Monitoring the Birds of Carson National Forest: 2006 Field Season Report

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In Cooperation With:

ROCKY MOUNTAIN BIRD OBSERVATORY

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

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

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

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

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

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EXECUTIVE SUMMARY

Birds are excellent indicators of environmental quality and change. In addition, they are one of the most highly visible and valued components of our native wildlife. Monitoring birds provides data needed not only to effectively manage bird populations, but also to understand the effects of human activities on the ecosystem and to gauge their sustainability. Because bird communities reflect an integration of a broad array of ecosystem conditions, monitoring entire bird communities at the habitat level offers a cost-effective means for monitoring biological integrity at a variety of scales.

In 2006, Rocky Mountain Bird Observatory (RMBO), in conjunction with its funding partner, the Carson National Forest (CNF), implemented Year 4 of *Monitoring Birds of the Carson National Forest,*, using a protocol similar to other RMBO monitoring programs as delineated by Panjabi (2006). RMBO has designed this program to provide statistically rigorous long-term trend data for populations of most diurnal, regularly breeding bird species in the Carson National Forest, including some U.S. Forest Service Region 3 Sensitive Species and CNF Management Indicator Species. In the short term, this program provides information needed to effectively manage and conserve bird populations in the CNF, including the spatial distribution, abundance, and relationship to important habitat characteristics for each species. This cooperative project supports the CNF's efforts to comply with requirements set forth in the National Forest Management Act and other statutes and regulations. It also contributes to RMBO's broader landscape-scale breeding bird monitoring program, which currently includes 11 states in the Rocky Mountains and Great Plains regions.

This year, RMBO staff conducted 57 point transect surveys (848 point counts) in seven habitats within the CNF (aspen, grassland, mixed conifer, pinyon-juniper, ponderosa pine, sage shrubland, and spruce-fir), with the majority of transects in pinyon-juniper and ponderosa pine. Very few transect modifications were made this year. In 2006, an additional 19 new transects (285 point counts) were established in the Valle Vidal Ranger District of the CNF in order to monitor the effects of potential energy development.

RMBO staff recorded 110 breeding bird species in seven habitats on point transects distributed throughout the CNF; many species were observed on only a few occasions. This year, we provided density estimates for all years of the monitoring project. We included density estimates for all species with a minimum of 100 detections for all four years (an average of 25 per year). We also included two species of special concern with less than 100 detections, Hairy Woodpecker and Sage Sparrow, in order to provide information that may aid in the management of these species. The habitat-stratified point transect data provided good estimates (CV of ≤ 50% in at least one habitat) for 41 bird species and moderately robust estimates (CV=50-75%) for six species, including three CNF Management Indicator Species and three Species of Greatest Conservation Need as designated by the New Mexico Comprehensive Wildlife Conservation Strategy. The 47 species should be effectively monitored under the current program in at least one of the seven habitats surveyed this year. We obtained sufficient data on several other species to monitor their populations across habitat types, although in some cases, these species may be better monitored with additional transects in certain habitats. In 2006,

we also were able to monitor seven of the 20 priority species identified in the New Mexico Parnters in Flight Plan for pinyon-juniper habitat.

In the Valle Vidal Ranger of the CNF, we recorded 65 breeding bird species in four habitats on point transects. We provided density estimates for all species for which we recorded at least 25 detections in a given habitat. We included one CNF Management Indicator Species, Hairy Woodpecker, with less than 25 detections in order to provide information that may be useful for this species. The habitat-stratified point transect data provided good results (CV of ≤ 50% in at least one habitat) for 14 bird species and moderately robust data (CV=50-75%) for three species, including one Management Indicator Species and one Species of Greatest Conservation Need. These 17 species should be effectively monitored under the current program in at least one of the four habitats surveyed this year. We also recorded sufficient detections to monitor four of the 21 priority species identified in the New Mexico Partner's in Flight Plan for ponderosa pine habitat in the Valle Vidal.

ACKNOWLEDGEMENTS

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INTRODUCTION

Program History

In 2003, the Rocky Mountain Bird Observatory (RMBO) began working with the Carson National Forest (CNF) in New Mexico to improve our knowledge of the status and habitat requirements of avian species in this forest. This program, known as *Monitoring the Birds of Carson National Forest* (*MBCNF*), is designed to provide population status and trend data for most diurnal, regularly-occuring breeding landbirds of the region. Over the last four years, RMBO has established bird survey transects in seven habitats throughout the CNF: aspen, grassland, mixed conifer, pinyon-juniper, ponderosa pine, sage shrubland, and spruce-fir. In 2006, we established new transects in the Valle Vidal (VV) Ranger District of the CNF in four habitats: grassland, mixed conifer, ponderosa pine, and spruce-fir.

Reasons for Monitoring

Much like the canary in the coalmine, birds can be excellent indicators of biological integrity and ecosystem health (Morrison 1986, Croonquist and Brooks 1991, Bureau of Land Management 1998, Hutto 1998, O'Connell et al. 2000, Rich 2002, U.S. EPA 2002, Birdlife International 2003). Because they comprise a diverse group of niche specialists, occupy a broad range of habitats, are sensitive to both physical and chemical impacts on the environment, and often reflect the abundance and diversity of other organisms with which they coexist, birds can be useful barometers of environmental change and for measuring the sustainability of human activities on ecosystems.

Bird communities reflect an integration of a broad array of ecosystem conditions, including productivity, vegetation structure and composition, water quality, and landscape integrity (Adamus et al. 2001). The response of bird communities to changes in the environment can be examined at a variety of spatial scales, making them a powerful and practical tool for evaluating the broader effects of resource management, conservation and restoration activities, or other environmental changes. And because birds are generally abundant, conspicuous, and relatively easy to identify, they offer tremendous logistical and economic advantages over other taxonomic groups for monitoring their populations. Also, birds are popular with the public and there is a strong and growing interest, both nationally and internationally, to manage and conserve bird populations, many of which are exhibiting long-term population declines (Sauer et al. 2003).

Aside from serving as environmental indicators, birds are a tremendous economic resource in and of themselves. A recent federal economic report found that 46 million birdwatchers across America spent $32 billion in 2001 on bird watching and related activities (USFWS 2003). This spending generated $85 billion in overall economic output and $13 billion in federal and state income

taxes, and supported more than 863,000 jobs. In addition to being an economic attraction, birds also pollinate, disperse seeds, and consume pests of ecologically and economically important plants, thereby providing ecosystem services worth many billions of dollars. Thus declines in bird populations diminish a valuable economic resource that could have profound negative implications for regional and local economies, both directly and indirectly.

In order for birds to be conserved on a global scale, people in all areas must assume responsibility to conserve the species and habitats for which they are stewards, and population monitoring forms the backbone of avian conservation. Without current monitoring data, conservation efforts are likely to be misguided and inefficient. For these and other reasons, monitoring is mandated by legislation such as the National Environmental Policy Act (1969), Endangered Species Act (ESA; 1973), and the Forest Management Act (1976), as well as by various state laws, Forest plans, Preserve management plans, and other long-range plans (Sauer 1993, Manley et al. 1993).

Effective conservation depends on adequate monitoring information. To date, resource managers have relied on data derived from the Breeding Bird Surveys (BBS), for bird population information. The BBS, however, is a road-based, volunteer-dependent survey that does not effectively sample many species or habitats (Robbins et al. 1993, Sauer 1993), and does not reliably decipher population trends at small geographic scales (Sauer 2000). Furthermore, the design and implementation of the BBS are such that results generated from these efforts are often inconclusive due to the difficulty associated with interpreting index counts (Sauer 2000) and numerous confounding variables (Robbins et al. 1986, Bohning-Gaese et al. 1993, Sauer et al. 1994, James et al. 1996, Thomas 1996). For these reasons, BBS data are generally insufficient to guide local or regional management decisions.

Given the declines of many species of North American breeding birds, there is an urgent need for monitoring programs that serve as an “early-warning system” to identify declining species and the causes of declines so that natural resource managers can proactively prevent further declines. RMBO’s monitoring programs are designed to be comparable, repeatable, data rich, long-term, multi-scale and accessible, so that managers can make informed decisions to effectively conserve birds and their habitats.

Monitoring Objectives

RMBO’s bird monitoring programs are designed to provide population trend or status data on most regularly-occurring breeding species within each program area. Initially, we expect to collect data to provide “early-warning” information for all species that can be monitored through a habitat-based approach. After establishing this monitoring framework, we anticipate collecting more demographic information and testing *a priori* hypotheses to determine the possible reasons for known declines and to better inform management decisions.

Herein we discuss the initial "early-warning" monitoring framework, the monitoring goals and progress.

The specific objectives of RMBO's monitoring program are:

1.) to integrate existing bird monitoring efforts in the region to provide better information on distribution and abundance for most breeding landbirds, especially priority species;
2.) to provide basic habitat association data for most bird species to address habitat-management issues;
3.) to provide long-term trend or status data on most regularly occurring breeding species in the region, with a target of detecting a minimum rate of population change of -3.0% per year over a maximum time period of 30 years;
4.) to maintain a high-quality database that is accessible to all of our collaborators as well as the public in the form of raw and summarized data and,
5.) to generate decision support tools such as population density models that help guide conservation efforts and provide a better measure of our conservation success.

