	ID	--	--	--	1

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

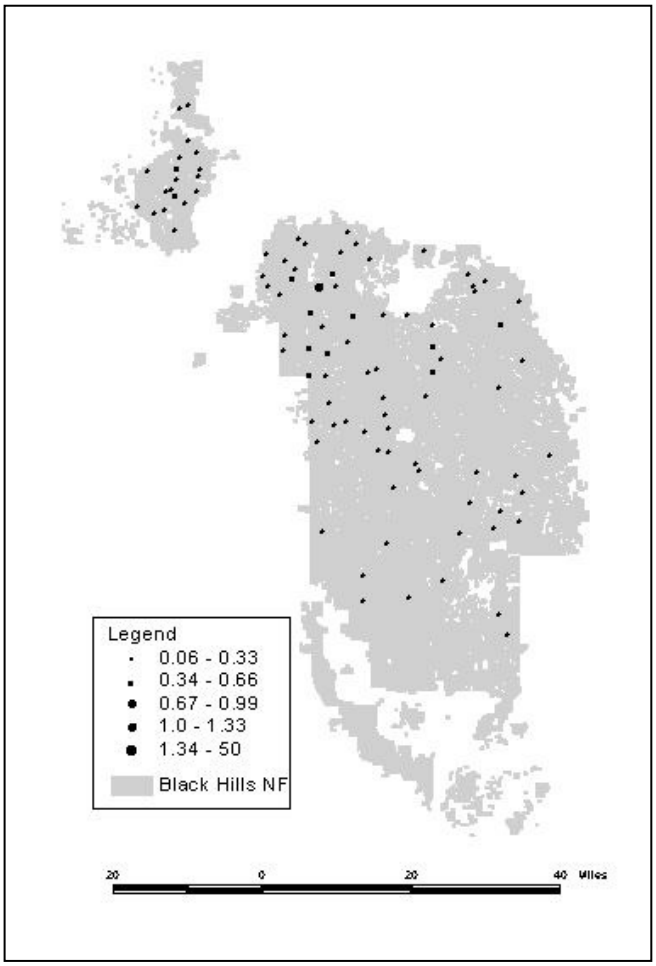
Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Red-naped Sapsucker

(USFWS Bird of Conservation Concern 2002)
(PIF High Overall Priority)

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

Red-naped Sapsucker occurs in highest density in AS, although density is only slightly lower in PN, likely due to the widespread nature of aspen and birch in this habitat. This species should be effectively monitored under MBBH by point-transects in a range of habitats, especially AS.

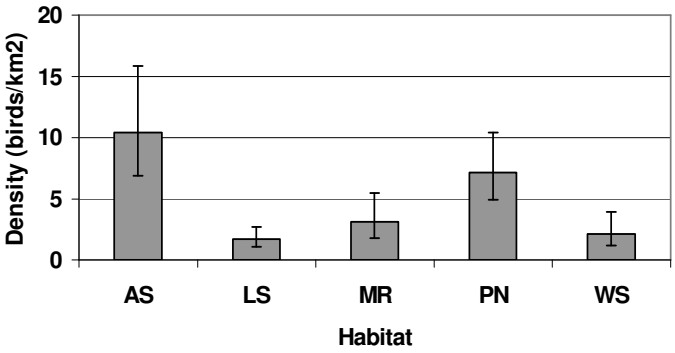


Abundance (avg. # birds/point-count) and breeding distribution of Red-naped Sapsucker in the Black Hills, 2002.

Habitat-specific density estimates for Red-naped Sapsucker in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	10.43	6.86	15.86	21	52
BU	ID	--	--	--	3
FR	ID	--	--	--	1
LS	1.70	1.08	2.68	23	24
MR	3.13	1.78	5.49	29	45
PN	7.14	4.89	10.40	19	46
PS	ID	--	--	--	7
WS	2.14	1.17	3.91	31	16

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data



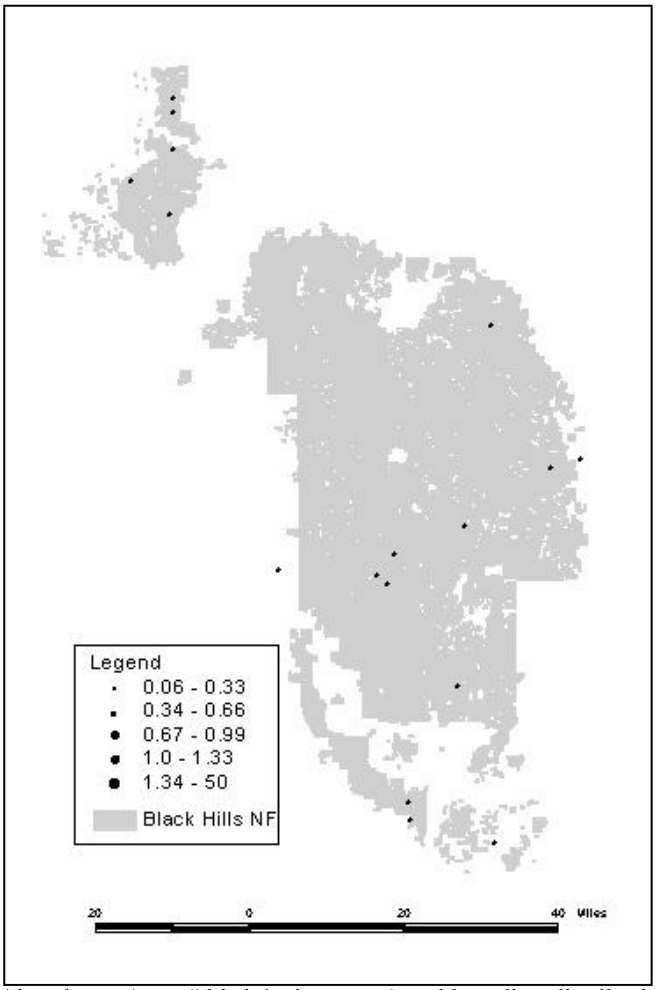
Relative density of Red-naped Sapsucker among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Downy Woodpecker

Downy Woodpecker occurs in low abundance in the Black Hills and does not appear to be numerous anywhere. It occurs in a wide range of habitats, although more observations of this species were made in FR than in other habitats.

Although too few birds were observed to estimate density in any single habitat, the total number of observations suggests this species should be tracked or monitored through point-transects *across habitats* in the Black Hills.



Abundance (avg. # birds/point-count) and breeding distribution of Downy Woodpecker in the Black Hills, 2002.

Habitat-specific density estimates for Downy Woodpecker in the Black Hills, 2002.

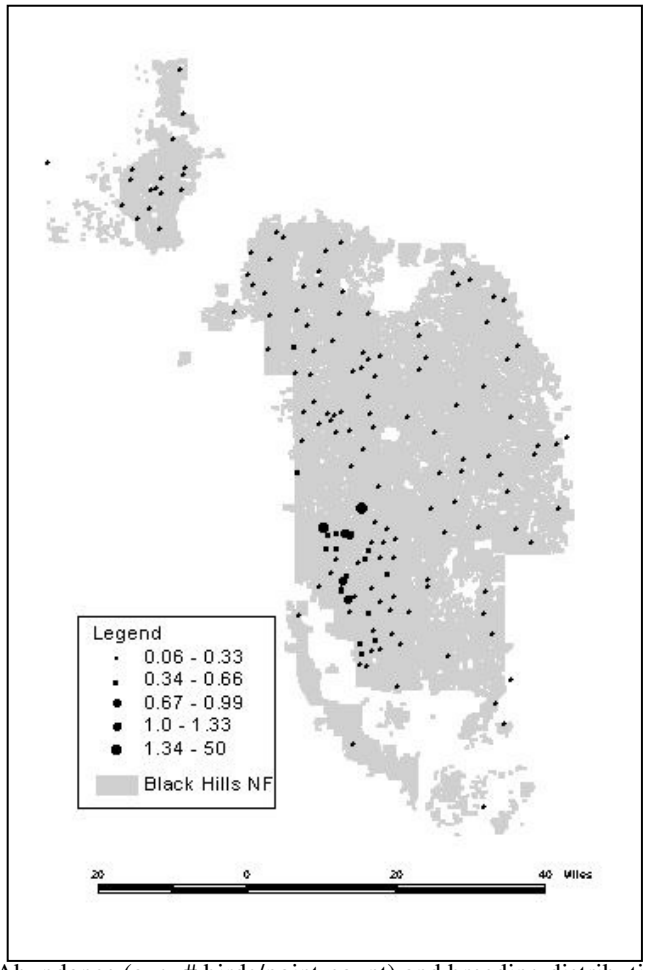
Habitat	D	LCL	UCL	CV(%)	N
BU	ID	--	--	--	6
FR	ID	--	--	--	9
LS	ID	--	--	--	3
MR	ID	--	--	--	6
PN	ID	--	--	--	1
PS	ID	--	--	--	4

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Hairy Woodpecker

Hairy Woodpecker occurs widely in low to moderate abundance throughout the Black Hills, but it has become most abundant in the Jasper Burn Area. Estimated density in BU was more than twice that in any other habitat, suggesting this species has responded positively to the burned area. Among unburned forest habitats, density appears to be highest in WS, although it is not significantly different from that in other habitats. This species should be effectively monitored under MBBH through point-transects in a wide range of habitats, especially BU.

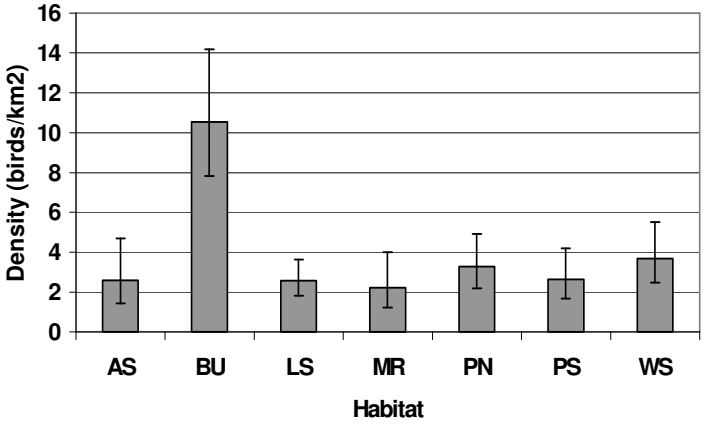


Abundance (avg. # birds/point-count) and breeding distribution of Hairy Woodpecker in the Black Hills, 2002.

Habitat-specific density estimates for Hairy Woodpecker in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV (%)	N
AS	2.60	1.44	4.69	30	23
BU	10.53	7.82	14.18	15	171
FR	ID	--	--	--	7
LS	2.56	1.81	3.64	18	50
MG	ID	--	--	--	13
MR	2.21	1.22	4.01	31	23
PN	3.28	2.19	4.92	21	38
PS	2.65	1.67	4.20	24	30
SH	ID	--	--	--	4
WS	3.69	2.47	5.51	21	35

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data



Relative density of Hairy Woodpecker among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

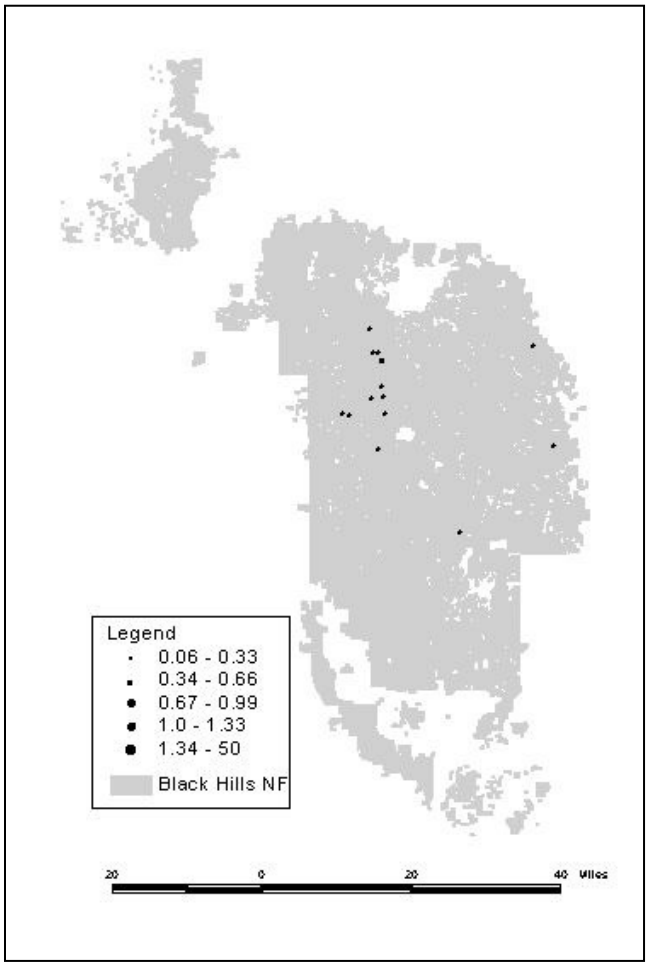
Three-toed Woodpecker

(Region 2 Sensitive Species)
(BHNF Management Indicator Species)

Three-toed Woodpecker occurs locally in the Black Hills in low abundance. Its distribution appears to be tied almost exclusively to mature stands of white spruce. Although four Three-toed Woodpeckers were recorded from LS sites, these sites encompassed some small stands of spruce along the bottoms of drainages within these stands, which presumably account for the observations there.

Interestingly, this species has not invaded the Jasper Burn or other burn areas in the Black Hills. This is in contrast to patterns of habitat use in the southern Rockies, where the species is well known for utilizing burns.

Three-toed Woodpecker should be effectively monitored under MBBH through point-transects in WS, although because of the relatively low number of observations additional effort should be made within this habitat to increase the numbers of observations of this species.



Abundance (avg. # birds/point-count) and breeding distribution of Three-toed Woodpecker in the Black Hills, 2002.

Habitat-specific density estimates for Three-toed Woodpecker in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV (%)	N
LS	ID	--	--	--	4
WS	1.80	1.15	2.79	23	22

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

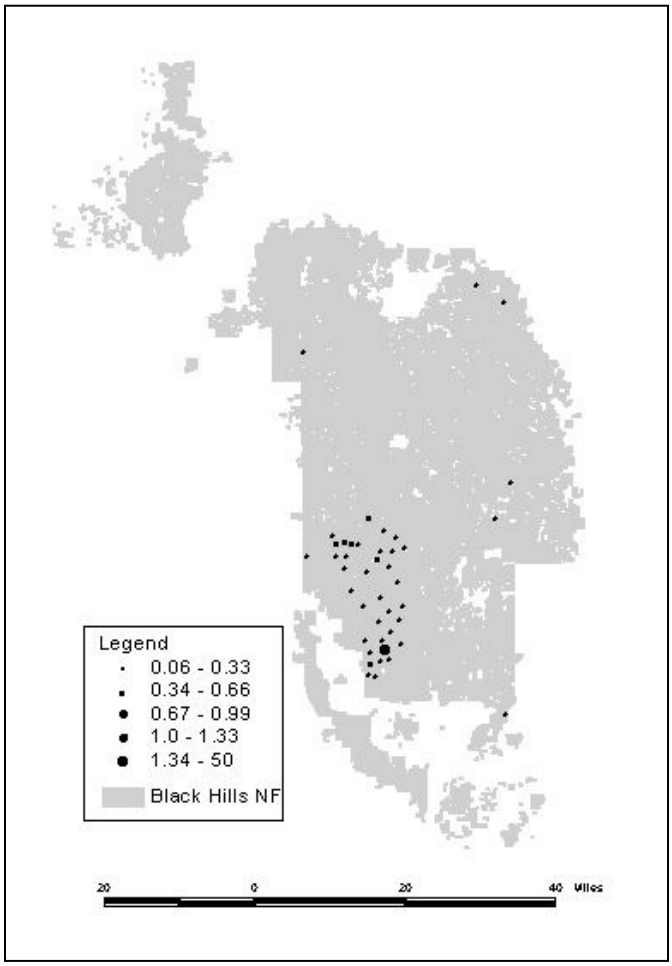
Black-backed Woodpecker

(Region 2 Sensitive Species)
(BHNF Management Indicator Species)
(PIF High Regional Priority)

Black-backed Woodpecker is widely distributed in the Black Hills, but it is rare in most places. However, Black-backed numbers have increased significantly since 2001 in the Jasper Burn Area, where it now occurs in moderately low density.

In some areas Black-backed Woodpeckers are more common than others. They prefer burned areas with a higher incidence of pre-burn snags, as suggested in previous literature and indicated by an unusually high number of this species recorded on a LS site along the eastern flank of Hell Canyon that was completely burned in 2001 (the largest dot on the map). They have also invaded other recent burn areas in Hell Canyon.

Burned-over forests appear to be critical habitat for this species in the Black Hills, and stand-replacement fires, especially in areas with a high incidence of snags, are probably important in maintaining long-term viability. This species should be effectively monitored under MBBH by point-transects in BU.