METHODS

Study Area

Habitats

In May 2003, RMBO in coordination with biologists from the United States Forest Service (USFS) selected nine habitats (alpine tundra, aspen, grassland, mixed conifer, mid-elevation riparian, pinyon-juniper, ponderosa pine, sage shrubland, and spruce-fir) in which to place 60 point-count transects. These habitats were selected on the basis of distinct avifaunal communities, as well as management questions associated with each on the CNF, with an emphasis placed on a massive die-off of pinyon pine (*Pinus edulis*). Therefore, half of the transects were assigned to pinyon-juniper with the goal that the remaining transects be evenly distributed among the other habitats. However, due to small and irregular patches of the other habitats besides ponderosa pine (*Pinus ponderosa*), only a few transects were able to be established in these habitats. In 2004, several new transects were established and many of the 2003 transects were relocated to more representative habitat. In 2005, it was decided to survey fewer pinyon-juniper transects and to drop alpine tundra and mid-elevation riparian transects to increase effort in other habitats. No significant changes were made in 2006, and the current transect allocation produced robust estimates for all habitats. Also, in 2006, 19 new transects were established in the VV section of the CNF in the four habitats that exist there.

Aspen

Aspen habitat consists of forested stands dominated by quaking aspen (*Populus tremuloides)* and, typically, some conifers are present as aspen is seldom a climax vegetation type. Englemann spruce (*Picea engelmanii*) and white fir (*Abies concolor*) are the most common conifers associated with aspen stands. As a result of the presence of these tree species, there are often many detections of bird species generally associated with conifers on aspen transects. Aspen stands also have varying amounts of understory vegetation. The most frequently encountered plants in the understory are aspen saplings, common juniper (*Juniperus communis*), and rabbitbrush (*Chrysothamnus sp.*)

Grassland

Grassland habitat is composed of high-elevation areas dominated by various grass species. In the CNF, grassland habitat is often above 10,000 feet elevation and not considered true “prairie”. Scattered shrubs are also present, with rabbitbrush, big sagebrush (*Artemisia tridentata*), and yucca (*Yucca sp.*) recorded most frequently. In the VV the most common shrubs are shrubby cinquefoil (*Pentaphylloides floribunda*) and rabbitbrush.

Mixed Conifer

Mixed Conifer habitat describes mid-elevation conifer-dominated stands made up of a diversity of tree species. On transects distributed throughout the CNF, the most commonly recorded overstory species are Douglas-fir (*Pseudotsuga menziesii*), aspen, and white fir. The most frequently encountered shrubs in mixed conifer are common juniper, aspen saplings, and snowberry (*Symphoricarpos sp.*). In the VV, Douglas-fir, ponderosa pine, and aspen are the most common overstory species. The most common understory species are common juniper, Gambel's oak (*Quercus gambelii*), and Englemann spruce saplings.

Pinyon-Juniper

Arid forested areas dominated by pinyon pine and juniper (*Juniperus* sp.) compose Pinyon-Juniper habitat. Juniper (*Juniperus sp.*) is the most commonly recorded tree, followed by live pinyon pine, and then dead pinyon. In 2005 we began recording dead pinyon trees in a separate category to help determine the impact of the drought on pinyon pine mortality. The most common understory species in pinyon-juniper habitat are big sagebrush, pinyon pine saplings, and juniper saplings.

Ponderosa Pine

Ponderosa Pine habitat is composed of arid conifer stands dominated by ponderosa pine that are typically lower in elevation than mixed conifer stands. In addition to ponderosa pine, the most common tree species are juniper and pinyon pine. The most common understory species are Gambel's oak, mountain mahogany (*Cercocarpus sp.*), and big sagebrush. In the VV, ponderosa pine, Douglas-fir, and dead pinyon pine are the most common trees recorded in this habitat. The most common understory species in the VV are Gambel's oak, ponderosa pine saplings, and mountain mahogany.

Sage Shrubland

Sage Shrubland consists of open landscapes dominated by big sagebrush. The stands of sage that we survey in the CNF are generally narrow "fingers" of pure sage; consequently, point-count stations were often near forests. In addition to big sagebrush, common plants include rabbitbrush and pinyon pine saplings.

Spruce-Fir

Spruce fir habitat is found at high elevations and is dominated by coniferous trees. On forest-wide transects, the three most common tree species are Engelmann spruce, subalpine fir (*Abies lasiocarpa*), and aspen, respectively. The three most frequently recorded plants in the understory are Englemann spruce saplings, subalpine fir saplings, and common juniper. In VV spruce-fir transects, subalpine fir, Engelmann spruce, and aspen are the three most common tree species. The most common understory species in spruce-fir in the VV, are subalpine fir, common juniper, and Engelmann spruce.

Field Personnel

Field work in 2006 was conducted by RMBO staff, consisting of six experienced biological technicians with excellent aural and visual bird-identification skills. All technicians had at least two years of experience conducting bird monitoring for RMBO, bringing with them considerable experience with the protocol and knowledge of the local birds. Each technician also completed a four-day training program at the beginning of the field season to ensure full understanding of the field protocols and to practice bird identification and distance estimation in a variety of habitats.

Site Selection

Survey sites for the *MBCNF* project were initially selected in 2003. In 2004, the alpine-tundra transects established the previous year were renamed as grassland as the transect locations were more representative of grassland habitat. Similarly, one of the aspen transects was renamed as mixed conifer, and two sage shrubland transects were renamed as pinyon-juniper. Also, one aspen transect conducted in 2003 and 2004 was renamed as mixed conifer. In 2004, we established several new transects: four in grassland, three in pinyon-juniper, two in ponderosa pine, two in sage shrubland, two in alpine tundra, one in aspen, one in spruce-fir and one in mixed-conifer habitat. In 2005 we made a few additional changes to the existing transects. We dropped the montane riparian habitats since we detected no birds of special interest that were not already being detected in sufficient numbers in one or more of the other habitats. Also, we established three, new ponderosa pine transects and one new mixed conifer transect. We changed *MBCNF* transects very little in 2006 and established 19 new transects in the VV district of the CNF.

Point Transect Protocol

RMBO staff conducted point transects (Buckland et al. 1993) in order to sample bird populations in each habitat selected for monitoring. Each transect was surveyed by one observer following protocol established by Leukering (2000) and modified by Panjabi (2006). RMBO technicians conducted all transect surveys in the morning, between ½-hour before sunrise and 11 AM; most surveys were completed before 10 AM. To maximize efficiency, observers located the selected stand on the ground prior to the morning of the survey. For new transects, observers used this pre-survey visit to establish an access point for each stand, and a random distance and bearing 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 if possible. In many cases, the pre-selected bearing eventually would lead the transect out of the target habitat, or to some obstruction (e.g., cliff or private land), forcing the observer to change the bearing of the transect. When this happened, the observer back-tracked to the last point and randomly turned the transect right or left, at an angle perpendicular to the original bearing, and then alternated right or left if additional turns were necessary. In some small or linear stands (e.g.,

riparian sites), the size and shape of the stand determined the location and course of the transect.

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

Beginning in 2004, we considered all non-independent detections of individual birds as part of a 'cluster' together with the first independently observed bird, rather than as a separate independent observation. This means that if the detection of an individual bird is dependent upon the previous detection of another individual, the resulting observation is recorded as one independent detection. We then record a cluster size of *C*, where *C* is the original individual detected plus the sum of any additional individuals detected as a result of the first individual.

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

Data Analysis

We used program DISTANCE (Thomas et al. 2006) to generate density estimates (*D*) using only data collected at point count stations. The notation, concepts, and analysis methods of DISTANCE were developed by Buckland et al. (1993). In DISTANCE analysis, a unique detection function is fit to each distribution of distances associated with a species in a given habitat. Because the detection function is unique to each species in each habitat, DISTANCE analysis avoids some serious problems inherent in traditional analyses of point count data (e.g., unquantifiable differences in detectability among habitats, species, and years). DISTANCE analysis relies on three assumptions, all of which are reasonably well met by *MBCNF*: 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.

In 2006, density estimates were generated only for species for which there was a minimum of 100 detections for all four years of the *MBCNF* project (an average of 25 per season) as recorded from count stations in a given habitat (not including flyovers or between-point observations, and prior to truncation or removal of outliers). For the VV project, we provided density estimates for all species that were detected a minimum of 25 times. Because we considered only independent detections in our analyses of density, the number of *observations* (*n*) reported for each species may be lower than the number of *individuals* (*N*) observed. This is especially true for species that tend to associate in groups (e.g., swifts, swallows, crossbills, etc.) Both numbers may be useful, especially for low-density species, and thus both are reported in the "Species Accounts" section. Note however, that in the habitat accounts in the "Results" section, the number of observations reported (*n*) reflects only the number of independent detections *used to estimate density* (i.e., after any truncation or removal of outliers), and may be less than the total number of independent detections or the total number of individuals observed. The total number of individuals recorded in each habitat for each project, including between point detections of low-density species, is provided in Appendix B and Appendix C.

RESULTS

RMBO staff conducted 848 point counts along 57 point transects in seven habitats (Figure 1) between 14 May and 12 July, 2006 on the forest-wide *MBCNF* project (Table 1). Also, in 2006, we conducted 285 point counts along 19 point transects in four habitats (Figure 1) between 10 June and 14 July, 2006 on the VV project (Table 1).

Table 1. Bird sampling periods and effort in each habitat for each project in the Carson National Forest, summer 2006.

Habitat	Dates sampled	No. of Point Transects	No. of Point Counts
MBCNF Project:			
Aspen	28 June – 8 July	3	45
Grassland	28 May – 31 May	4	60
Mixed Conifer	25 June – 27 June	4	60
Pinyon-Juniper	14 May – 2 June	25	368
Ponderosa Pine	1 June – 16 June	12	180
Sage Shrubland	15 May – 23 May	5	75
Spruce-Fir	9 July – 12 July	4	60
All Habitats	**14 May – 12 July**	**57**	**848**
VV Project:			
Grassland	10 June – 12 June	3	45
Mixed Conifer	15 June – 24 June	4	60
Ponderosa Pine	13 June – 23 June	10	150
Spruce-Fir	13 July – 14 July	2	30
All Habitats	**10 June – 14 July**	**19**	**285**

We recorded 7,478 birds of 109 species on *MBCNF* point-count transects in 2006. We provided density estimations for 46 breeding species with a minimum of 100 detections for all four years of the project in at least one habitat. We have documented 139 species since 2003 that have been present in late spring and summer in the Carson National Forest (Appendix B). Please note that the number of birds in Appendix B includes between point detections of low-density species and flyovers of species that are not believed to be utilizing the habitat in which they were detected. We recorded these detections while surveying but they are not used for estimating densities. We also recorded 1,998 birds of 67 species on point-count transects in the VV in 2006 (Appendix C). For the VV project, we provided density estimates for 17 breeding species for which we recorded a minimum of 25 detections in at least one habitat.

The total number of species detected on *MBCNF* point counts in each habitat in 2006 ranged from 32 in grassland to 86 in pinyon-juniper (Table 2). The total number of species detected on point counts in each habitat in the VV district ranged from 29 in grassland to 56 in ponderosa pine (Table 2). While these totals reflect the spectrum of possible species across a range of sites within a

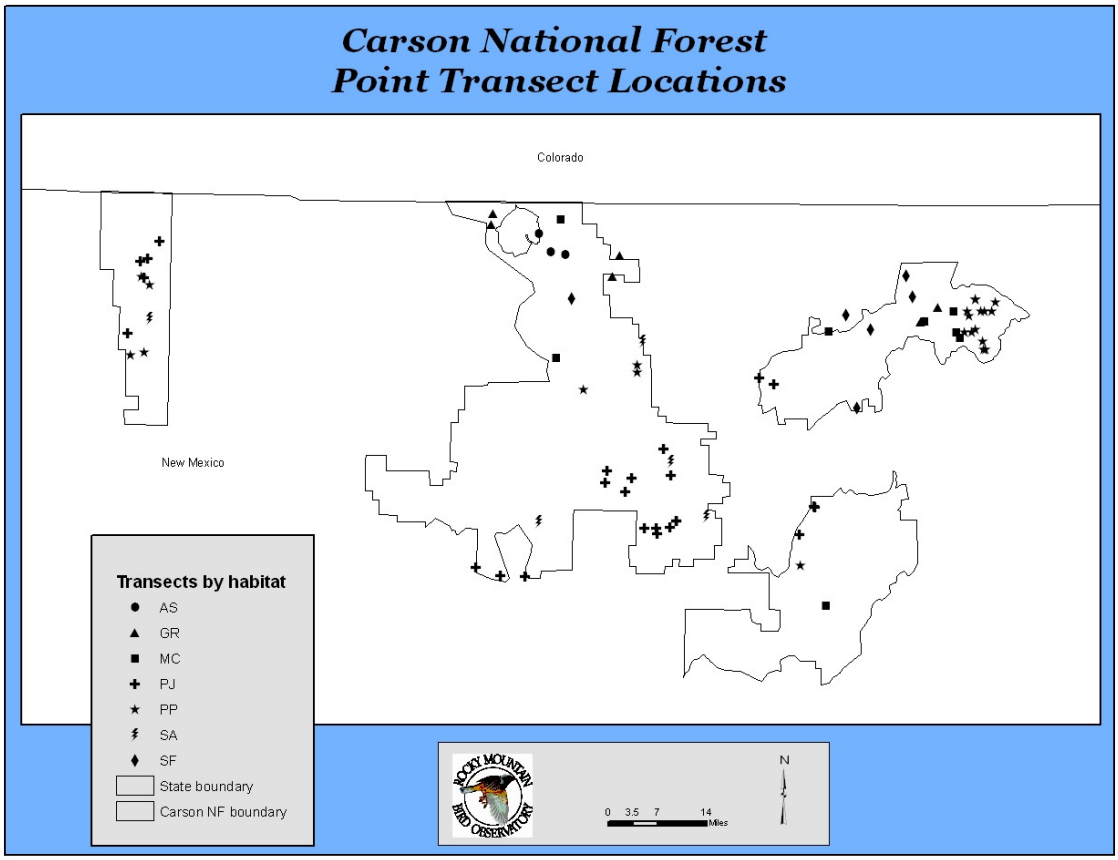
habitat type, it should be understood that some species included in each total were largely peripheral to the habitat in which they were recorded. Thus, species richness measures reflect both the within- and between-habitat diversity of the sites surveyed in each habitat category.

Of the habitats surveyed for the *MBCNF* project in 2006, average species richness per point was greatest in pinyon-juniper habitat; however, average species richness per transect was greatest in ponderosa pine (Table 2). In the VV district, average species richness per point and per transect were greatest in spruce-fir habitat (Table 2). We provide estimates of avian species richness at both the point-level (i.e., sub-sample) and the transect (i.e., site) level. The point-level data are not influenced by stand size (i.e., the number of sub-samples per site), and are therefore best for direct inter-habitat comparisons, while the site-level data, which are influenced by stand size, provide a more complete picture of the bird community within a given stand of habitat. Thus, both estimates are useful from a management perspective.

Table 2. Total detections and species richness in habitats surveyed in the CNF, summer 2006.

Habitat	# birds detected	Avg. # birds/point	# species detected	Avg. species richness/point	Avg. species richness/transect
MBCNF Project:					
Aspen	390	8.7	38	6.5	25
Grassland	339	5.7	32	3.3	14
Mixed Conifer	508	8.5	47	6.6	26
Pinyon-Juniper	3554	9.7	86	6.7	28
Ponderosa Pine	1578	8.8	66	6.5	29
Sage Shrubland	685	9.1	53	5.4	21
Spruce-Fir	473	7.9	37	6.0	22
All habitats	**7527**	**8.9**	**110**	**6.2**	**26**
VV Project:					
Grassland	279	6.2	29	3.4	16
Mixed Conifer	427	7.1	37	5.7	24
Ponderosa Pine	1070	7.1	56	5.4	25
Spruce-Fir	224	7.5	30	5.9	27
All habitats	**1998**	**7.0**	**67**	**5.2**	**23**

Figure 1. Distribution of habitats targeted for bird monitoring under *Monitoring the Birds of Carson National Forest*.



Aspen (AS)

We surveyed 45 point counts along 3 transects in aspen habitat between 28 June and 8 July, 2006 (Table 1). We recorded 390 birds in this habitat, with an average of 8.7 birds per count (Table 2). Observers detected 38 species with an average of 6.5 species per point count and 25 species per transect (i.e., per site).

The point transect data from aspen yielded robust density estimates for four species (CV<50%) (Table 3). *MBCNF* should effectively monitor these four species, which represents 11% of all species recorded from aspen in 2006.

Seventeen species listed as priorities for management concern by NM-PIF were detected on aspen transects reported here by number of individuals detected, from highest to lowest: Western Wood-Pewee, Mountain Bluebird, Dark-eyed Junco, Green-tailed Towhee, Red-naped Sapsucker, Violet-green Swallow, Vesper Sparrow, Williamson's Sapsucker, Red-breasted Nuthatch, Townsend's Solitaire, Dusky Flycatcher, Clark's Nutcracker, Broad-tailed Hummingbird, Olive-sided Flycatcher, Hammond's Flycatcher, Pygmy Nuthatch, and Pine Grosbeak. NM-PIF does not provide a list of priority species specifically for aspen habitat, so these species are those listed in all forested habitats.

Conducting more transects in aspen in the CNF will enable us to provide density estimates for more species. One factor that might influence our ability to do this is the absence of large aspen stands in which to place transects in the CNF. If more financial resources could be dedicated to this effort, we would be able to establish more aspen transects.

Table 3. Estimated densities of breeding birds in aspen habitat in the Carson National Forest, 2003-2006[1].

Species	Year	*D*	*LCL*	*UCL*	*%CV*	*n*
Warbling Vireo	2003	87	30	251	42	30
	2004	221	164	299	16	51
	2005	119	79	179	21	40
	2006	142	87	231	23	49
Mountain Chickadee	2003	51	10	251	62	22
	2004	87	0.8*	9802*	93*	25
	2005	67	21	211	45	29
	2006	46	28	77	23	20
American Robin	2003	16	10	26	23	9
	2004	54	7.6	379	42	20
	2005	39	13	124	45	22
	2006	66	19	229	49	37
Audubon's Warbler	2003	408	109*	1537*	89*	33
	2004	148	37*	597*	89*	8
	2005	594	154*	2288*	91*	47
	2006	198	61*	643*	80*	15

Table 3 cont. Estimated densities of breeding birds in aspen in the Carson National Forest, summer 2003-2006.