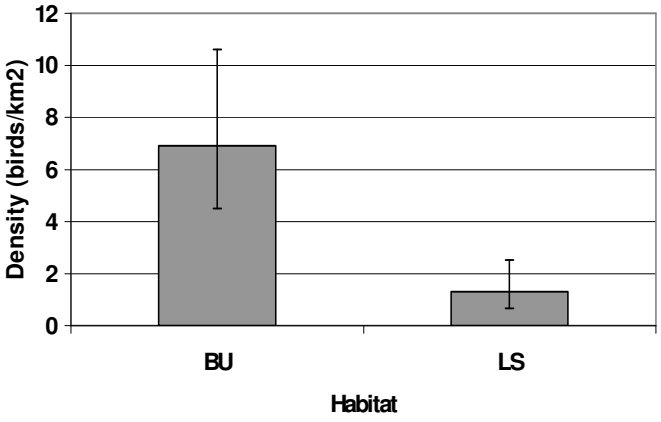


Abundance (avg. # birds/point-count) and breeding distribution of Black-backed Woodpecker in the Black Hills, 2002.

Habitat-specific density estimates for Black-backed Woodpecker in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV (%)	N
AS	ID	--	--	--	1
BU	6.91	4.50	10.62	22	71
LS	1.30	0.68	2.52	34	20
MG	N/A	--	--	--	22
PN	ID	--	--	--	1
PS	ID	--	--	--	6
SH	ID	--	--	--	2

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

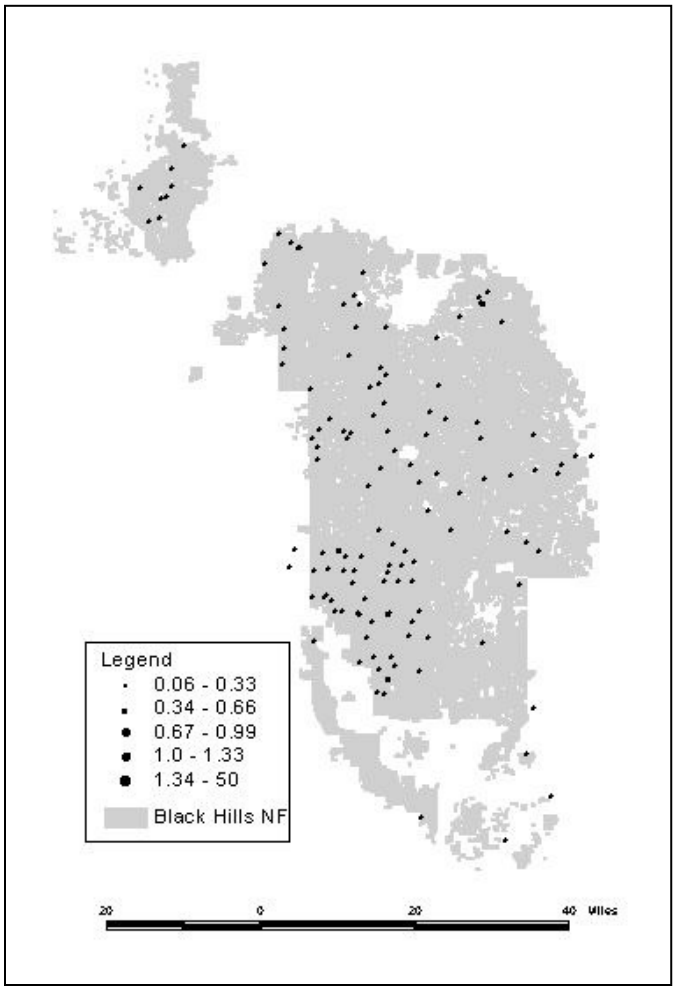


Relative abundance of Black-backed Woodpecker among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Northern Flicker

Northern Flicker ranges throughout the Black Hills in low to moderate abundance. Two forms occur in the Black Hills, "Yellow-shafted" and "Red-shafted"; they are treated together here. Northern Flicker occurs in all habitats, although density is surprisingly low for a species generally considered to be common. Estimated density is highest in BU and WS, although not significantly different from other habitats. As with other woodpeckers, the availability of snags is likely an important factor in habitat use during the breeding season. This species should be effectively monitored under MBBH through point-transects in a range of habitats, especially in BU and WS.

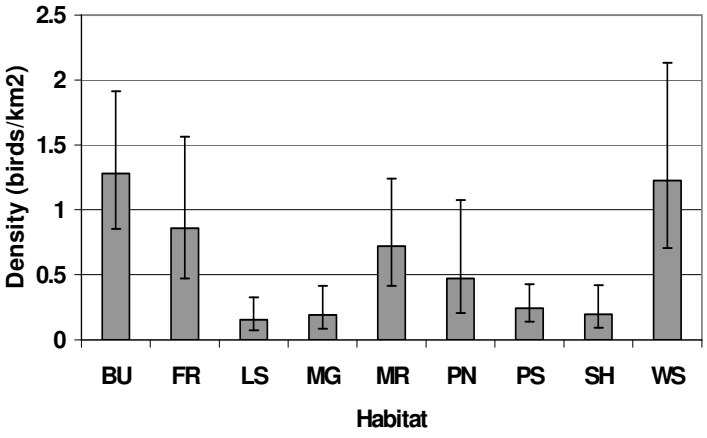


Abundance (avg. # birds/point-count) and breeding distribution of Northern Flicker in the Black Hills, 2002.

Habitat-specific density estimates for Northern Flicker in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV (%)	N
AS	ID	--	--	--	5
BU	1.28	0.86	1.91	21	57
FR	0.86	0.47	1.57	31	16
LS	0.15	0.07	0.33	39	11
MG	0.19	0.09	0.42	41	14
MR	0.72	0.42	1.24	28	25
PN	0.47	0.21	1.08	42	14
PS	0.24	0.14	0.43	29	17
SH	0.19	0.09	0.42	40	9
WS	1.23	0.71	2.13	28	19

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data



Relative density of Northern Flicker among habitats in the Black Hills, 2002.

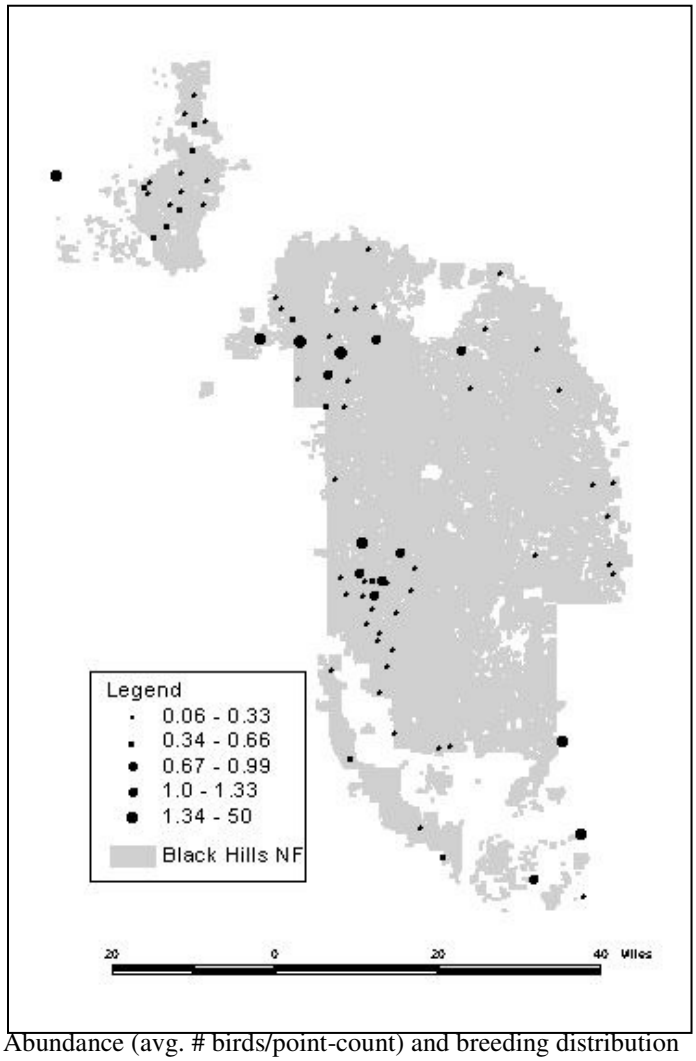
Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Western Wood-Pewee

Western Wood-Pewee occurs widely in the Black Hills, mostly in low to moderate abundance, but it appears to be absent from much of the central hills. I found that Western Wood-Pewee occurs in a wide variety of forest types, most densely in FR and PN, although even in these habitats density is low.

Earlier accounts suggest that Western Wood-Pewee was formerly more abundant in the Black Hills. Grinnell (1875) described this species as "one of the most common flycatchers" in the Black Hills, and that "every tree had one or two occupants of this species." Cary (1901) reported that this species was "frequently seen" in the Black Hills especially in heavily wooded areas. Pettingill and Whitney (1965) described it as "common to abundant at all elevations" and "the most numerous flycatcher in the pine forests." Although it is still locally common, the data presented here suggest that Western Wood-Pewee has declined significantly over the past decades.

This species should be effectively monitored under MBBH through point-transects in several habitats, especially FR and PN.

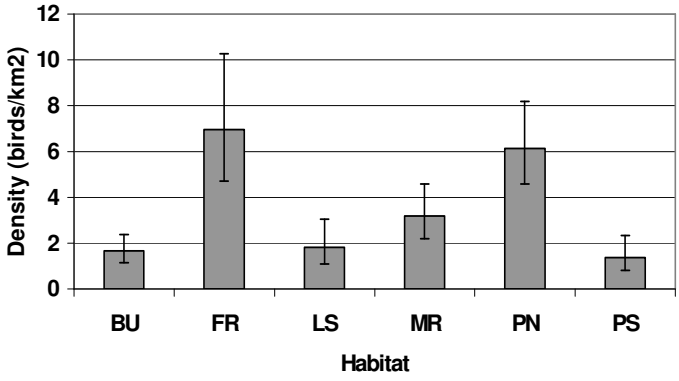


Abundance (avg. # birds/point-count) and breeding distribution of Western Wood-Pewee in the Black Hills, 2002.

Habitat-specific density estimates for Western Wood-Pewee in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV (%)	N
AS	ID	--	--	--	16
BU	1.66	1.16	2.37	18	64
FR	6.95	4.71	10.27	20	58
LS	1.82	1.09	3.04	26	40
MG	ID	--	--	--	1
MR	3.18	2.20	4.58	19	55
PN	6.12	4.58	8.19	15	91
PS	1.37	0.81	2.32	27	23
SH	ID	--	--	--	7
WS	ID	--	--	--	8

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data



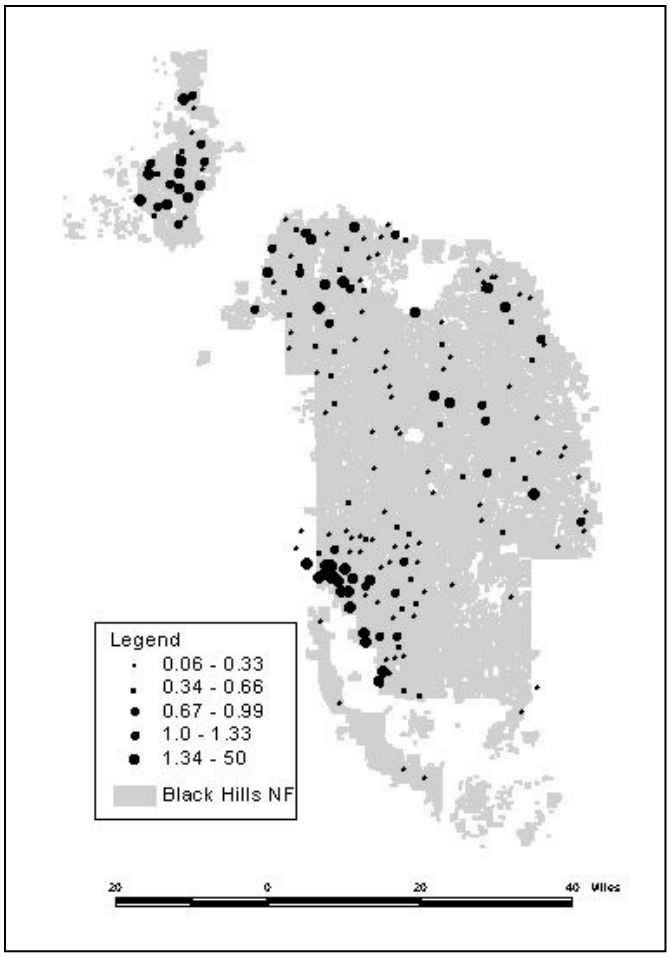
Relative density of Western Wood-Pewee among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Dusky Flycatcher

Dusky Flycatcher ranges throughout the Black Hills, but it is especially abundant in certain habitats. Its distribution appears largely to be correlated with the presence of broad-leaved, deciduous vegetation.

Dusky Flycatcher occurs in moderate density in most habitats. It occurs in very high density in SH and MR, and in somewhat lower, but still high density in AS and PN. This species should be effectively monitored through point-transects in a wide range of habitats under *MBBH*.

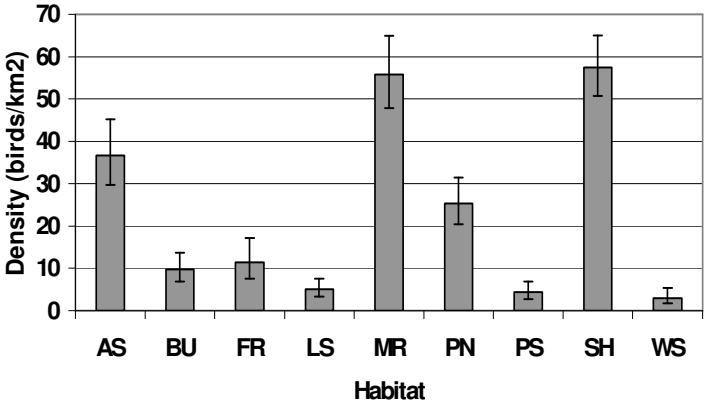


Abundance (avg. # birds/point-count) and breeding distribution of Dusky Flycatcher in the Black Hills, 2002.

Habitat-specific density estimates for Dusky Flycatcher in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV (%)	N
AS	36.66	29.70	45.26	11	167
BU	9.75	6.95	13.67	17	111
FR	11.41	7.56	17.21	21	50
LS	5.07	3.37	7.62	21	71
MG	N/A	--	--	--	53
MR	55.78	47.91	64.95	8	322
PN	25.33	20.36	31.52	11	158
PS	4.39	2.79	6.91	23	55
SH	57.43	50.74	65.01	6	365
WS	3.05	1.73	5.41	29	27

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

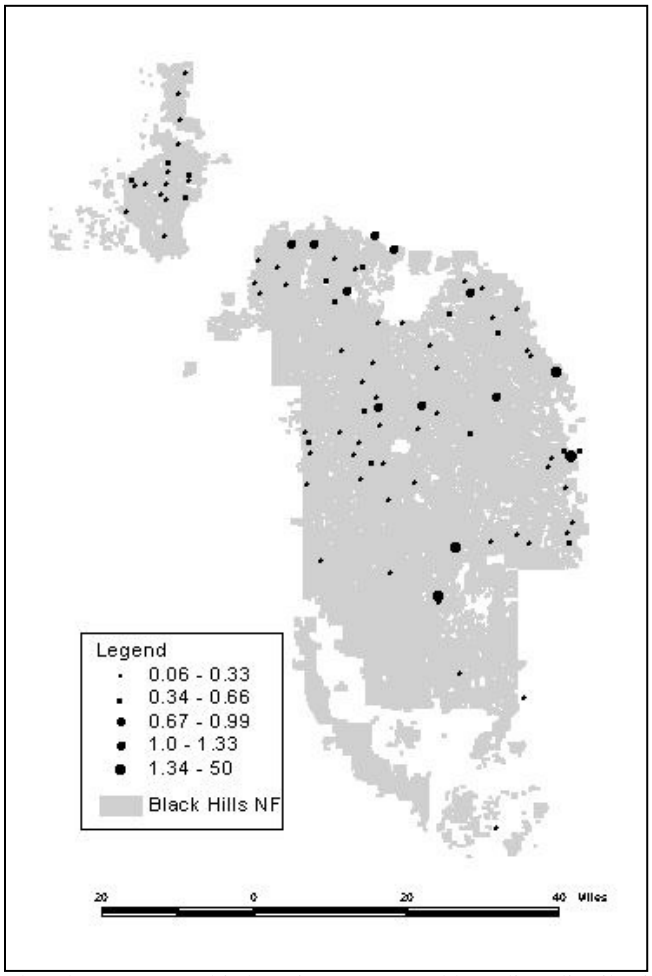


Relative density of Dusky Flycatcher among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Cordilleran Flycatcher

Cordilleran Flycatcher occurs in much of the Black Hills, but it appears to occur in greatest abundance at low elevations, especially in the north and east. The species nests primarily on low cliffs and rock outcrops, especially in moist canyons with abundant broad-leaved deciduous vegetation. Estimated density of Cordilleran Flycatcher is highest in FR, although it is not significantly different from that in MR. It occurs in a range of other habitats as well, wherever suitable nesting substrates exist. This species should be effectively monitored under *MBBH* through point-transects in a range of habitats, especially FR.