Species	Year	*D*	*LCL*	*UCL*	*%CV*	*n*
Gray-headed Junco	2003	89	55	143	25	19
	2004	133	20	892	48	18
	2005	145	98	213	23	31
	2006	75	40	139	30	16

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of observations used to estimate *D*; * = variance not estimable.

Grassland (GR)

We surveyed 60 point counts along 4 transects in aspen habitat between 28 May and 31 May, 2006 (Table 1). We recorded 337 individual birds, with an average of 5.6 birds per point count (Table 2). Observers detected 32 with an average of 3.3 species per point count and 13.8 species per transect (Table 2).

The point transect data from grassland habitat yielded robust density estimates (CV<50%) for Horned Lark, Vesper Sparrow and Western Meadowlark (Table 4). Vesper Sparrow and Western Meadowlark are listed as Representative Species for Plains and Mesa Grassland habitat by the NM-PIF. *MBCNF* should effectively monitor these three species, which represent 9% of all species recorded from grassland in 2006.

Table 4. Estimated densities of breeding birds in grassland habitat in the Carson National Forest, summer 2003-2006[1].

Species	Year	*D*	*LCL*	*UCL*	*%CV*	*n*
Horned Lark	2003	--	--	--	--	0
	2004	30	18	52	31	42
	2005	31	18	56	22	17
	2006	34	13	91	47	35
Vesper Sparrow	2003	8.2	4.8	14	24	31
	2004	21	16	28	15	118
	2005	15	11	22	13	29
	2006	19	12	28	20	70
Western Meadowlark	2003	2.5	0.7	9.1	61	10
	2004	15	10	23	22	92
	2005	17	8.3	34	20	34
	2006	20	9.3	43	35	81

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of observations used to estimate *D*.

Mixed Conifer (MC)

We conducted 75 point counts along 5 transects in mixed-conifer habitat between 25 June and 27 June, 2006 (Table 1). We recorded 508 individual birds, with an average of 8.4 birds per point count (Table 2). Observers detected 47 species with an average of 6.6 species per point count and 26.0 species per transect in this habitat (Table 2).

The point transect data from mixed conifer yielded robust density estimates (CV<50%) for five species and moderately robust estimates (CV=50-75%) for three species (Table 5). *MBCNF* should effectively monitor these eight species, which represent 17% of all species recorded from mixed conifer in 2006. Unfortunately, the observer that collected data in this habitat in 2005 did not estimate distances correctly so some density estimates from that year were not provided.

Ten species listed as priorities for management concern for mixed conifer forest by NM-PIF were detected on mixed conifer transects: Dark-eyed Junco, Violet-green Swallow, Red-breasted Nuthatch, Broad-tailed Hummingbird, Townsend's Solitaire, Clark's Nutcracker, Cordilleran Flycatcher, Red-naped Sapsucker, Dusky Flycatcher, and Olive-sided Flycatcher.

Table 5. Estimated densities of breeding birds in mixed conifer habitat in the Carson National Forest, summer 2003-2006[1].

Species	Year	*D*	*LCL*	*UCL*	*%CV*	*n*
Warbling Vireo	2003	74	37	150	36	48
	2004	67	38	119	31	61
	2005	137	60	314	39	71
	2006	81	27	247	52	42
Mountain Chickadee	2003	69	37	128	37	22
	2004	126	80	198	26	81
	2005	--	--	--	--	--
	2006	40	15	108	56	24
Ruby-crowned Kinglet	2003	26	16	43	27	32
	2004	14	6.0	33	49	24
	2005	20	8.2	47	43	19
	2006	15	6.9	35	41	15
American Robin	2003	73	49	111	22	42
	2004	71	44	114	26	57
	2005	61	21	177	50	28
	2006	105	50	218	35	48
Audubon's Warbler	2003	87	64	119	16	49
	2004	98	57	168	29	77
	2005	--	--	--	--	--
	2006	89	73	109	11	40
Western Tanager	2003	31	21	44	21	59
	2004	44	30	63	22	78
	2005	--	--	--	--	--
	2006	30	11	83	56	25
Gray-headed Junco	2003	30	12	71	47	12
	2004	50	27	93	38	62
	2005	--	--	--	--	--
	2006	30	11	78	46	24
Pine Siskin	2003	11	5.3	22	43	15
	2004	55	29	104	37	38
	2005	--	--	--	--	--
	2006	61	34	109	35	14

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of observations used to estimate *D*.

Pinyon-Juniper (PJ)

We conducted 368 counts along 25 transects in pinyon-juniper habitat in the CNF between 14 May and 10 June, 2006 (Table 1). We recorded 3,553 birds with an average of 9.7 birds at each count station (Table 2). Observers detected 86 species, with an average of 6.7 species per point count and 28.0 species per site in pinyon-juniper (Table 2).

The point transect data from pinyon-juniper yielded robust density estimates (CV<50%) for 25 species and moderately robust estimates for another five species (CV=50-75%) for which we are able to provide densities (Table 6). *MBCNF* should effectively monitor these 30 species, which represent 35% of all species recorded from pinyon-juniper in 2006.

Nine species listed by the NM-PIF as priority for management concern for pinyon-juniper habitat were detected on transects this year, reported here by number of individuals detected from highest to lowest: Black-throated Gray Warbler, Gray Flycatcher, Ash-throated Flycatcher, Juniper Titmouse, Pinyon Jay, Western Bluebird, Mountain Bluebird, Cassin's Kingbird, and Say's Phoebe. In addition to being a NM-PIF priority, Juniper Titmouse is also an MIS species for the CNF; we recorded one other MIS, Hairy Woodpecker, 21 times in pinyon-juniper habitat.

Table 6. Estimated densities of breeding birds in pinyon-juniper habitat in the Carson National Forest, summer 2003-2006[1].

Species	Year	*D*	*LCL*	*UCL*	*%CV*	*n*
Mourning Dove	2003	2.6	1.7	4.1	26	47
	2004	5.7	3.9	8.3	23	83
	2005	2.7	1.5	5.0	37	40
	2006	7.0	4.5	11	27	101
Broad-tailed Hummingbird	2003	14	4.5*	45*	79*	3
	2004	211	86	521	59	39
	2005	562	233	1357	57	102
	2006	189	74	485	62	33
Hairy Woodpecker	2003	2.3	1.3	4.1	37	12
	2004	5.3	3.8	8.3	27	24
	2005	4.5	2.5	7.9	35	20
	2006	2.8	1.5	5.1	37	12
Gray Flycatcher	2003	26	19	36	19	155
	2004	31	24	40	16	157
	2005	49	36	66	18	247
	2006	57	41	79	20	275
Ash-throated Flycatcher	2003	7.4	5.4	10	19	159
	2004	18	13	26	20	176
	2005	26	15	45	34	189
	2006	9.4	6.3	14	25	130
Plumbeous Vireo	2003	7.8	5.6	11	19	77
	2004	11	8.1	15	18	94
	2005	16	12	23	21	138
	2006	15	11	20	18	119

Table 6 cont. Estimated densities of breeding birds in pinyon-juniper habitat in the Carson National Forest, summer 2003-2006.

Species	Year	*D*	*LCL*	*UCL*	*%CV*	*n*
Western Scrub-Jay	2003	6.8	4.7	10	22	82
	2004	3.9	2.6	6.0	26	37
	2005	4.5	2.9	7.0	27	44
	2006	7.5	5.2	11	22	74
Pinyon Jay	2003	1.3	0.6	2.6	45	33
	2004	1.8	0.9	3.4	41	32
	2005	2.0	1.1	3.3	32	51
	2006	1.7	0.9	3.1	39	39
Common Raven	2003	15	5.8	41	64	107
	2004	7.5	2.8	20	64	52
	2005	7.7	2.9	21	66	52
	2006	10	3.6	28	68	62
Violet-green Swallow	2003	11	6.3	19	34	38
	2004	25	14	46	38	51
	2005	18	10	33	37	67
	2006	16	10	26	28	55
Mountain Chickadee	2003	22	7.4	63	72	32
	2004	44	16	123	68	51
	2005	33	12	91	69	37
	2006	47	17	130	68	55
Juniper Titmouse	2003	22	16	30	19	141
	2004	20	14	29	22	109
	2005	20	14	30	23	108
	2006	22	15	33	24	116
Bushtit	2003	22	14	36	30	44
	2004	51	32	82	29	66
	2005	38	26	57	24	58
	2006	18	11	29	30	25
White-breasted Nuthatch	2003	3.5	2.0	6.2	34	26
	2004	4.1	2.2	7.7	39	26
	2005	4.0	2.3	7.0	34	25
	2006	6.5	3.7	11	34	39
Rock Wren	2003	1.1	0.5	2.2	44	35
	2004	1.3	0.6	2.6	44	37
	2005	1.6	0.8	3.8	45	46
	2006	1.1	0.6	2.2	41	30
Bewick's Wren	2003	10	6.7	14	21	109
	2004	5.1	3.3	7.8	25	50
	2005	8.4	5.6	13	24	81
	2006	15	10	23	25	141
Blue-gray Gnatcatcher	2003	12	8.0	18	26	40
	2004	15	8.8	26	32	40
	2005	27	18	40	23	72
	2006	22	14	35	29	59
Mountain Bluebird	2003	2.6	1.2	5.5	48	20
	2004	3.0	1.4	6.5	48	23
	2005	3.6	1.7	7.6	47	24

Table 6 cont. Estimated densities of breeding birds in pinyon-juniper habitat in the Carson National Forest, summer 2003-2006.