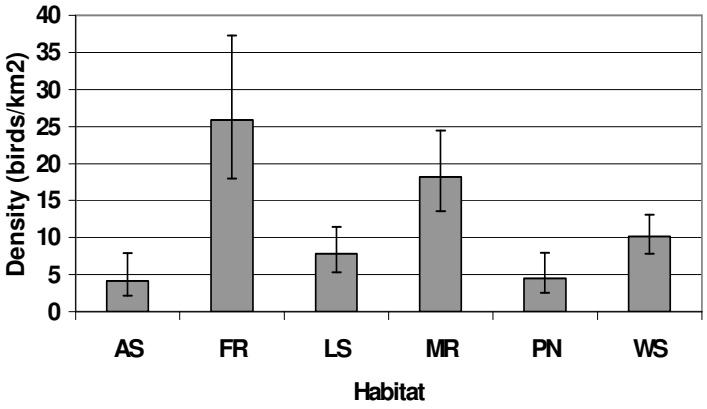


Abundance (avg. # birds/point-count) and breeding distribution of Cordilleran Flycatcher in the Black Hills, 2002.

Habitat-specific density estimates for Cordilleran Flycatcher in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV (%)	N
AS	4.16	2.19	7.88	33	19
BU	ID	--	--	--	3
FR	25.92	18.00	37.32	19	81
LS	7.84	5.37	11.45	19	49
MR	18.21	13.56	24.45	15	100
PN	4.51	2.56	7.94	29	21
PS	ID	--	--	--	8
SH	ID	--	--	--	1
WS	10.13	7.82	13.13	13	77

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

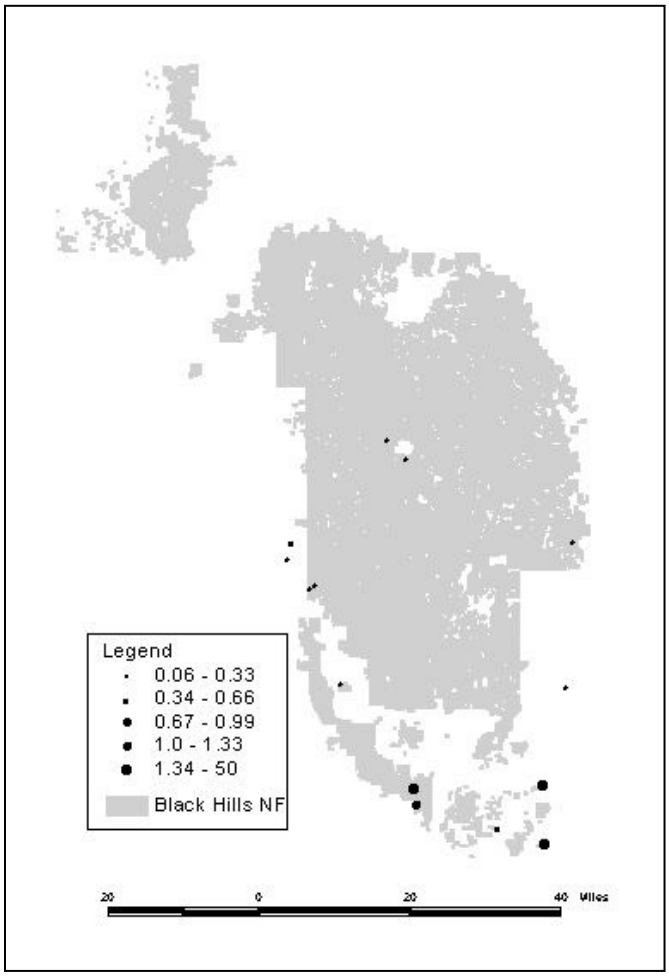


Relative density of Cordilleran Flycatcher among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Eastern Kingbird

Eastern Kingbird occurs locally in the Black Hills, primarily in the south at low elevations. We found it in greatest density in FR, where it can sometimes be very abundant. Eastern Kingbird also occurs locally in MG habitats within the Black Hills. However, it is undoubtedly more widespread and abundant in the plains surrounding the Black Hills. Nonetheless, this species should be effectively monitored under MBBH through point-transects in FR.



Abundance (avg. # birds/point-count) and breeding distribution of Eastern Kingbird in the Black Hills, 2002.

Habitat-specific density estimates for Eastern Kingbird in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV (%)	N
FR	21.78	14.12	33.57	22	69
MG	ID	--	--	--	7
PN	ID	--	--	--	1
SH	ID	--	--	--	2

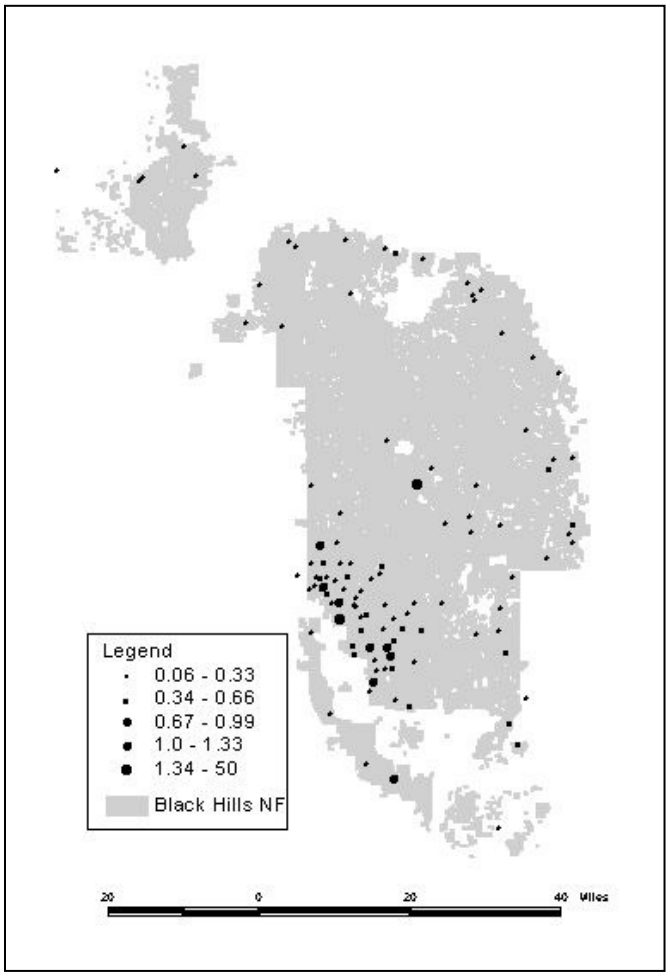
D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Plumbeous Vireo

Plumbeous Vireo occurs widely in the Black Hills in low to moderate abundance. It is particularly abundant and widespread in the southwest. Elsewhere in the Black Hills it is perhaps most common along the northern and eastern perimeters of the Hills.

Plumbeous Vireo occupies a range of habitats, but is typically associated with ponderosa pine. Estimated density is higher in SH than in other habitats, although this difference is not significant. This species should be effectively monitored under MBHH through point-transects in a range of habitats, especially in PS and SH.

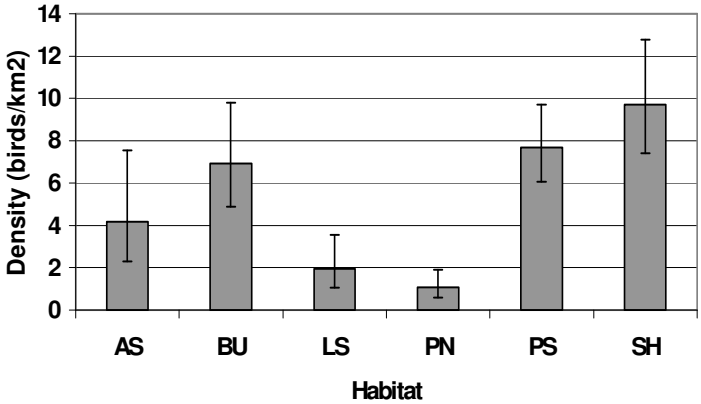


Abundance (avg. # birds/point-count) and breeding distribution of Plumbeous Vireo in the Black Hills, 2002.

Habitat-specific density estimates for Plumbeous Vireo in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV (%)	N
AS	4.17	2.31	7.55	31	22
BU	6.93	4.90	9.79	18	52
LS	1.95	1.07	3.56	31	22
PN	1.08	0.61	1.91	30	11
PS	7.68	6.07	9.72	12	102
SH	9.72	7.40	12.78	14	83

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data



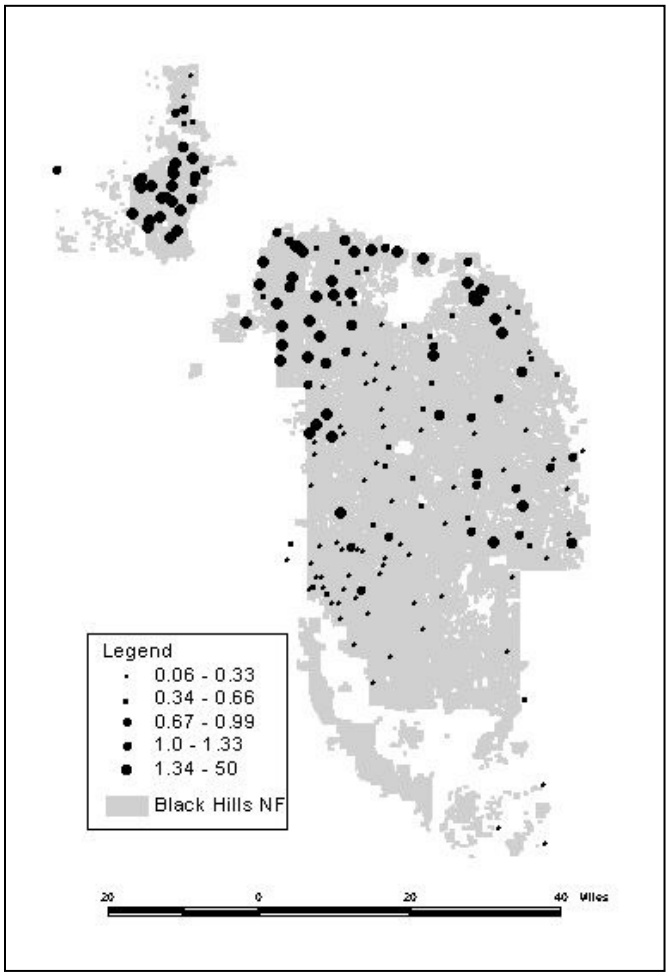
Relative density of Plumbeous Vireo among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Warbling Vireo

Warbling Vireo occurs widely in the Black Hills, often in great abundance, especially in the northern Hills and Bear Lodge Mountains. Even though it is less common in the south, overall, Warbling Vireo is one of the most abundant bird species in the Black Hills.

Warbling Vireo invariably occurs in association with deciduous vegetation, especially birch and aspen. Not surprisingly, estimated density is highest in AS, although high densities also occur in MR and PN. This species should be effectively monitored under *MBBH* through point-transects in a range of habitats, especially AS.

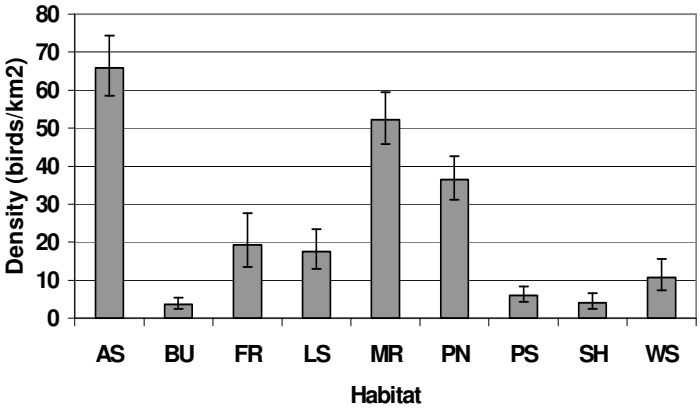


Abundance (avg. # birds/point-count) and breeding distribution of Warbling Vireo in the Black Hills, 2002.

Habitat-specific density estimates for Warbling Vireo in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV (%)	N
AS	65.93	58.44	74.37	6	573
BU	3.63	2.41	5.46	21	55
FR	19.34	13.50	27.70	18	94
LS	17.52	13.07	23.48	15	199
MR	52.21	45.81	59.50	7	469
PN	36.50	31.22	42.67	8	384
PS	6.01	4.32	8.37	17	78
SH	4.04	2.44	6.68	26	27
WS	10.74	7.41	15.56	19	66

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

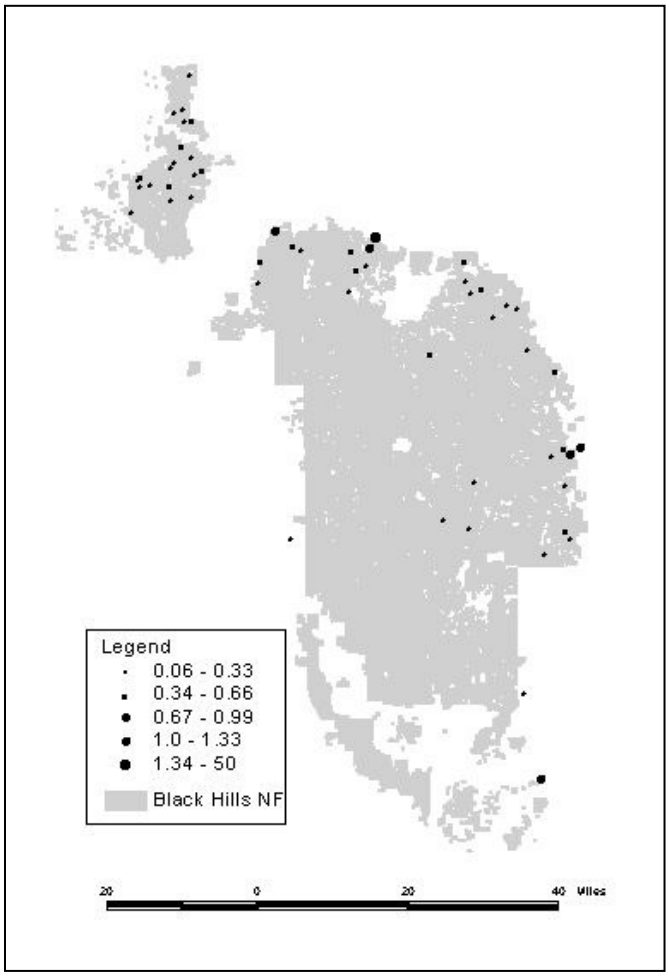


Relative density of Warbling Vireo among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Red-eyed Vireo

Red-eyed Vireo occurs primarily in the northern and eastern Black Hills in low to moderate abundance. It is found primarily at lower elevations, and usually in association with broad-leaved, deciduous trees, especially bur oak. Estimated density is highest in FR, and is only slightly lower in MR. In both these habitats it is found most often where oaks occur. This species should be effectively monitored under *MBBH* through point-transects in RI and PN.

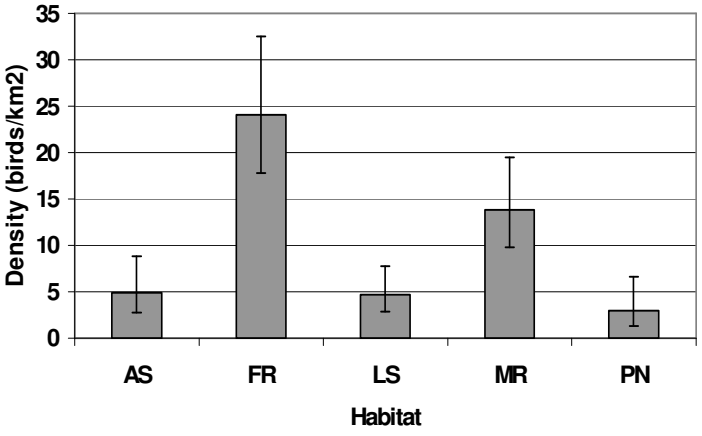


Abundance (avg. # birds/point-count) and breeding distribution of Red-eyed Vireo in the Black Hills, 2002.

Habitat-specific density estimates for Red-eyed Vireo in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	4.92	2.74	8.83	30	17
FR	24.05	17.78	32.54	15	85
LS	4.69	2.85	7.71	26	26
MR	13.81	9.80	19.47	18	76
PN	2.92	1.29	6.61	42	18

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

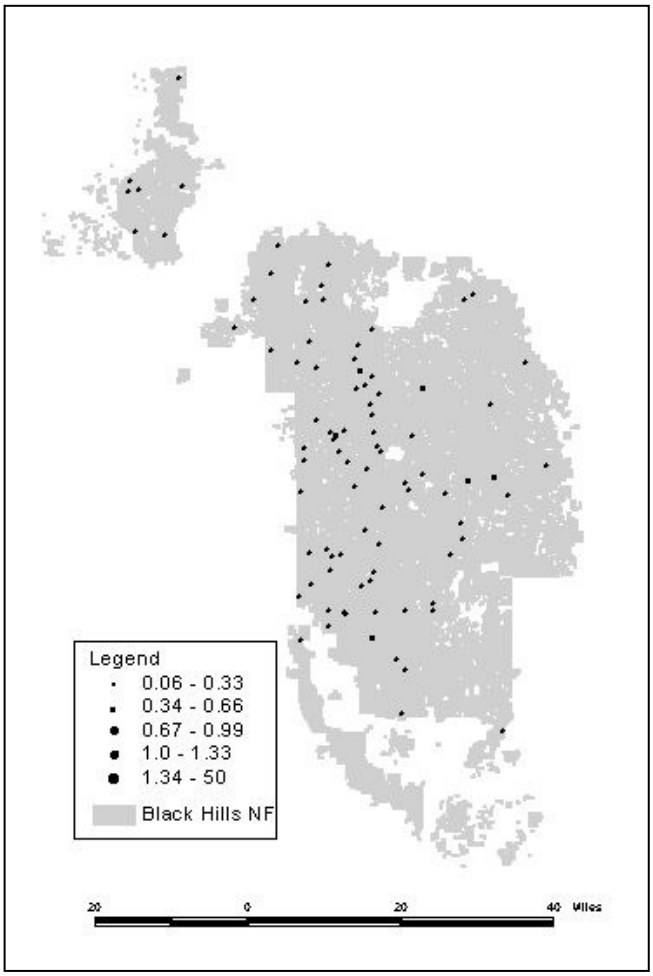


Relative density of Red-eyed Vireo among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Gray Jay

Gray Jay is found throughout the Black Hills, but is perhaps less abundant in the east and extreme south. Gray Jay occupies a range of habitats, and it is probably the most numerous corvid in the Black Hills. Although densities are low in all habitats, it is probably greatest in WS. Although Gray Jay behavior can be somewhat problematic in analyses of distance data (they are often come in to investigate an observer), based on our results from this year Gray Jay should be effectively monitored under MBBH through point-transects, especially in WS.

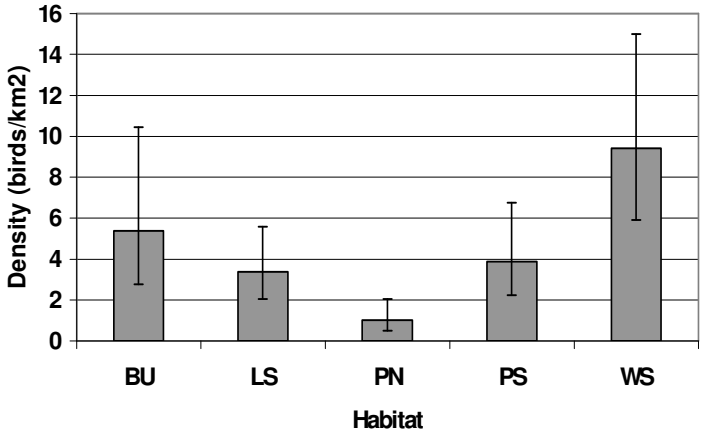


Abundance (avg. # birds/point-count) and breeding distribution of Gray Jay in the Black Hills, 2002.

Habitat-specific density estimates for Gray Jay in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
BU	5.37	2.76	10.43	35	30
LS	3.37	2.03	5.59	26	28
PN	1.01	0.50	2.05	36	19
PS	3.88	2.23	6.76	29	35
WS	9.42	5.92	14.99	24	49

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

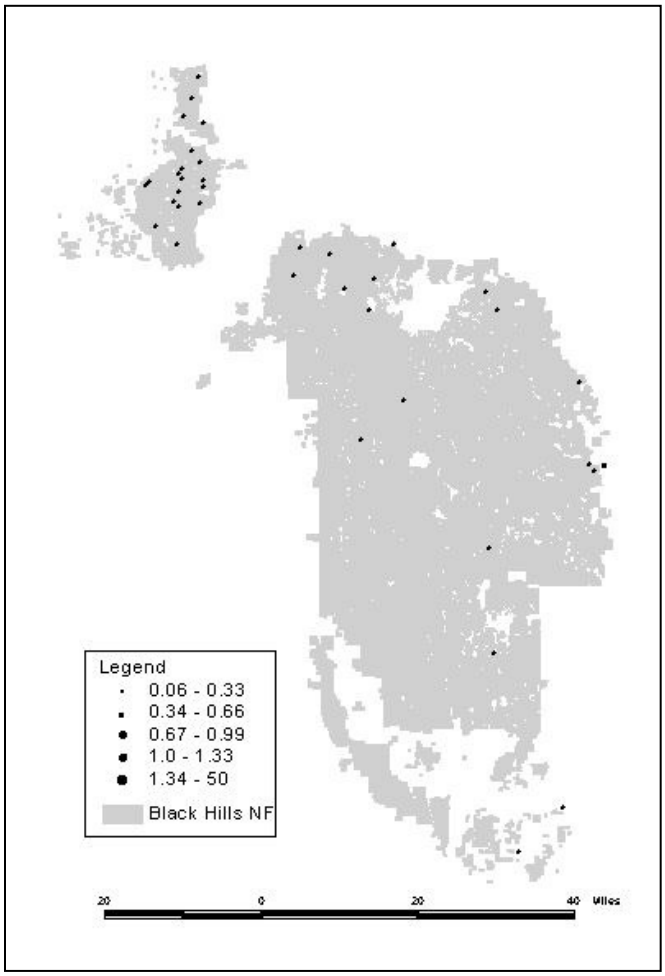


Relative density of Gray Jay among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Blue Jay

Blue Jay occurs mostly at lower elevations in the northern and eastern Black Hills, generally in low abundance. It is found less frequently in the interior of the hills. This species occurs in low density in FR, and in somewhat lower density in MR. Nonetheless, this species should be effectively monitored through point-transects under MBBH in FR and MR habitat.

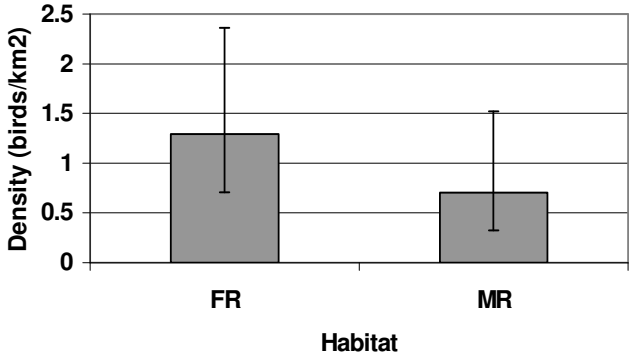


Abundance (avg. # birds/point-count) and breeding distribution of Blue Jay in the Black Hills, 2002.

Habitat-specific density estimates for Blue Jay in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
FR	1.29	0.71	2.36	31	17
LS	ID	--	--	--	12
MR	0.70	0.33	1.52	40	20
PN	ID	--	--	--	8
PS	ID	--	--	--	1
WS	ID	--	--	--	3

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data



Relative density of Blue Jay among habitats in the Black Hills, 2002.

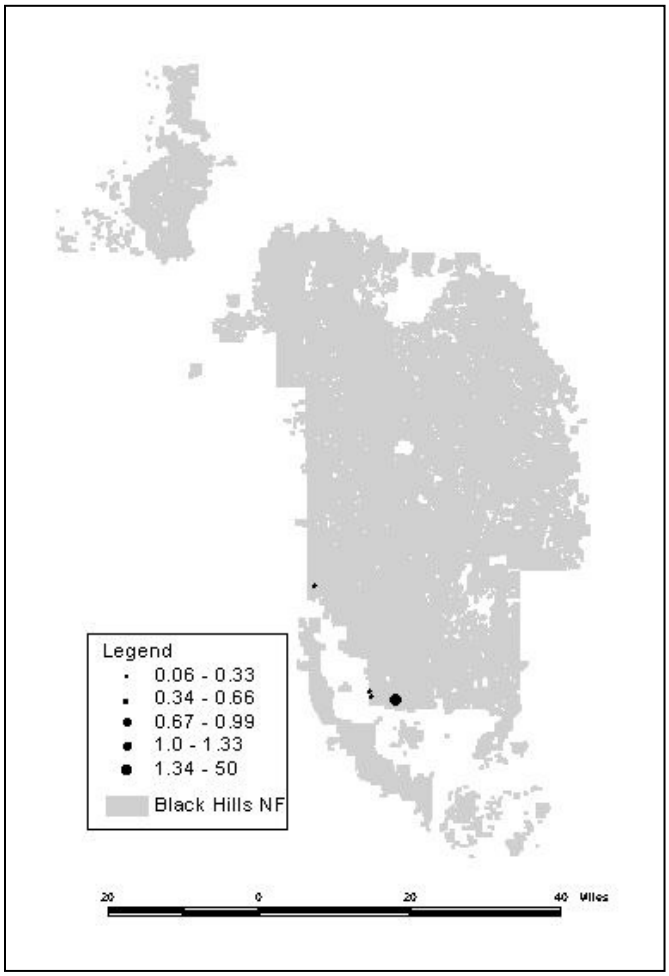
Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Pinyon Jay

(PIF Continental Watch List 2003)

Pinyon Jays are generally uncommon at low elevations in the Black Hills, primarily in the southwest, although they occasionally show up elsewhere. Because this species typically occurs in flocks, detecting it on surveys can be hit-or-miss. This year, it appears that we missed. Although we detected fairly large numbers in MG, these birds were not using this habitat. Instead, they were recorded in flocks flying over the habitat. It is more likely they were using adjacent SH or PS habitats, but only six birds were detected on transects in SH.

In 2001, the results suggested that we should be able to monitor Pinyon Jay through point-transects in SH, although this year I am less certain. However, the results do suggest we still should be able to monitor this species across habitat types. Continued effort to increase the number of transects in SH and MG in this region should further improve our prospects for monitoring this somewhat nomadic species in the Black Hills.



Abundance (avg. # birds/point-count) and breeding distribution of Pinyon Jay in the Black Hills, 2002.

Habitat-specific density estimates for Pinyon Jay in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
MG	N/A	--	--	--	41
SH	ID	--	--	--	6

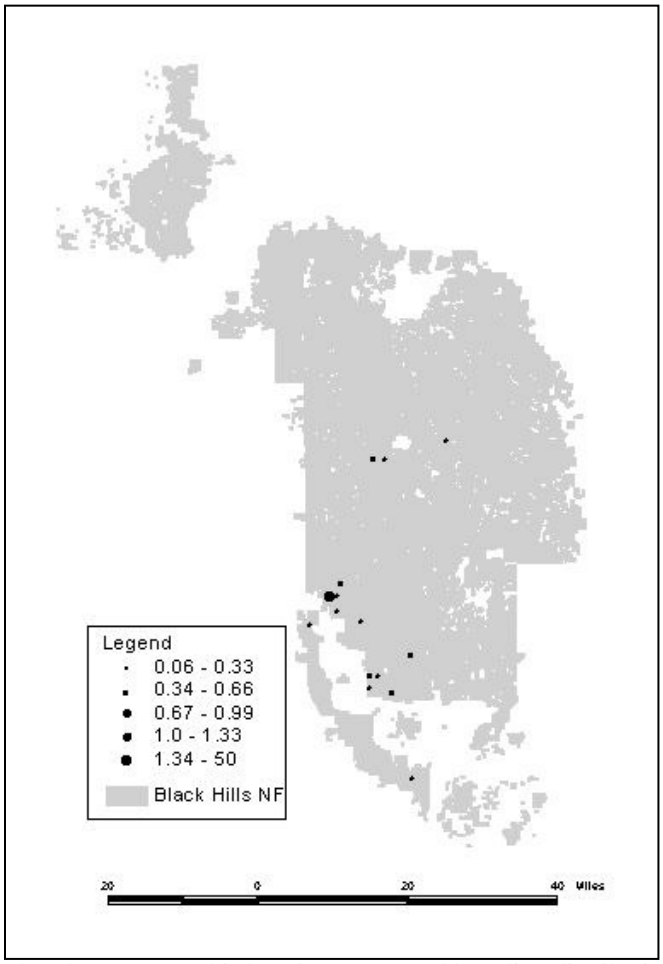
D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Clark's Nutcracker

Clark's Nutcracker occurs widely in the Black Hills, but it seems to have a decided preference for areas in the southwest. Although rarely observed in high numbers, Clark's Nutcracker was detected in a wide range of habitats. We recorded more individuals per unit-effort in SH and MG, although birds recorded in MG were either using adjacent habitats or flying over.

Pettingill and Whitney (1965) describe this species as a "rare or uncommon visitant" in the Black Hills and cite no evidence of breeding. Breeding Bird Atlas data suggest, but do not confirm, breeding in the Black Hills (Peterson 1995). Based on an observation by field crewmembers in late May of a presumed juvenile being fed by an adult, Clark's Nutcracker probably does breed in the Black Hills. Although observations were too few to monitor this species in any single habitat, Clark's Nutcracker should be effectively monitored through point-transects across habitat types in the Black Hills.



Abundance (avg. # birds/point-count) and breeding distribution of Clark's Nutcracker in the Black Hills, 2002.

Habitat-specific density estimates for Clark's Nutcracker in the Black Hills, 2002.

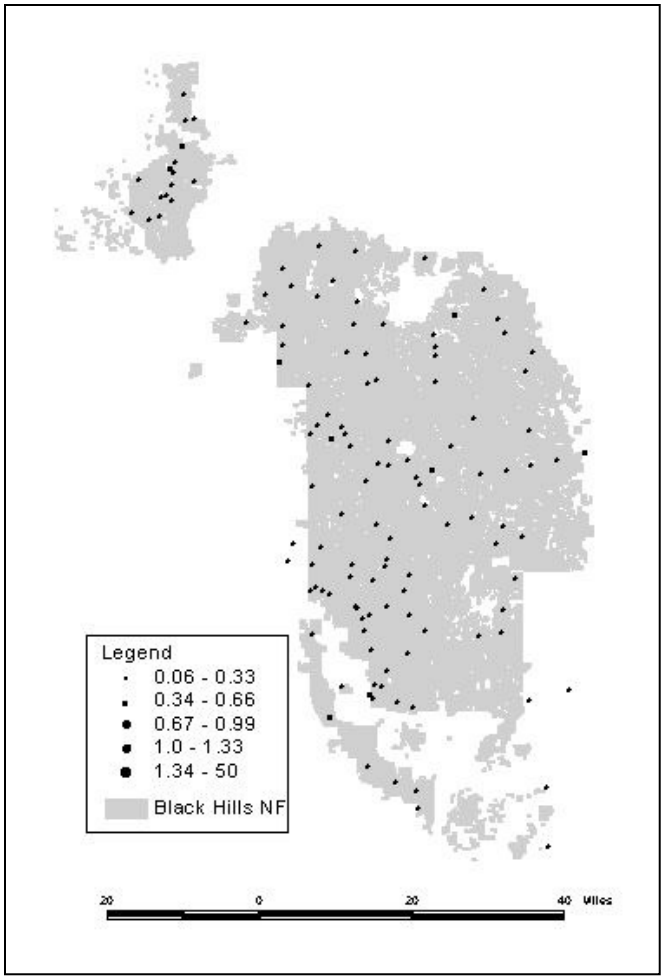
Habitat	D	LCL	UCL	CV(%)	N
BU	ID	--	--	--	4
FR	ID	--	--	--	3
LS	ID	--	--	--	3
MG	ID	--	--	--	17
MR	ID	--	--	--	8
PS	ID	--	--	--	9
SH	ID	--	--	--	16
WS	ID	--	--	--	5

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

American Crow

American Crow occurs in low abundance throughout the Black Hills. Estimated density does not appear to differ significantly among habitats, but low numbers of observations make precise estimation of density difficult. Nonetheless, this species should be effectively monitored under *MBBH* through point-transects in a wide range of habitats.