Species	Year	*D*	*LCL*	*UCL*	*%CV*	*n*
Mountain Bluebird	2006	3.0	1.7	5.4	37	21
Northern Mockingbird	2003	1.6	0.8	3.0	40	37
	2004	0.7	0.3	1.7	59	14
	2005	0.3	0.1	0.6	51	5
	2006	3.4	1.5	7.5	50	66
Virginia's Warbler	2003	11	5.5	21	42	40
	2004	15	7.8	28	40	48
	2005	16	8.4	31	40	51
	2006	9.9	4.3	22.8	53	30
Black-throated Gray Warbler	2003	43	32	59	18	210
	2004	52	34	79	25	214
	2005	57	44	75	16	238
	2006	79	58	107	18	312
Western Tanager	2003	5.1	3.0	8.5	32	93
	2004	2.7	1.8	4.1	24	40
	2005	3.4	2.0	5.9	33	52
	2006	4.5	2.8	7.4	29	68
Spotted Towhee	2003	21	16	27	15	245
	2004	15	11	21	20	155
	2005	19	14	26	19	194
	2006	22	16	29	18	210
Chipping Sparrow	2003	66	46	96	22	150
	2004	76	55	106	20	149
	2005	135	99	184	19	250
	2006	91	65	129	21	167
Brewer's Sparrow	2003	0.5	0.2	1.1	51	8
	2004	1.3	0.4	4.0	73	18
	2005	2.2	1.0	4.8	49	29
	2006	2.0	0.8	4.7	54	26
Vesper Sparrow	2003	1.6	0.7	3.6	50	50
	2004	1.0	0.5	2.0	46	26
	2005	0.9	0.4	2.4	59	24
	2006	0.8	0.4	1.5	43	19
Black-headed Grosbeak	2003	6.3	4.2	9.3	24	114
	2004	4.8	3.2	7.3	25	76
	2005	5.7	3.5	9.2	29	88
	2006	3.9	2.4	6.4	30	58
Brown-headed Cowbird	2003	4.3	2.2	8.8	44	26
	2004	3.3	1.7	6.7	43	20
	2005	6.3	3.6	11	34	36
	2006	9.2	5.5	16	32	49
House Finch	2003	1.0	0.3	2.8	72	11
	2004	1.4	0.5	3.7	64	15
	2005	2.0	1.0	3.8	40	23
	2006	3.9	1.9	7.7	42	43
Pine Siskin	2003	0.8	0.2*	2.5*	79*	2
	2004	1.8	0.5*	6.3*	87*	4

Table 6 cont. Estimated densities of breeding birds in pinyon-juniper habitat in the Carson National Forest, summer 2003-2006.

Species	Year	*D*	*LCL*	*UCL*	*%CV*	*n*
Pine Siskin	2005	33	17	63	42	69
	2006	26	12	55	48	52

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of observations used to estimate *D*; * = variance not estimable.

Ponderosa Pine (PP)

We conducted 180 point counts along 12 transects in ponderosa pine forest in the CNF between 1 June and 16 June, 2006 (Table 1). We recorded 1,170 birds, with an average of 8.8 birds at each count station (Table 2). Observers detected 66 species in ponderosa pine and an average of 6.5 species per point count and 28.6 species per site (Table 2).

The point transect data from ponderosa pine yielded robust density estimates (CV<50%) for 17 species and moderately robust estimates for another two species (CV=50-75%; Table 7). *MBCNF* should effectively monitor these 19 species, which represent 29% of all species recorded from ponderosa pine in 2006.

Twelve species listed by the NM-PIF as priority for management concern for ponderosa pine habitat were detected on transects this year, reported here by number of detections from highest to lowest: Western Wood-Pewee, Western Bluebird, Dark-eyed Junco, Pygmy Nuthatch, Plumbeous Vireo, Grace's Warbler, Virginia's Warbler, Dusky Flycatcher, Williamson's Sapsucker, Broad-tailed Hummingbird, Northern Goshawk, and Olive-sided Flycatcher.

Table 7. Estimated densities in ponderosa pine forest in the Carson National Forest, summer 2003-2006[1].

Species	Year	*D*	*LCL*	*UCL*	*%CV*	*n*
Mourning Dove	2003	2.7	0.6*	13*	114*	5
	2004	7.1	1.9*	27*	96*	16
	2005	3.2	0.9*	11*	88*	12
	2006	39	12*	128*	84*	141
Northern Flicker	2003	2.6	1.0	6.8	53	7
	2004	4.4	2.3	8.7	37	17
	2005	1.6	0.8	3.4	42	9
	2006	9.1	6.6	13	20	49
Western Wood-Pewee	2003	6.5	2.0	21	69	34
	2004	45	26	77	31	90
	2005	191	146	248	16	158
	2006	28	18	45	27	98
Plumbeous Vireo	2003	22	12	40	36	26
	2004	22	13	36	31	39
	2005	37	22	62	32	87
	2006	13	7.3	23	35	31
Purple Martin	2003	6.2	1.3*	29*	93*	10

Table 7 cont. Estimated densities in ponderosa pine forest in the Carson National Forest, summer 2003-2006.

Species	Year	*D*	*LCL*	*UCL*	*%CV*	*n*
Purple Martin	2004	14	4.0*	48*	77*	24
	2005	4.3	1.8	10	53	22
	2006	7.6	3.1	18	54	20
Violet-green Swallow	2003	166	85	322	40	23
	2004	248	127	485	41	46
	2005	271	172	426	28	132
	2006	206	112	380	38	60
Mountain Chickadee	2003	9.2	3.3	25	56	8
	2004	42	27	65	26	46
	2005	38	24	61	29	66
	2006	15	8.7	26	33	22
White-breasted Nuthatch	2003	27	16	45	30	19
	2004	28	18	46	27	30
	2005	32	22	45	21	45
	2006	21	14	32	25	30
Pygmy Nuthatch	2003	14	3.5*	58*	98*	19
	2004	69	37	129	37	54
	2005	63	43	92	23	70
	2006	81	40	164	44	40
Western Bluebird	2003	55	20	150	59	20
	2004	55	32	93	31	66
	2005	91	54	152	31	49
	2006	47	26	85	36	52
Hermit Thrush	2003	0.8	0.2	2.4	65	7
	2004	1.6	0.7	3.5	46	22
	2005	1.6	0.8	2.9	36	29
	2006	1.9	1.1	3.4	34	36
American Robin	2003	31	21	45	21	36
	2004	27	14	51	37	46
	2005	38	24	61	27	88
	2006	46	33	63	19	105
Virginia's Warbler	2003	10	3.0	36	73	9
	2004	10	3.1	32	73	13
	2005	38	20	73	39	67
	2006	6.3	3.2	13	42	11
Audubon's Warbler	2003	37	15	89	47	19
	2004	53	29	99	35	41
	2005	80	56	114	21	82
	2006	69	48	100	22	70
Grace's Warbler	2003	47	20	111	47	28
	2004	33	17	63	39	29
	2005	19	7.0	54	63	23
	2006	19	6.7	51	63	22
Western Tanager	2003	7.6	3.7	15	40	28
	2004	22	15	34	24	80
	2005	15	9.8	24	27	59
	2006	36	21	61	32	75

Table 7. Estimated densities in ponderosa pine forest in the Carson National Forest, summer 2003.

Species	Year	*D*	*LCL*	*UCL*	*%CV*	*n*
Spotted Towhee	2003	37	16	86	44	41
	2004	36	17	77	44	59
	2005	36	20	65	34	79
	2006	34	17	69	42	74
Chipping Sparrow	2003	36	19	67	34	17
	2004	47	22	97	42	34
	2005	70	49	101	22	70
	2006	44	25	78	34	43
Gray-headed Junco	2003	7.6	2.6	22	59	5
	2004	36	21	63	32	35
	2005	37	22	63	31	49
	2006	45	28	71	27	59
Black-headed Grosbeak	2003	16	8.1	33	37	36
	2004	4.5	1.2*	17*	80*	15
	2005	9.5	5.7	16	30	41
	2006	2.9	1.7	5.2	33	13
Pine Siskin	2003	35	5.8*	216*	141*	5
	2004	155	37*	644*	104*	30
	2005	126	30*	506*	103*	27
	2006	95	23*	397*	105*	21

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of observations used to estimate *D*; * = variance not estimable.

Sage Shrubland (SA)

We conducted 75 point counts along 5 transects in sage shrublands between 15 May and 23 May, 2006 (Table 1). We recorded 666 birds, with an average of 8.8 birds detected at each count station (Table 2). Observers detected 53 species with an average of 5.3 species per point count and 20.8 species per site (Table 2).

The point transect data from sage shrubland habitat yielded robust density estimates (CV<50%) for four species and a moderately robust estimate for one species (CV=50-75; Table 8). *MBCNF* should effectively monitor these five species, which represent 9% of all species recorded from sage shrubland in 2006.