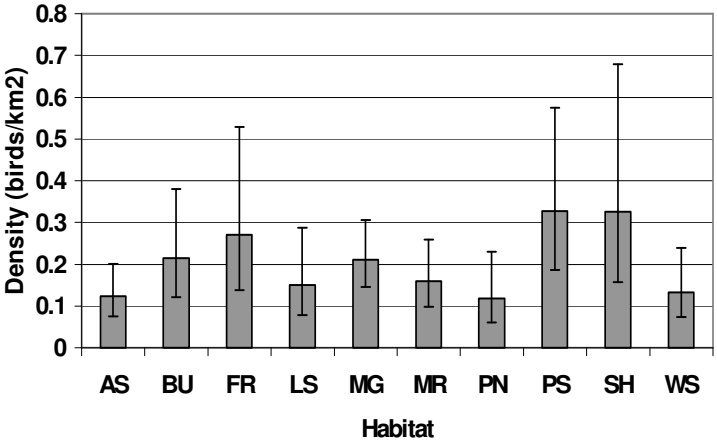


Abundance (avg. # birds/point-count) and breeding distribution of American Crow in the Black Hills, 2002.

Habitat-specific density estimates for American Crow in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	0.12	0.08	0.20	25	28
BU	0.21	0.12	0.38	29	28
FR	0.27	0.14	0.53	35	20
LS	0.15	0.08	0.29	34	19
MG	0.21	0.15	0.31	19	29
MR	0.16	0.10	0.26	25	29
PN	0.12	0.06	0.23	34	17
PS	0.33	0.19	0.58	29	33
SH	0.33	0.16	0.68	38	14
WS	0.13	0.07	0.24	31	21

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

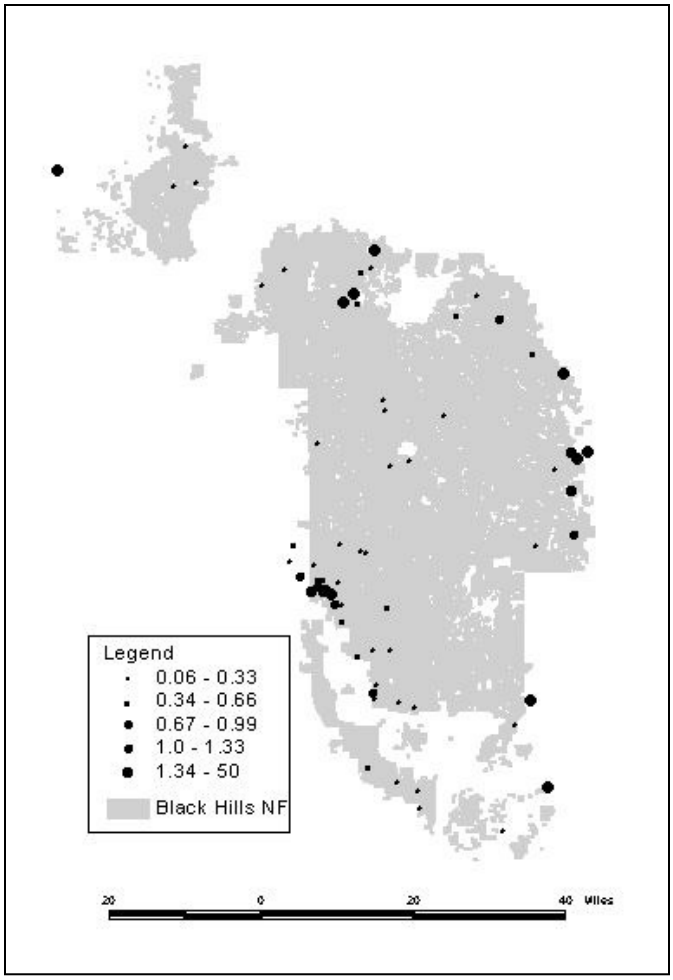


Relative abundance of American Crow among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Violet-green Swallow

Violet-green Swallow occurs locally in the Black Hills, mostly at low elevations. It can be abundant where steep cliffs provide suitable nesting sites. Estimated density of Violet-green Swallow is greatest in SH, FR, and MR, reflecting the widespread availability of cliffs near these habitats. This species should be effectively monitored under *MBBH* through point-transects in SH, FR and MR habitats.

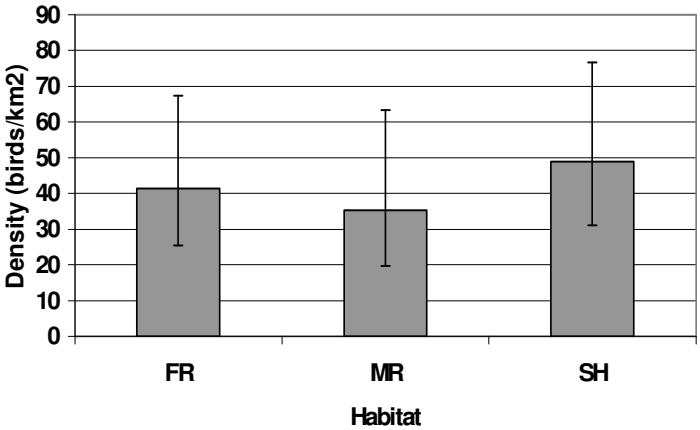


Abundance (avg. # birds/point-count) and breeding distribution of Violet-green Swallow in the Black Hills, 2002.

Habitat-specific density estimates for Violet-green Swallow in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	ID	--	--	--	2
BU	ID	--	--	--	12
FR	41.42	25.48	67.34	25	195
LS	ID	--	--	--	7
MG	ID	--	--	--	18
MR	35.31	19.68	63.34	30	126
PN	ID	--	--	--	9
PS	ID	--	--	--	14
SH	48.84	31.11	76.68	23	147
WS	ID	--	--	--	19

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

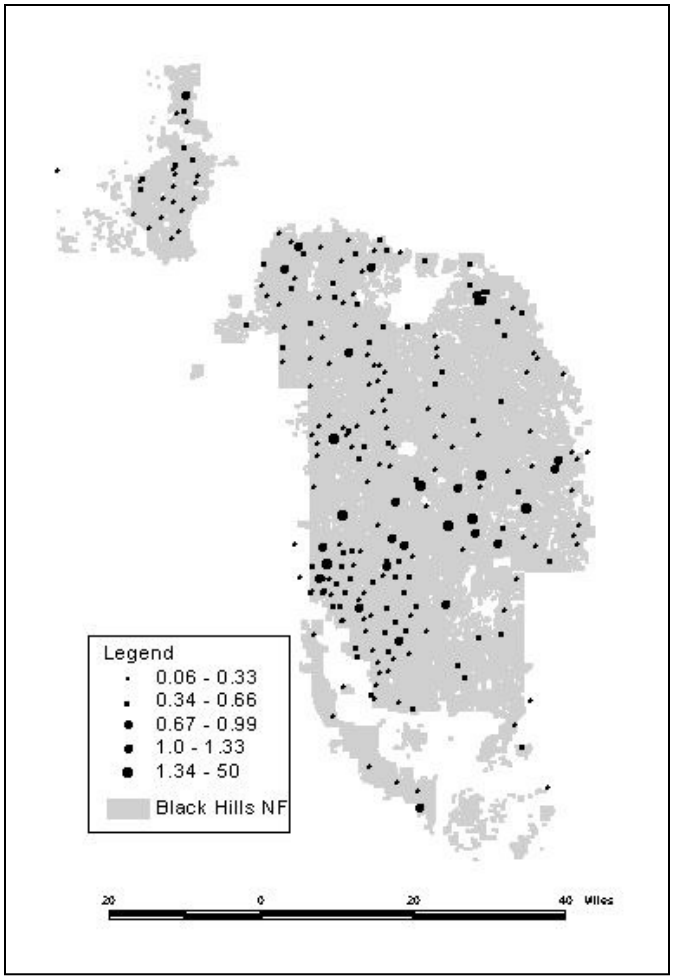


Relative density of Violet-green Swallow among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Black-capped Chickadee

Black-capped Chickadee is a widespread and often abundant resident of the Black Hills. It occurs in a wide range of habitats, and although density may be greatest in AS, it is not significantly different from that in some other habitats. This species should be effectively monitored through point-transects under *MBBH* in a wide range of habitats.

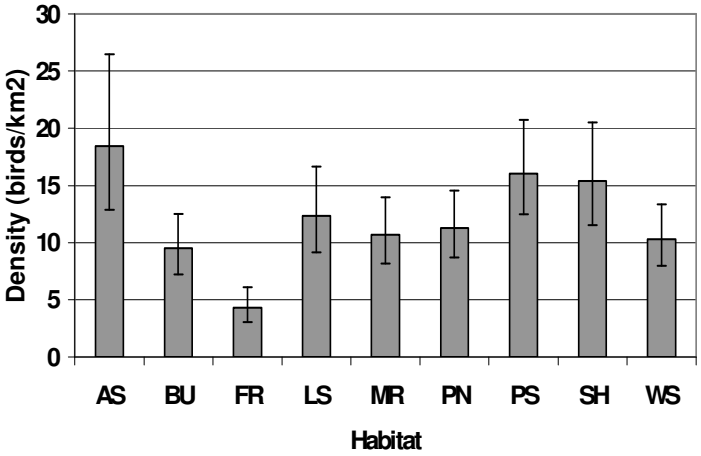


Abundance (avg. # birds/point-count) and breeding distribution of Black-capped Chickadee in the Black Hills, 2002.

Habitat-specific density estimates for Black-capped Chickadee in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	18.44	12.85	26.46	18	130
BU	9.49	7.21	12.48	14	159
FR	4.30	3.04	6.08	18	35
LS	12.33	9.13	16.64	15	130
MG	N/A	--	--	--	31
MR	10.68	8.17	13.96	14	119
PN	11.25	8.70	14.54	13	123
PS	16.05	12.44	20.71	13	185
SH	15.36	11.52	20.49	15	83
WS	10.30	7.95	13.35	13	83

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

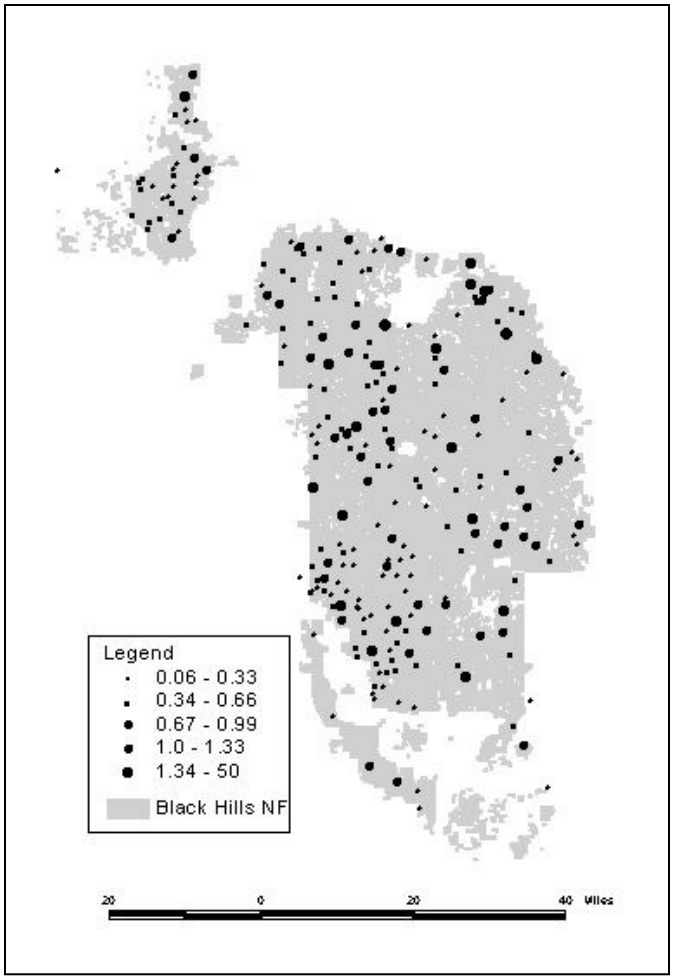


Relative density of Black-capped Chickadee among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Red-breasted Nuthatch

Red-breasted Nuthatch occurs throughout the Black Hills. It is found in a wide range of habitats, and is generally quite common. Although estimated density is highest in PN, it is not significantly different than that in some other habitats. This species should be effectively monitored under *MBBH* through point-transects in a wide range of habitats.

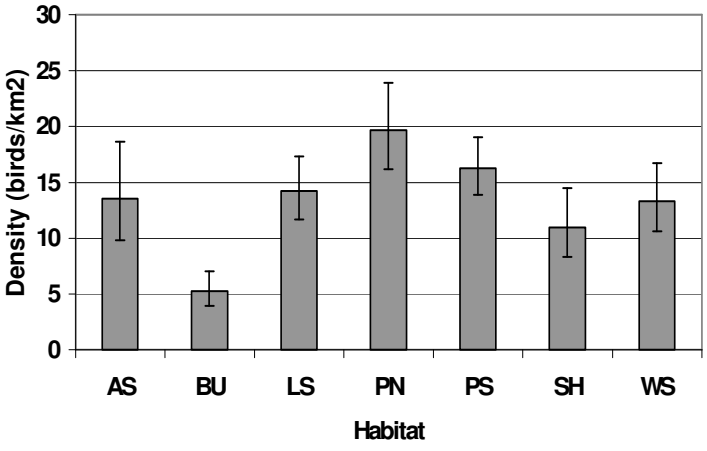


Abundance (avg. # birds/point-count) and breeding distribution of Red-breasted Nuthatch in the Black Hills, 2002.

Habitat-specific density estimates for Red-breasted Nuthatch in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	13.52	9.80	18.64	16	141
BU	5.25	3.93	7.01	15	103
FR	N/A	--	--	--	30
LS	14.21	11.67	17.30	10	250
MG	N/A	--	--	--	41
MR	N/A	--	--	--	122
PN	19.66	16.18	23.89	10	281
PS	16.25	13.87	19.02	8	269
SH	10.95	8.29	14.47	14	88
WS	13.30	10.59	16.71	12	178

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

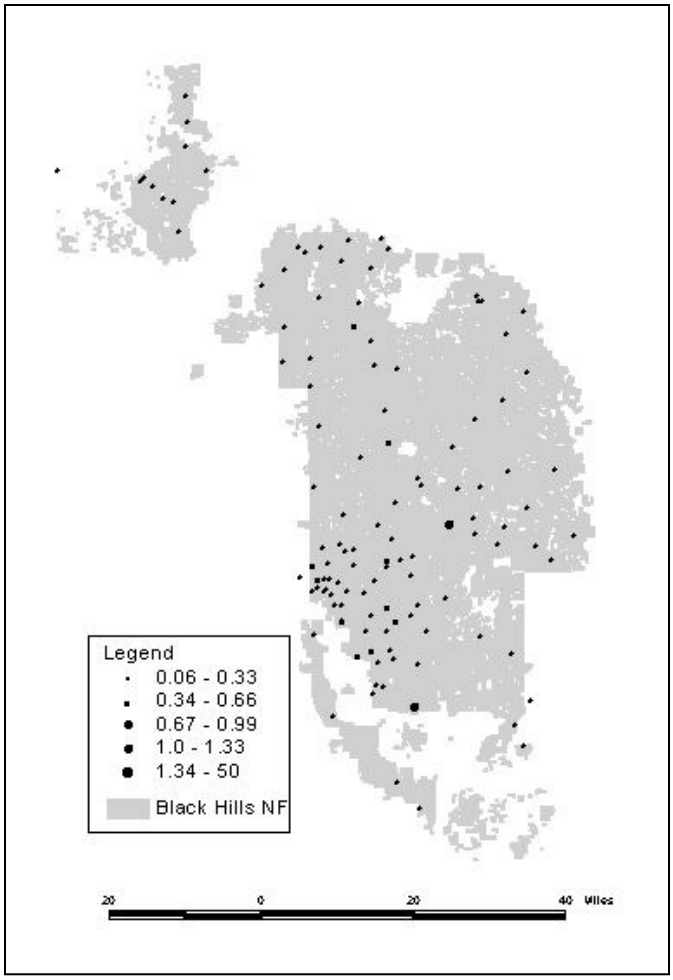


Relative density of Red-breasted Nuthatch among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

White-breasted Nuthatch

White-breasted Nuthatch occurs throughout the Black Hills region, typically in low abundance. Estimated density is greatest in SH, but does not differ significantly from that in most other habitats. This species should be effectively monitored through point-transects in a range of habitats under MBBH.

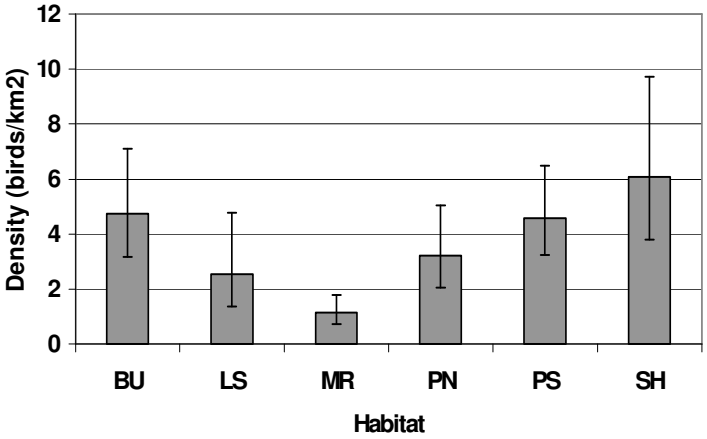


Abundance (avg. # birds/point-count) and breeding distribution of White-breasted Nuthatch in the Black Hills, 2002.