Nine species listed as priorities for management concern for montane shrubland or Great Basin desert shrub (both habitats can be considered sage shrubland) by NM-PIF were detected on sage shrubland transects, reported here by number of detection from highest to lowest: Spotted Towhee, Brewer's Sparrow, Sage Sparrow, Green-tailed Towhee, Virginia's Warbler, Sage Thrasher, Rock Wren, Ash-throated Flycatcher, and Blue-gray Gnatcatcher. Also, a MIS for the CNF, Brewer's Sparrow, was detected enough times in sage shrubland to provide a density estimate.

Table 8. Estimated densities of breeding birds in sage shrubland in the Carson National Forest, 2003-2006[1].

Species	Year	*D*	*LCL*	*UCL*	*%CV*	*n*
Green-tailed Towhee	2003	13	6.7	24	31	29
	2004	9.6	2.2	42	71	23
	2005	16.6	8.0	34	37	47
	2006	3.7	1.4	9.4	48	11
Spotted Towhee	2003	17	5.1	54	55	42
	2004	12	4.9	31.2	43	33
	2005	8.3	2.7	25	57	26
	2006	11	6.6	18.9	27	37
Brewer's Sparrow	2003	19	12	32	27	21
	2004	40	17	99	44	44
	2005	28	17	46	28	37
	2006	26	11	63	47	37
Vesper Sparrow	2003	23	9.7	54	39	30
	2004	61	24	160	44	83
	2005	29	16	53	30	47
	2006	50	21	120	43	87
Sage Sparrow	2003	25	4.0*	150*	106*	22
	2004	45	12.4*	161*	76*	41
	2005	5.4	1.3*	23*	89*	6
	2006	78	5.5	57	72	21

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of observations used to estimate *D*; * = variance not estimable.

Spruce-Fir (SF)

We conducted 60 point counts along 4 transects in spruce-fir habitat in the CNF between 9 July and 12 July, 2006 (Table 1). We recorded 473 individual birds, with an average of 7.9 birds per point count (Table 2). Observers detected 37 species with an average of 6.0 species per point count and 21.5 species per transect (Table 2).

The point transect data from spruce-fir yielded robust density estimates (CV<50%) for five species and a moderately robust estimate for one species (CV=50-75%; Table 9). *MBCNF* should effectively monitor these six species, which represent 16% of all species recorded from sage shrubland in 2006. Unfortunately, the observer that collected data in this habitat in 2005 did not record distances correctly so some density estimates for that year were not reported.

Seven species listed as priorities for management concern for spruce-fir forest by NM-PIF were detected on spruce-fir transects, reported here by number of detections from highest to lowest: Dark-eyed Junco, Clark's Nutcracker, Townsend's Solitaire, Brown Creeper, Broad-tailed Hummingbird, Pine Grosbeak, and Dusky Grouse.

Table 9. Estimated densities of breeding birds in spruce-fir in the Carson National Forest, 2003-2006[1].

Species	Year	*D*	*LCL*	*UCL*	*%CV*	*n*
Mountain Chickadee	2003	170	109	266	24	27
	2004	309	212	452	23	96
	2005	323	183	567	30	67
	2006	218	123	387	31	46
Hermit Thrush	2003	18	4.3	72	53	22
	2004	31	17	57	32	77
	2005	28	15	52	29	46
	2006	30	23	41	15	51
American Robin	2003	260	75	899	67	26
	2004	105	37	299	64	20
	2005	260	104	645	55	34
	2006	225	86	586	57	30
Audubon's Warbler	2003	201	134	303	22	32
	2004	170	77	376	44	53
	2005	--	--	--	--	--
	2006	160	110	235	22	34
Gray-headed Junco	2003	211	76	582	49	27
	2004	211	123	360	32	53
	2005	--	--	--	--	--
	2006	269	158	460	32	46
Pine Siskin	2003	98	27	350	54	11
	2004	267	164	435	29	49
	2005	--	--	--	--	--
	2006	387	223	673	31	48

[1] *D* = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90% confidence limits on *D*; *%CV* = percent coefficient of variation of *D*; *n* = number of observations used to estimate *D*.

DISCUSSION AND RECOMMENDATIONS

Monitoring Pinyon-Juniper Habitat

The emphasis of this project is to monitor birds in pinyon-juniper habitat. In the southwest, millions of pinyon pines have died as a result of severe drought conditions. In the Carson National Forest, similar die-offs have occurred among pinyon pines. Consequently, the CNF partnered with RMBO to monitor the status of bird species in this habitat over time.

The New Mexico Partners in Flight Plan identifies 20 priority bird species for pinyon-juniper habitat. In 2006 we collected sufficient data to monitor two of the highest priority species (Gray Flycatcher and Black-throated Gray Warbler), two priority species (Mountain Bluebird and Virginia's Warbler), and three high responsibility species (Ash-throated Flycatcher, Pinyon Jay, and Juniper Titmouse). We also collected sufficient data on one other high priority species, Western Bluebird, to monitor its status across the full spectrum of surveyed habitats on the CNF.

Brown-headed Cowbird parasitism rates may affect the breeding success of many songbird species, especially Plumbeous Vireo, Blue-gray Gnatcatcher and Western Tanager. We detect all three of these species, as well as cowbirds, in sufficient number to monitor their status in pinyon-juniper habitat forest-wide. Although an insufficient number of years have been sampled, it is interesting to note that Brown-headed Cowbird density estimates have shown an overall increase in pinyon-juniper.

In addition to surveying birds in pinyon-juniper, we also began collecting data on the proportion of dead trees at each point-count station in 2005. We will track this over time and compare it to the trends we detect for each species. Declines in the numbers of Corvid seed dispersers active in pinyon-juniper woodlands will probably be associated with the loss of mature pinyons. In 2006, Pinyon Jays, and Western Scrub-Jays were detected in sufficient numbers in pinyon-juniper habitat to monitor their status.

Pinyon-juniper woodlands occupy millions of acres across the southwestern United States and provide habitat for many bird species. Additionally, pinyon-juniper woodlands provide seasonal habitat for elk and mule deer, as well as many human uses including pinyon nuts, firewood, fence posts and livestock forage. The shift in plant composition, distribution and abundance that may occur in this habitat as a result of the drought will impact a diverse, dependent community. Few studies have monitored the impacts of such a change over the long-term on the full-spectrum of the avian community. Continued monitoring in this habitat will provide valuable information to both managers as well as the scientific community.

Prospects for Population Monitoring

The habitat-stratified point transects produced excellent estimates with low coefficients of variation (≤ 50%) for 41 bird species in at least one habitat surveyed in 2006. Thus we should be able to detect habitat-specific population trends for these species within

our maximum target of 30 years. These 41 species represent about 37% of *all species* observed in the seven habitats surveyed in 2006, but they represent 70% of all *individual birds* observed. The other 63% of species (~30% of birds observed) fall into one of the following categories below:

1) Low-density, highly localized species, such as White-throated Swift;
2) Low-density, widespread species, such as Evening Grosbeak;
3) Irregular species, such as White-winged Crossbill;
4) Vagrant breeders, such as Gray Vireo;
5) Species that occur mainly outside the Carson National Forest in other habitats, such as Lewis's Woodpecker;
6) Nocturnal species, such as Northern Pygmy-Owl;
7) Wetland-obligate species, such as Red-winged Blackbird; and
8) Species that are readily detectable only prior to late May, such as Say's Phoebe.

Species in the aforementioned groups could be monitored through additional effort using one or more of the following survey techniques:

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

One way to monitor the health of bird populations, especially small ones, is to monitor reproductive output at nests. While this method can be more labor intensive than count-based monitoring, depending on the species in question and the detail of information needed, monitoring reproductive output does not necessarily imply high costs.

For species with small populations, such as Golden Eagles and Prairie Falcons, monitoring could be achieved by locating all active nests and visiting each during the spring and summer as necessary to evaluate the nest success of each. Known nests would first be identified by consulting with local biologists, birders, and other experts, and then as part of the field effort, additional suitable habitat could be searched to locate previously unrecorded nests. Ultimately, the majority of active nests would be included in the monitoring scheme. Because relatively few nests exist for these species, this type of monitoring would probably require the equivalent effort of what is required for habitat-based monitoring (i.e., one additional person in the field during the spring and early summer).

For some low-density but widespread species, such as Northern Goshawk, a brief call-response survey could be used to detect the presence of this or other similar species across the areas already covered by the habitat-stratified point transects. A high-powered, yet highly portable playback system would be required for each observer, but

other than this expense, relatively few additional expenses would be incurred. RMBO implemented such a survey for Northern Goshwak in Region 2 of the USFS in 2006.

Because of the already extensive point transect effort undertaken each year, implementing additional field techniques to target other high-priority species can be done cost-effectively. We suggest either conducting more focal-species surveys or moving towards a rotating panel of transects in habitats that are currently being surveyed at a fairly low effort. Except for pinyon-juniper and ponderosa pine, all of the current habitats have five or fewer regularly surveyed transects. In order to accurately assess trends at the habitat level for most breeding landbirds, we would need to increase the number of transects in each of these habitats to at least 20. We recommend adding transects in each of these habitats and surveying them on a rotating panel, or adding more transects in pinyon-juniper and ponderosa pine to reduce the time to detect trends It would be the same amount of effort per year but provide much better data for birds in these habitats over time. Rocky Mountain Bird Observatory is open to discussing these options with the Carson National Forest in the future.

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APPENDIX A. Species Accounts

In this section we present one-page accounts and a map for each bird species detected in 2006 that is of management interest, as designated by either the USFS, Partners in Flight, USFWS and/or the New Mexico State Comprehensive Wildlife Conservation Plan.

All species accounts follow the same format with an overview of our findings, a table of the density estimates by habitat (for species with a sufficient number of detections), a comparison of density estimates for all years of the project and a summary of the findings and prospects for monitoring. In the density estimate tables we present *n, the number of independent observations for each species*. The total number of individuals observed, which includes between point detections of low-density species and flyovers, is presented in the appendices for the *MBCNF* and VV projects. These numbers may be different as often several individuals are detected in a single observation, as when birds are in a flock. While the number of individuals observed is of interest, especially for rare species, density estimates are derived using only independent observations. Habitat type codes are listed in Table 10.

Table 10. List of habitat types and habitat codes used in the species accounts.

Habitat Type	Code
Aspen	AS
Grassland	GR
Mixed Conifer	MC
Pinyon Juniper	PJ
Ponderosa Pine	PP
Sage Shrubland	SA
Spruce Fir	SF

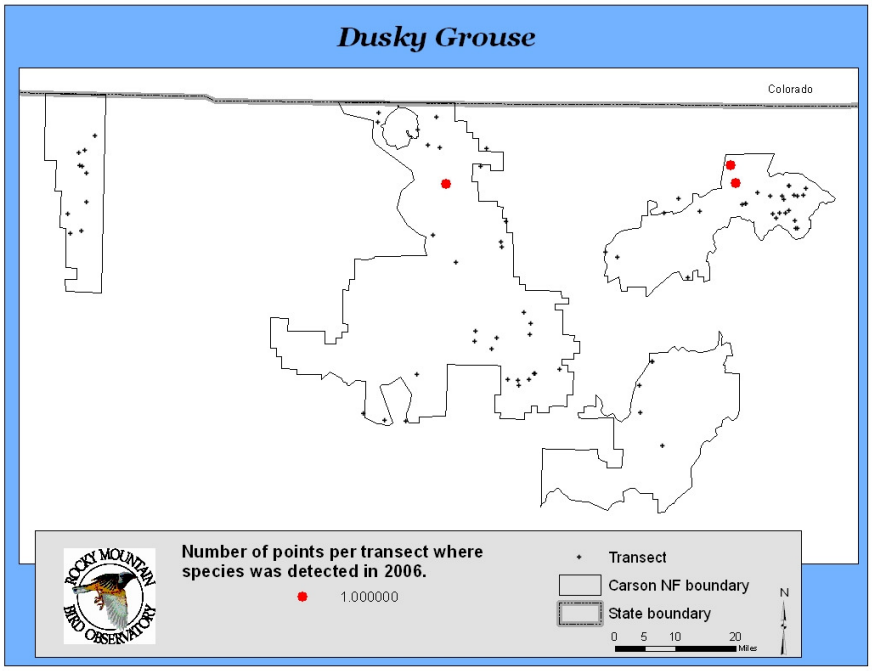
The geographic distribution maps in the following accounts depict the locations and relative abundance of species of management interest that were detected on point transects in 2006. The relative abundance scale used in the maps is based on the number of points per transect where the species was detected, with the maximum number of detections equal to 15. Also, the location of each dot does not necessarily indicate the precise location of the point at which the species was observed, but rather the access point (starting point) of that transect. It is important to keep in mind that the maps only reflect the abundance and distribution of the species across the sites we surveyed, and should not necessarily be construed to suggest anything about the range of the species.

In the summary, we tried to briefly describe the breeding habitat for each species in the CNF, other pertinent information, and evaluate our ability to monitor the species under *MBCNF*.

Dusky Grouse
(Dendragapus obscurus)

PIF Species of Continental Concern
NMDGF – Species of Greatest Conservation Need
NM-PIF Priority Species in Mixed Conifer
NM-PIF Species of Highest Priority in Spruce-Fir

We detected three Dusky Grouse in spruce-fir habitat in 2006, one on a *MBCNF* transect and two on VV transects. We detected a Dusky Grouse on this same spruce-fir transect, SF02, in 2004. This low-density species will not be monitored by point-count transects; however, under the current point transect sampling design, we will be able to continue to provide location information for this species.



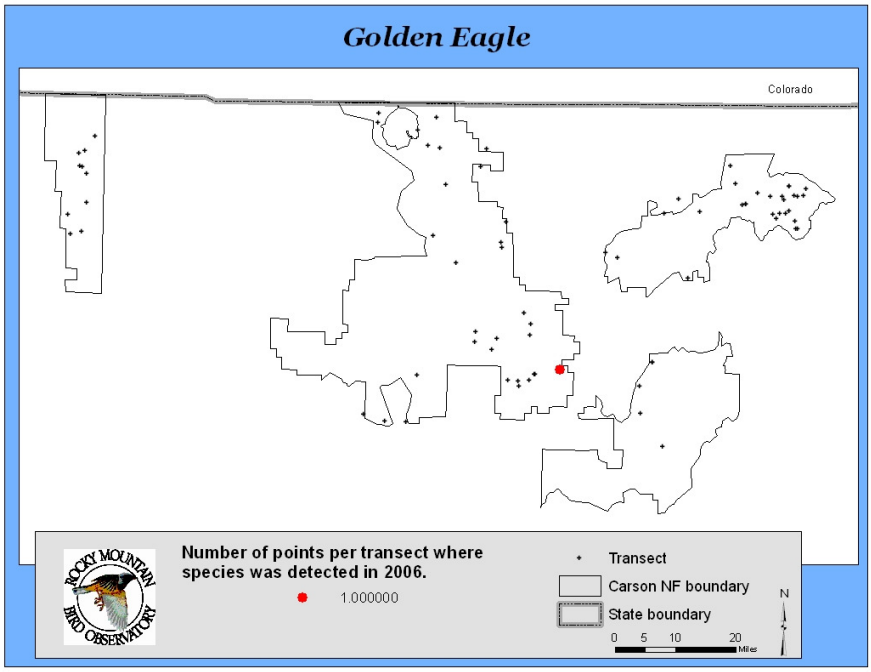
Map showing Index of Abundance for Ducky Grouse on transects in the Carson National Forest, 2006.

Golden Eagle

(Aquila chrysaetos)

PIF Species of Regional Concern
USFWS Bird of Conservation Concern
NMDGF – Species of Greatest Conservation Need

Golden Eagles occur locally in the CNF, especially in areas with remote, high cliffs suitable for nesting. In 2006, we recorded one Golden Eagle, on a sage shrubland transect, SA01, on the *MBCNF* project. This is only the second detection of Golden Eagle in the history of the MBCNF program.



Map showing Index of Abundance for Golden Eagle on transects in the Carson National Forest, 2006.

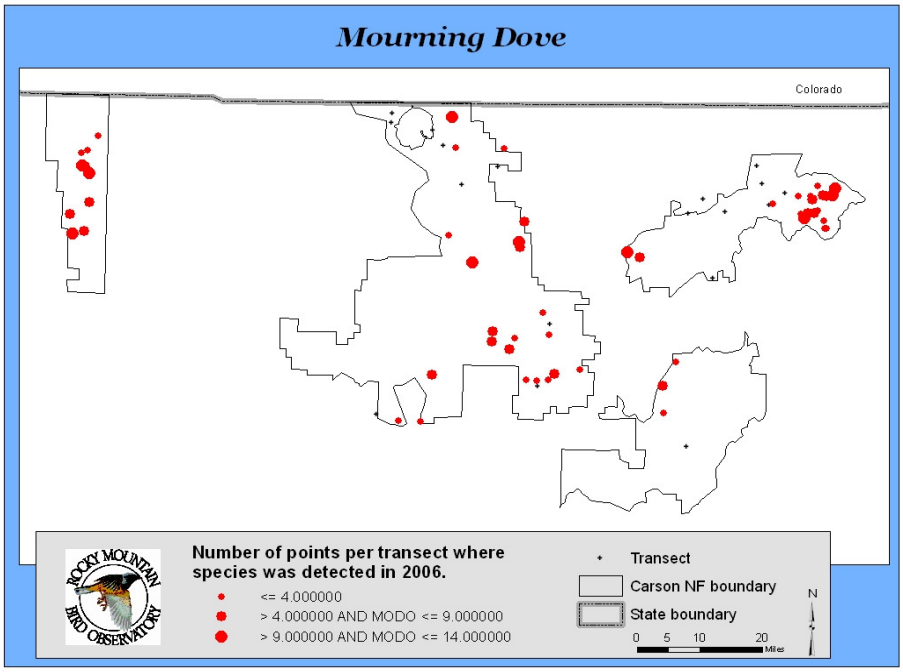
Because of the scarcity and localized nature of the species, Golden Eagle will not be effectively monitored through habitat-based point transects. Effective monitoring will likely best be accomplished through locating and monitoring as many nests as possible in the CNF. Given interest, such a program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

Mourning Dove

(Zenaida macroura)

NMDGF -Species of Greatest Conservation Need

Mourning Doves are commonly found in all low-elevation habitats in the southern Rocky Mountains. In 2006, we detected 334 Mourning Doves in six habitats on the *MBCNF* project and 73 in three habitats on the VV project. We provided density estimates for pinyon-juniper and ponderosa pine for the *MBCNF* project and for ponderosa pine on the VV project. Mourning Doves should be monitored in the CNF in pinyon-juniper and ponderosa pine habitats.