Habitat-specific density estimates for White-breasted Nuthatch in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	ID	--	--	--	13
BU	4.74	3.16	7.11	21	53
FR	ID	--	--	--	9
LS	2.55	1.36	4.77	32	22
MG	ID	--	--	--	6
MR	1.14	0.73	1.79	23	18
PN	3.22	2.05	5.04	23	29
PS	4.58	3.23	6.49	18	56
SH	6.07	3.79	9.72	24	45
WS	ID	--	--	--	8

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data



Relative density of White-breasted Nuthatch among habitats in the Black Hills, 2002.

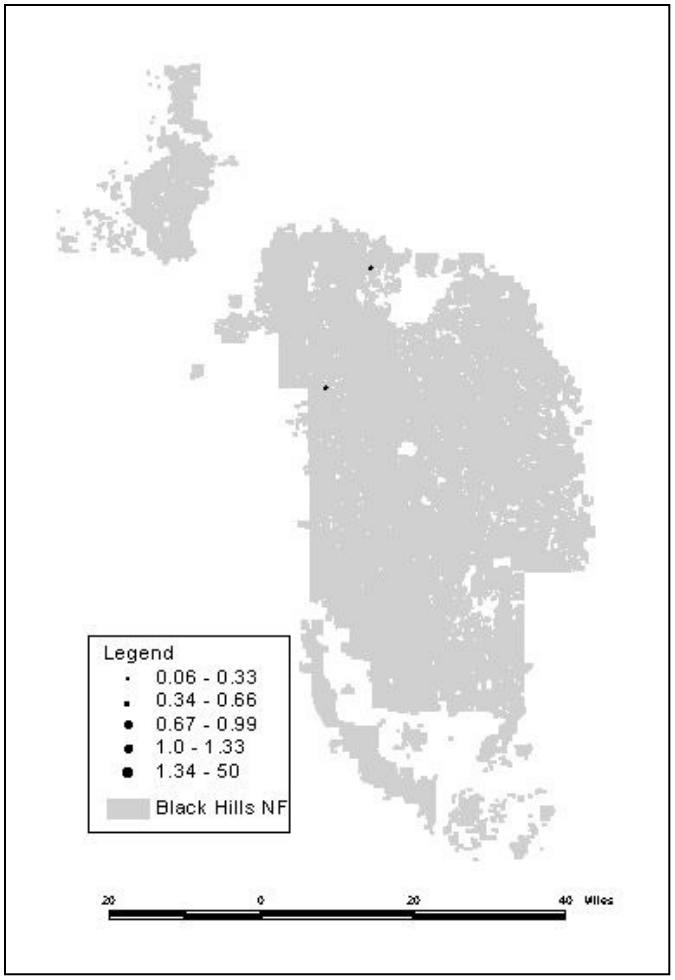
Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Pygmy Nuthatch

(Region 2 Sensitive Species)
(BHNF Management Indicator Species)

Pygmy Nuthatch is a rare bird in the Black Hills. We recorded only two individuals on point-transects in 2002, at different locations than where we recorded the species in 2001. Our observations (or perhaps more appropriately, our lack thereof) seem to be consistent with available historical information on this species (Pettingill and Whitney, 1965).

It seems that point-transects will be insufficient to monitor this species in the Black Hills, due to its scarcity and unpredictable distribution. More specific efforts aimed at locating individuals and important breeding areas are needed. Monitoring of reproductive success would likely yield important information on the biology of this species in the Black Hills.



Abundance (avg. # birds/point-count) and breeding distribution of Pygmy Nuthatch in the Black Hills, 2002.

Habitat-specific density estimates for Pygmy Nuthatch in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
LS	ID	--	--	--	1
WS	ID	--	--	--	1

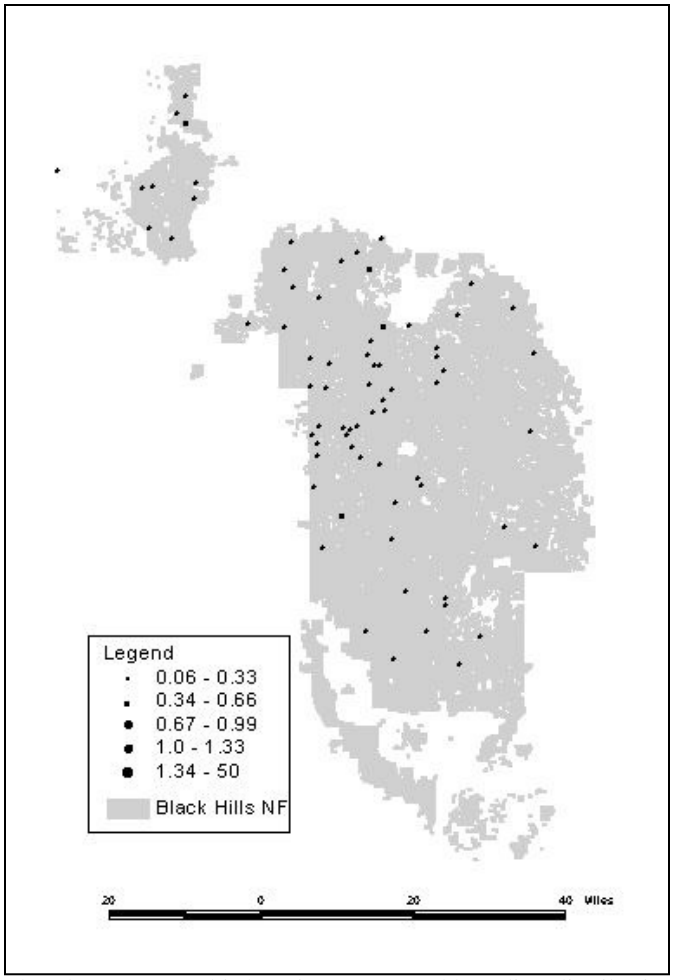
D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Brown Creeper

(BHNF Management Indicator Species)

Brown Creeper occurs in low abundance throughout the Black Hills, primarily in coniferous habitats. It occurs in greatest density in WS and LS. In 2002, approximately 96% of all observations of Brown Creepers (*n*=145), were recorded at sites where the surrounding habitat was classified as either mature or old growth (seral stage 4 or 5; Buttery and Gillam 1983). Thus, the distribution of Brown Creeper in the Black Hills is largely tied to mature and old-growth forests. This species should be effectively monitored through point-transects under *MBBH* in LS and WS.

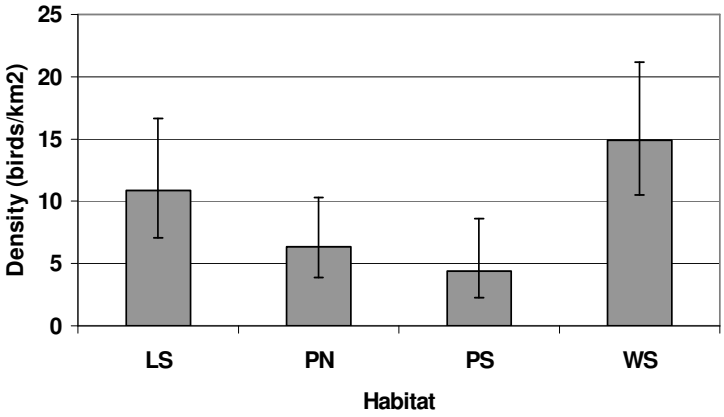


Abundance (avg. # birds/point-count) and breeding distribution of Brown Creeper in the Black Hills, 2002.

Habitat-specific density estimates for Brown Creeper in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	ID	--	--	--	7
BU	ID	--	--	--	2
FR	ID	--	--	--	2
LS	10.86	7.09	16.65	22	41
MR	ID	--	--	--	6
PN	6.32	3.88	10.30	25	26
PS	4.39	2.24	8.61	35	18
WS	14.90	10.49	21.16	18	43

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

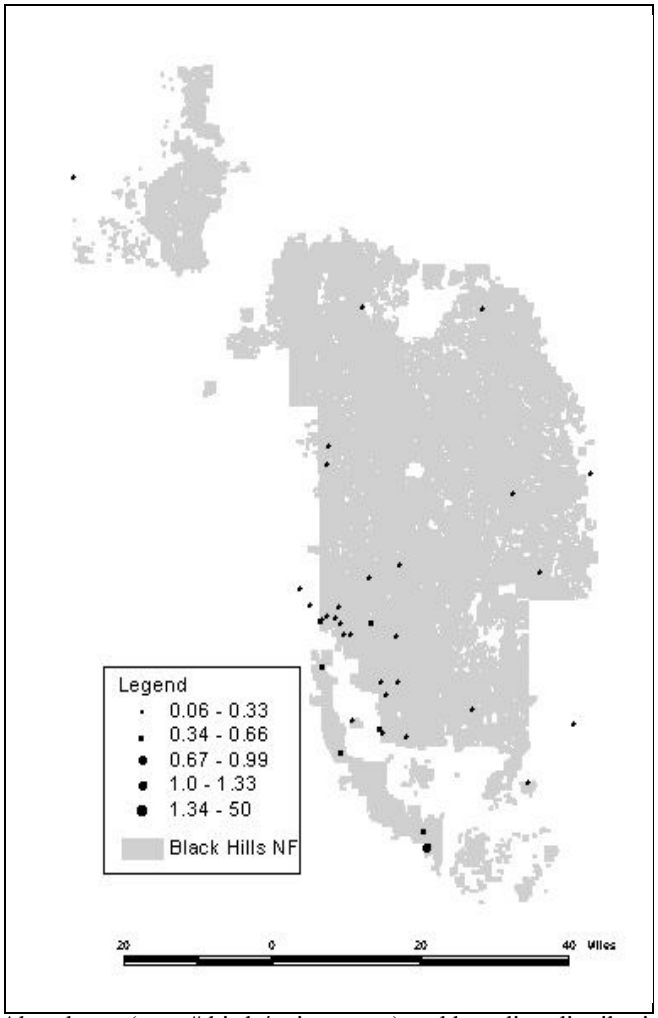


Relative density of Brown Creeper among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Rock Wren

Rock Wren occurs locally across the Black Hills, generally in low abundance. Although we detected it primarily in FR and SH, its distribution is more closely tied to the availability of steep, rocky slopes in arid environments, that are often found in association with these habitats. The results suggest that this species should be effectively monitored under MBBH through point-transects in SH and FR.

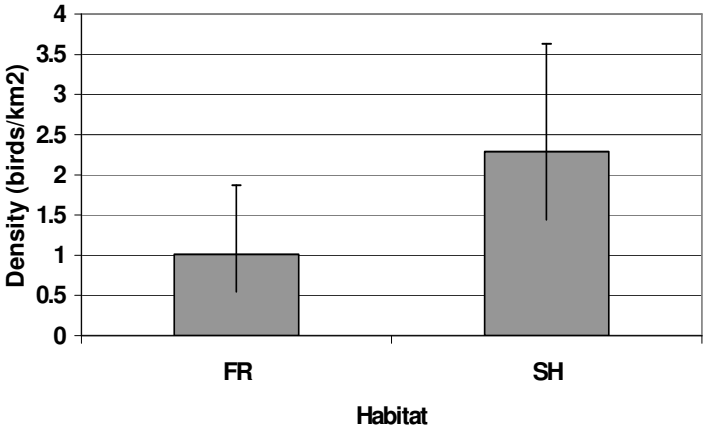


Abundance (avg. # birds/point-count) and breeding distribution of Rock Wren in the Black Hills, 2002.

Habitat-specific density estimates for Rock Wren in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	ID	--	--	--	1
BU	ID	--	--	--	8
FR	1.01	0.55	1.87	32	25
LS	ID	--	--	--	2
MG	ID	--	--	--	8
MR	ID	--	--	--	11
PN	ID	--	--	--	2
PS	ID	--	--	--	13
SH	2.29	1.44	3.63	24	31
WS	ID	--	--	--	1

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

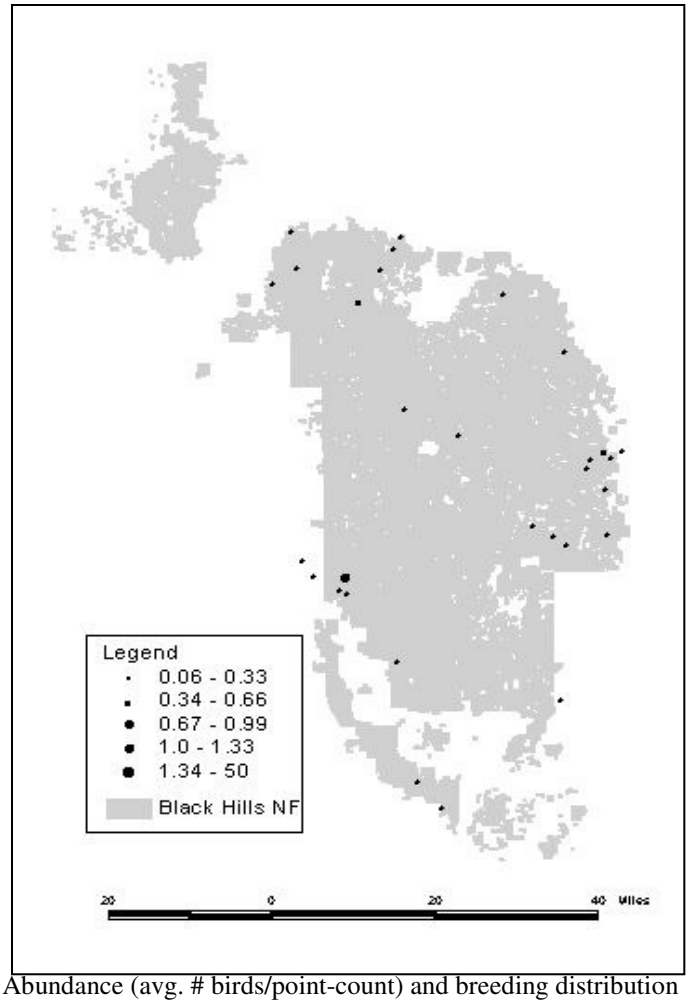


Relative density of Rock Wren among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Canyon Wren

Canyon Wren occurs locally in the Black Hills, primarily in steep canyons with high cliffs that provide suitable breeding habitat. We observed Canyon Wren most frequently along FR habitats, which often occur along the bottoms of such canyons. The results suggest that this species should be effectively monitored under MBBH through point-transects in FR.



Abundance (avg. # birds/point-count) and breeding distribution of Canyon Wren in the Black Hills, 2002.

Habitat-specific density estimates for Canyon Wren in the Black Hills, 2002.

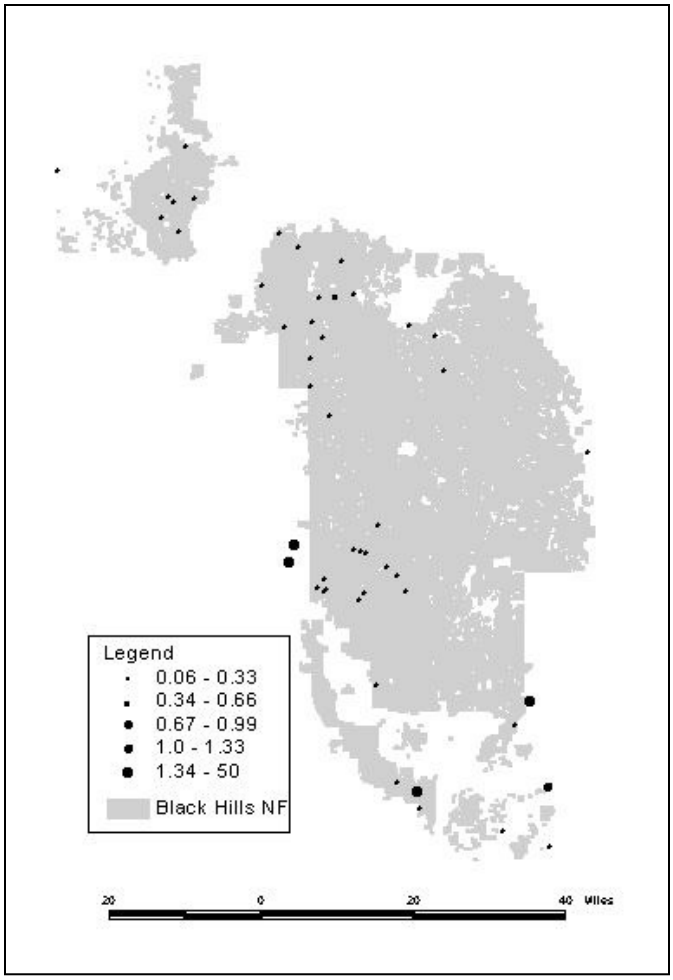
Habitat	D	LCL	UCL	CV(%)	N
AS	ID	--	--	--	1
FR	1.09	0.68	1.77	25	29
LS	ID	--	--	--	7
MR	ID	--	--	--	10
PS	ID	--	--	--	2
SH	ID	--	--	--	9
WS	ID	--	--	--	1

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

House Wren

House Wren is fairly widespread in the Black Hills, although unlike in many parts of its range, it is surprisingly uncommon or absent in most places. Pettingill and Whitney (1965) described this species as a "common summer resident at lower elevations." Although we detected House Wren in a number of habitats in the Black Hills, density is greatest in FR, although it occurs to a lesser extent in MR as well. The results suggest that this species should be effectively monitored under MBBH through point-transects in FR.

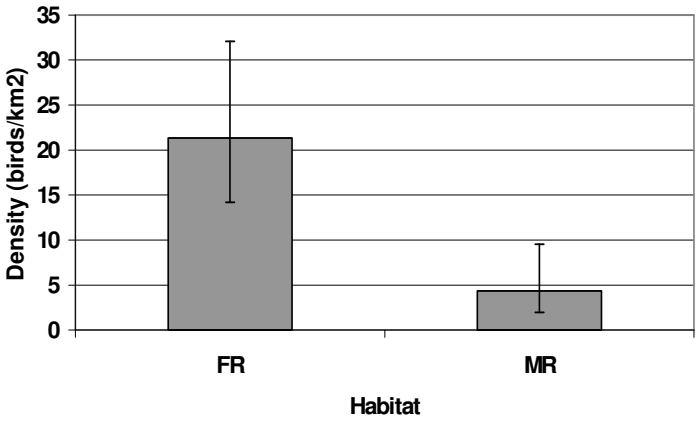


Abundance (avg. # birds/point-count) and breeding distribution of House Wren in the Black Hills, 2002.

Habitat-specific density estimates for House Wren in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	ID	--	--	--	10
BU	ID	--	--	--	8
FR	21.33	14.18	32.08	21	90
LS	ID	--	--	--	6
MG	ID	--	--	--	1
MR	4.31	1.95	9.52	41	19
PN	ID	--	--	--	6
PS	ID	--	--	--	2
SH	ID	--	--	--	6

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

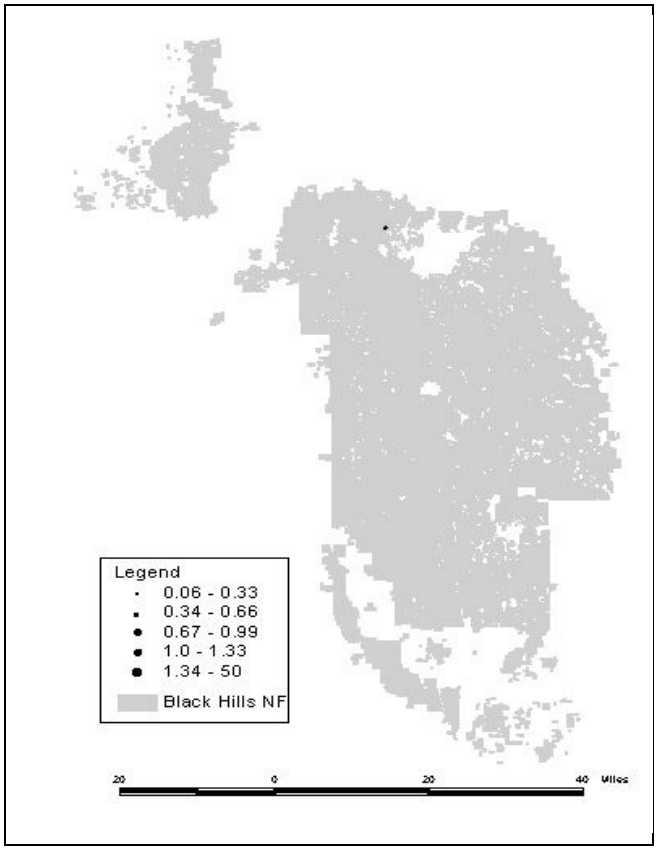


Relative density of House Wren among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

American Dipper

American Dipper occurs only along fast-flowing, rocky streams in the Black Hills. It relies wholly on aquatic insects (particularly larvae) that are sensitive to water quality, and it is thus an excellent indicator of overall stream health (Tyler and Ormerod 1994). American Dippers were recorded at a single location in 2002 on Spearfish Creek. Although they do occur elsewhere in small numbers, they are at present primarily restricted to this watershed. Previous reports indicate that dippers were formerly more widespread in the Black Hills, occurring on French Creek, Box Elder Creek, Elk Creek and, until recently, on Rapid Creek (Backlund 2001). This species will not be adequately monitored by point-transects under MBBH. Additional efforts focused on censusing populations along streams, especially Spearfish Creek and it's tributaries, Whitewood Creek, Bear Butte Creek, and Rapid Creek, will be necessary to adequately monitor this species in the Black Hills.



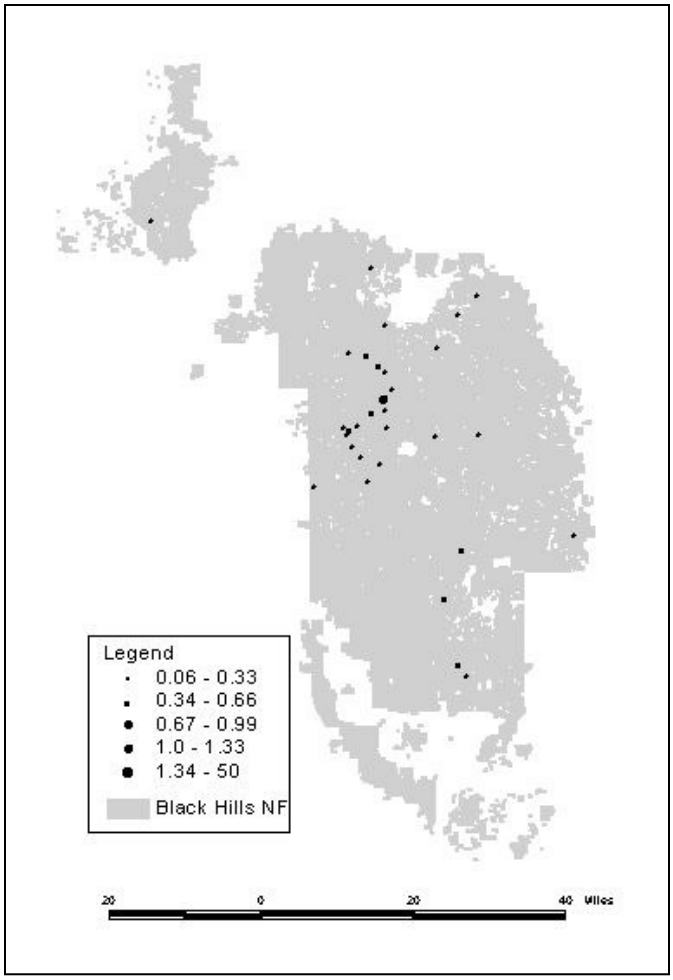
Point-transect observations of the American Dipper in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Golden-crowned Kinglet

(Region 2 Sensitive Species)

Golden-crowned Kinglet occurs locally in the Black Hills in conjunction with stands of mature white spruce. We found Golden-crowned Kinglet almost exclusively in WS habitat, although a few individuals were recorded from other habitats, presumably where significant stands of spruce were present. This species should be effectively monitored under *MBBH* through point-transects in WS.



Abundance (avg. # birds/point-count) and breeding distribution of Golden-crowned Kinglet in the Black Hills, 2002.

Habitat-specific density estimates for Golden-crowned Kinglet in the Black Hills, 2002.

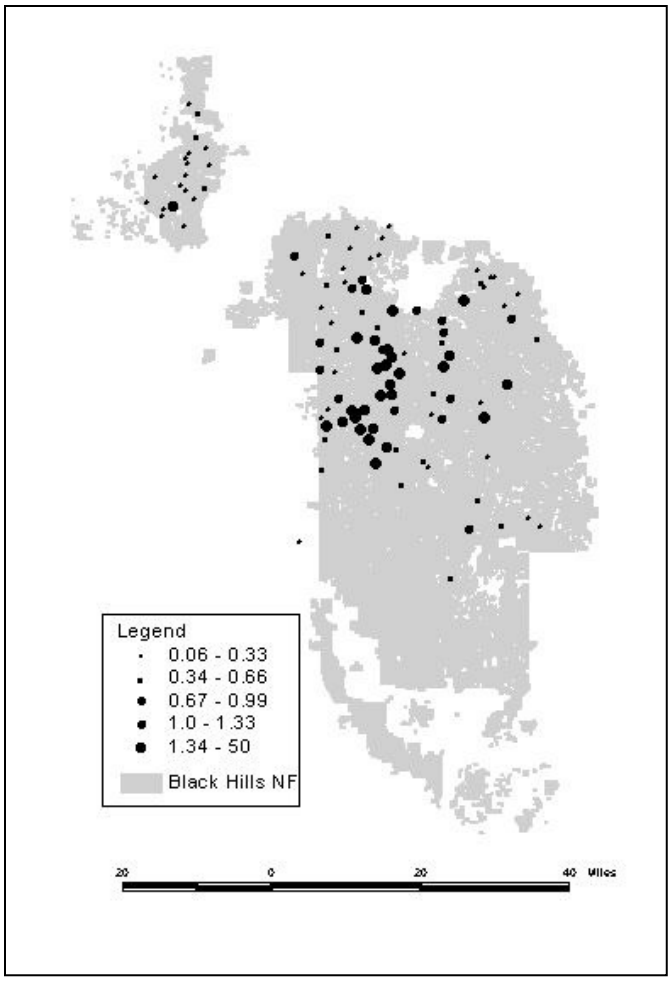
Habitat	D	LCL	UCL	CV(%)	N
AS	ID	--	--	--	1
FR	ID	--	--	--	1
LS	ID	--	--	--	11
MR	ID	--	--	--	4
PN	ID	--	--	--	5
PS	ID	--	--	--	3
WS	18.49	13.01	26.28	18	72

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Ruby-crowned Kinglet

Ruby-crowned Kinglet occurs primarily in the northern Black Hills and Bear Lodge Mountains. Similar to the Golden-crowned Kinglet, this species typically occurs in association with white spruce, although this relationship is less rigid than in the former species. Nonetheless, density is greatest in WS, where it is very high. Ruby-crowned Kinglet also occurs in lower density in other habitats, generally where there is some spruce present. It appears that less extensive stands of spruce are needed for this species to occur. Golden-crowned Kinglet should be effectively monitored under MBBH through point-transects in a range of habitats, especially WS.

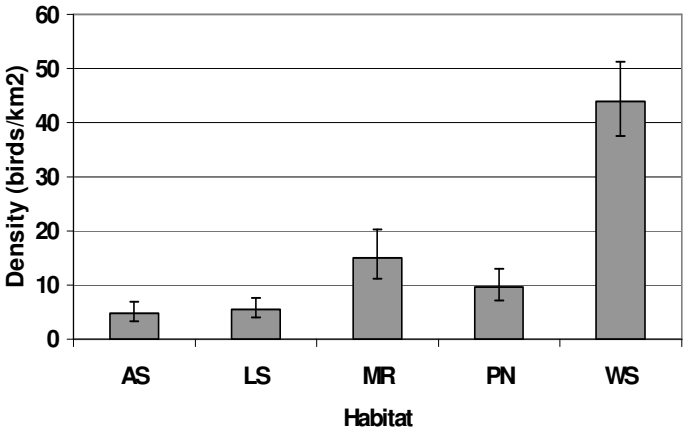


Abundance (avg. # birds/point-count) and breeding distribution of Ruby-crowned Kinglet in the Black Hills, 2002.

Habitat-specific density estimates Ruby-crowned Kinglet in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	4.75	3.27	6.89	19	72
FR	ID	--	--	--	12
LS	5.52	3.99	7.64	17	78
MR	15.03	11.16	20.24	15	160
PN	9.67	7.17	13.02	15	114
PS	ID	--	--	--	13
WS	43.89	37.58	51.28	8	459

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

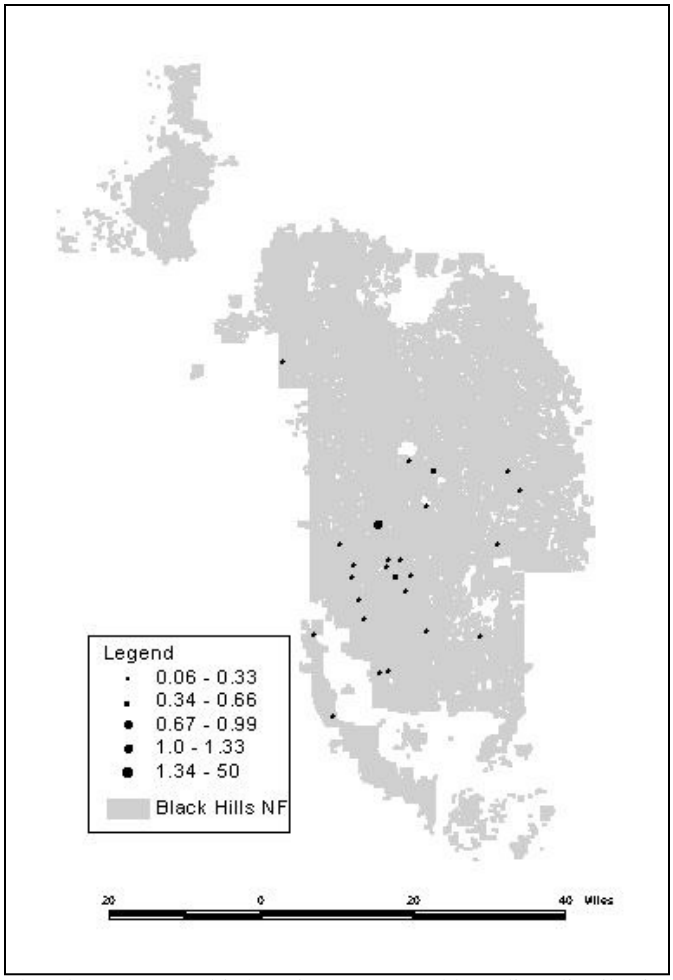


Relative density of Ruby-crowned Kinglet among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Eastern Bluebird

Eastern Bluebird occurs locally in the Black Hills, particularly in the Jasper Burn Area, although it is generally not abundant anywhere. Eastern Bluebirds typically occupy open habitats, such as pine woodlands, grasslands, and pastures, with available snags or nest boxes for nesting. Although Eastern Bluebirds were recorded from several habitats, density was greatest in BU. This species should be effectively monitored under *MBBH* through point-transects in BU.



Abundance (avg. # birds/point-count) and breeding distribution of Eastern Bluebird in the Black Hills, 2002.

Habitat-specific density estimates for Eastern Bluebird in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	ID	--	--	--	2
BU	2.57	1.34	4.94	34	40
LS	ID	--	--	--	1
MG	ID	--	--	--	9
PS	ID	--	--	--	5

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

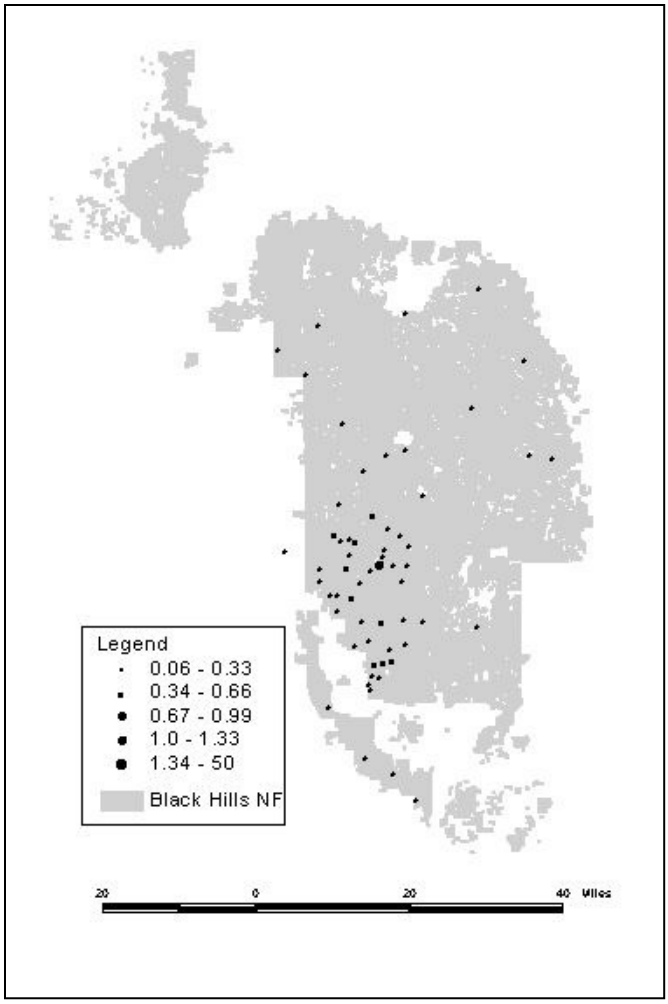
Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Mountain Bluebird

(PIF High Regional Priority)

Mountain Bluebird occurs throughout much of the Black Hills, although it appears to be most abundant and widespread in the southwest. Estimated density is greatest in BU, where Mountain Bluebirds typically outnumber Eastern Bluebirds.

Mountain Bluebirds are locally common in native grasslands, typically where at least some trees are present. They tend to be absent in expansive grasslands that lack trees. Because the MG category currently contains sites both with and without trees, the density estimate in MG reflects its average density across both types of grasslands. However, density is likely higher along forest-grassland ecotones. Nonetheless, the results suggest that Mountain Bluebird should be effectively monitored under MBBH through point-transects in a range of habitats, especially in BU and MG.

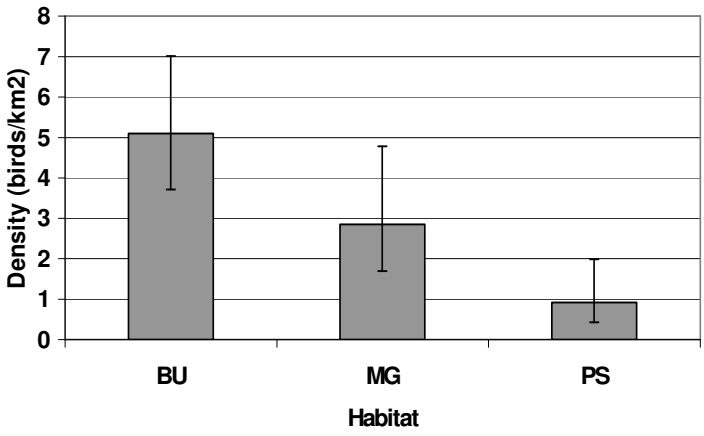


Abundance (avg. # birds/point-count) and breeding distribution of Mountain Bluebird in the Black Hills, 2002.

Habitat-specific density estimates for Mountain Bluebird in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	ID	--	--	--	1
BU	5.10	3.71	7.02	16	76
FR	ID	--	--	--	8
LS	ID	--	--	--	7
MG	2.85	1.69	4.79	27	30
MR	ID	--	--	--	5
PN	ID	--	--	--	6
PS	0.91	0.42	1.99	40	16
SH	ID	--	--	--	15
WS	ID	--	--	--	2

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

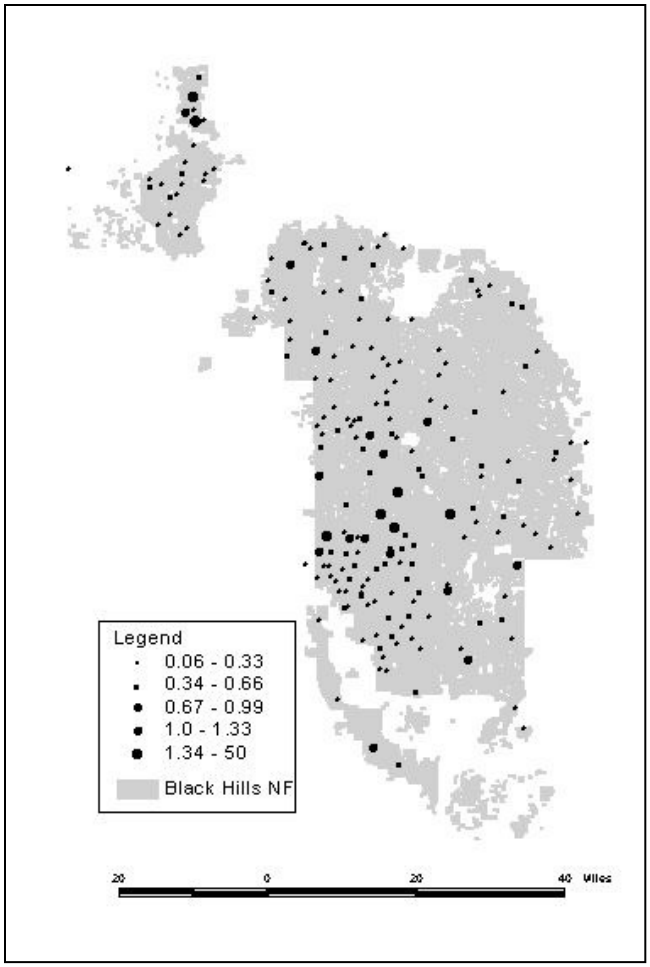


Relative density of Mountain Bluebird among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Townsend's Solitaire

Townsend's Solitaire occurs throughout the Black Hills in low to moderately high abundance. Density appears to be greatest in PN and LS, although it is not significantly different in these habitats than in some others. This species should be effectively monitored under *MBBH* through point-transects in range of habitats.

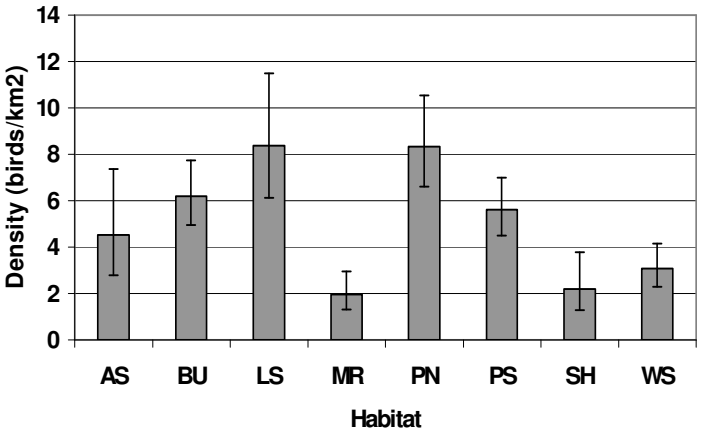


Abundance (avg. # birds/point-count) and breeding distribution of Townsend's Solitaire in the Black Hills, 2002.

Habitat-specific density estimates for Townsend's Solitaire in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	4.53	2.78	7.37	25	53
BU	6.18	4.94	7.73	11	190
FR	ID	--	--	--	10
LS	8.38	6.12	11.48	16	149
MG	ID	--	--	--	15
MR	1.96	1.30	2.95	21	35
PN	8.33	6.59	10.53	12	124
PS	5.60	4.49	6.99	11	177
SH	2.20	1.28	3.77	28	27
WS	3.07	2.28	4.14	15	60

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

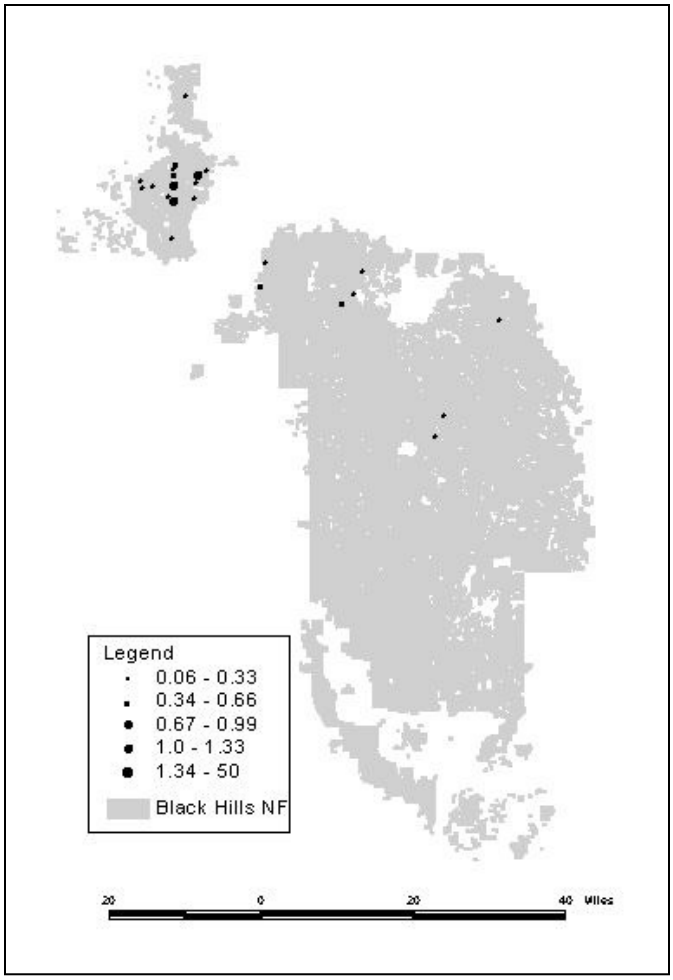


Relative density of Townsend's Solitaire among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Veery

Veery occurs in low to moderate abundance in the northern Black Hills. It is most abundant in the Bear Lodge Mountains. Veeries do occur locally further south in the Black Hills. Veeries are found in highest density in MR, although they also do occur less commonly in other habitats, especially in the Bear Lodge Mountains, where dense understory vegetation exists. This species should be effectively monitored under *MBBH* through point-transects in MR.



Abundance (avg. # birds/point-count) and breeding distribution of Veery in the Black Hills, 2002.

Habitat-specific density estimates for Veery in the Black Hills, 2002.

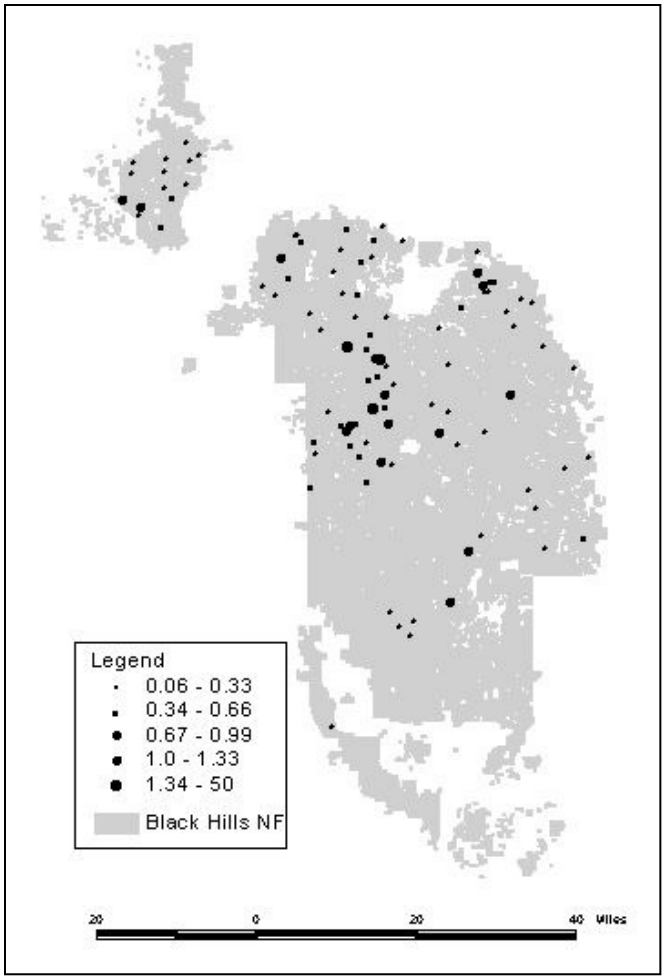
Habitat	D	LCL	UCL	CV(%)	N
AS	ID	--	--	--	12
LS	ID	--	--	--	5
MR	2.87	1.96	4.22	20	67
PN	ID	--	--	--	9
WS	ID	--	--	--	1

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

Swainson's Thrush

Swainson's Thrush occurs widely in the Black Hills in low to moderately high abundance, although it is most widespread in the north. Swainson's Thrush occurs in greatest density in WS, although it also occurs in other habitats, generally where at least some spruce is present. This species should be effectively monitored under *MBBH* through point-transects in a range of habitats, especially WS.

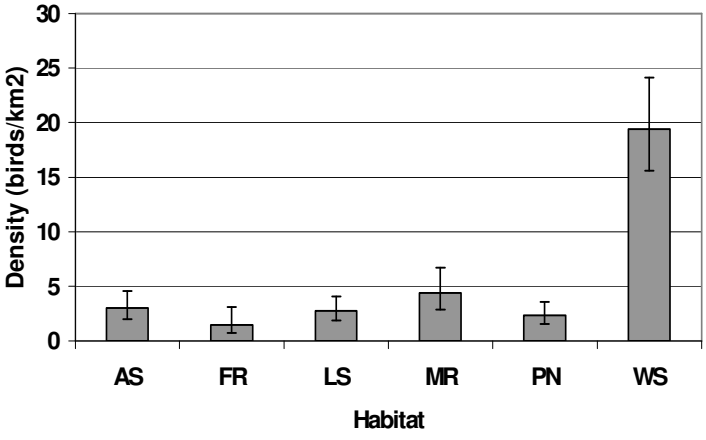


Abundance (avg. # birds/point-count) and breeding distribution of Swainson's Thrush in the Black Hills, 2002.

Habitat-specific density estimates for Swainson's Thrush in the Black Hills, 2002.

Habitat	D	LCL	UCL	CV(%)	N
AS	3.02	2.00	4.57	21	37
BU	ID	--	--	--	4
FR	1.48	0.71	3.08	38	16
LS	2.75	1.87	4.05	20	56
MR	4.39	2.87	6.71	22	63
PN	2.35	1.54	3.57	22	50
PS	ID	--	--	--	1
WS	19.41	15.61	24.14	11	218

D=Density in birds/km2; LCL=lower 95% confidence limit on D; UCL=upper 95% confidence limit on D; coefficient of variation on D; N=number of observations; ID=insufficient data

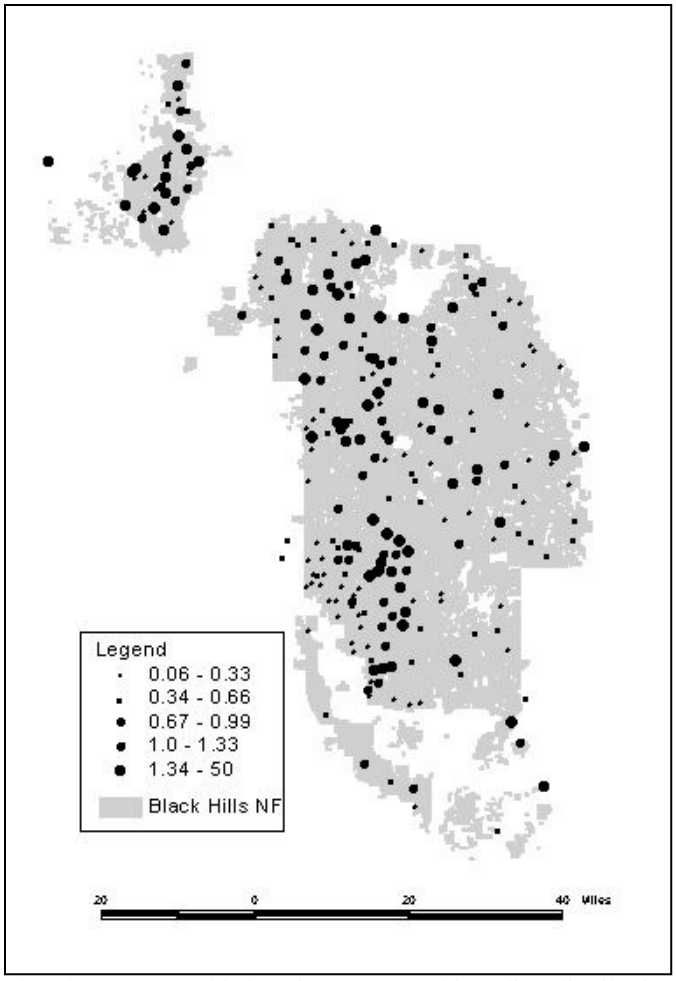


Relative density of Swainson's Thrush among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

American Robin

American Robin is one of the most abundant and widespread bird species in the Black Hills. It occurs throughout the region in all habitats, Estimated density is greatest in MR and WS. This species should be effectively monitored through point-transects under *MBBH* in a wide range of habitats.



Abundance (avg. # birds/point-count) and breeding distribution of American Robin in the Black Hills, 2002.

Relative density of American Robin among habitats in the Black Hills, 2002.

Legend: **AS**=Aspen, **BU**=Burn, **FR**= Foothill Riparian, **LS**=Late-successional Pine, **MG**=Mixed-grass, **MR**= Montane Riparian, **PN**=Pine-north, **PS**=Pine-south, **SH**=Shrubland, **WS**=White Spruce. *Error bars* denote 95% confidence intervals.

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