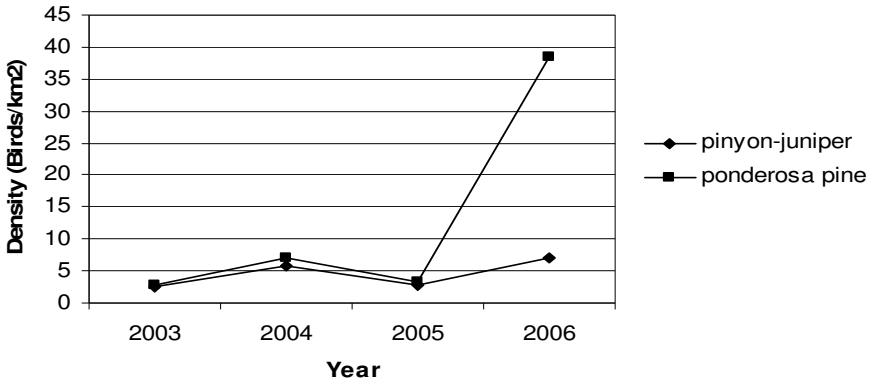
Map showing Index of Abundance for Mourning Dove on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Mourning Dove on the *MBCNF* and VV projects, 2006.

Project	Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
MBCNF	PJ	7.0	4.5	11	27	101	132
MBCNF	PP	39	12*	128*	84*	141	156
VV	PP	3.4	2.0	5.8	32	47	52

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected; * = variance not estimable.

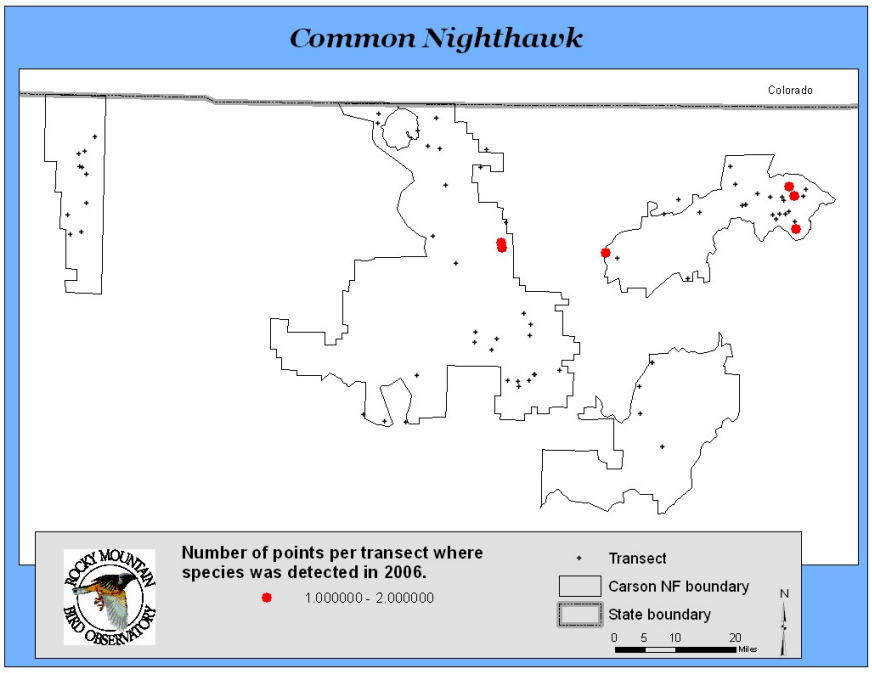
Estimated densities of Mourning Dove in pinyon-juniper and ponderosa pine for *MBCNF* monitoring project, 2003-2006.



Common Nighthawk
(Chordeiles minor)

PIF Species of Regional Concern
NM-PIF Species of High Responsibility in Pinyon-Juniper
NM-PIF Species of High Responsibility in Plains and Mesa Grassland

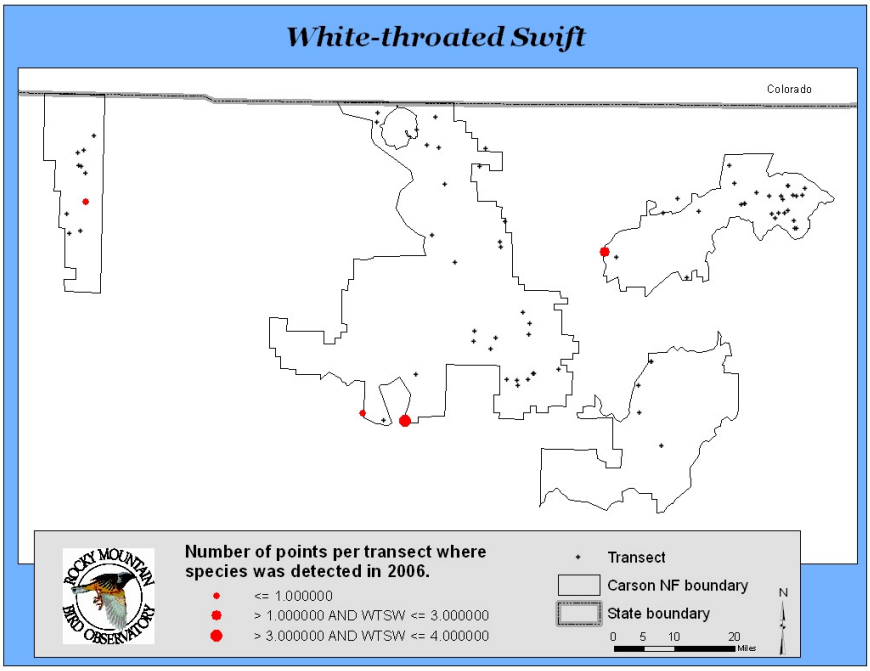
In 2006, we detected seven Common Nighthawks in two habitats on the *MBCNF* project and three in ponderosa pine on the VV project. This low-density species will not be monitored by point-count transects; however, under the current point transect sampling design, we will be able to continue to provide location information for this species.



Map showing Index of Abundance for Common Nighthawk on transects in the Carson National Forest, 2006.

White-throated Swift
(Aeronautes saxatalis)

PIF Species of Continental Concern
PIF Regional Stewardship Species
NM-PIF Species of High Responsibility for Cliff/Cave/Rock



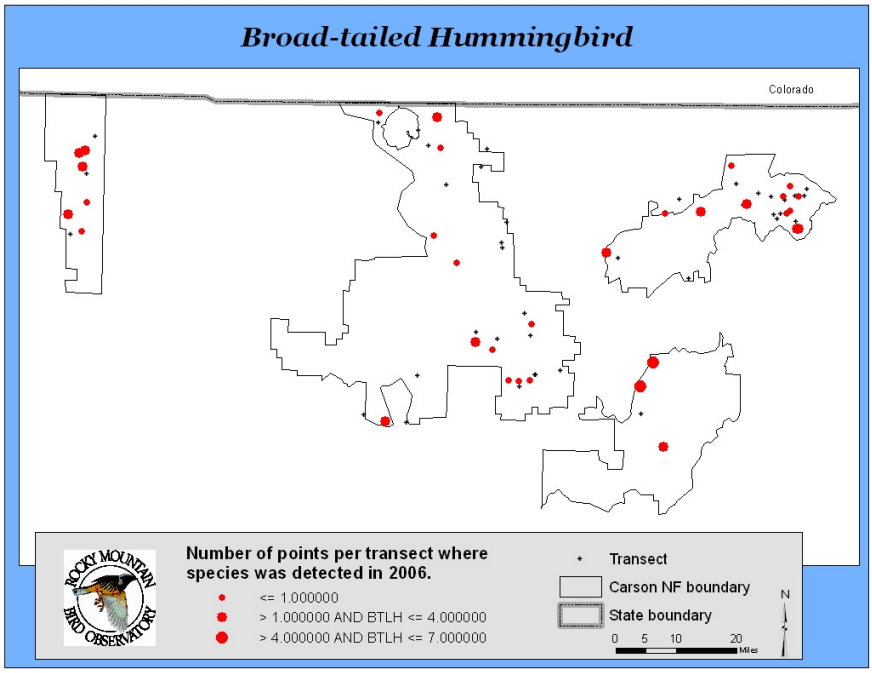
Map showing Index of Abundance for White-throated Swift on transects in the Carson National Forest, 2006.

In this region White-throated Swifts typically nest in mountainous areas on cliffs in small colonies of up to a dozen. Given their specialized nesting behavior White-throated Swifts are difficult to monitor with point-transects and would be better monitored by censusing birds at known nesting sites and searching for new nesting sites in potential habitat. This low-density species will not be monitored by point-count transects; however, under the current point transect sampling design, we will be able to continue to provide location information for this species. In 2006, we detected 11 White-throated Swifts in two habitats on the *MBCNF* project. We detected White-throated Swifts on three pinyon-juniper transects in 2006: PJ30, PJ36 and PJ37. We also detected White-throated Swifts on these transects in 2005 and 2004.

Broad-tailed Hummingbird
(Selasphorus platycercus)

PIF Regional Stewardship Species
NM-PIF Species of High Responsibility in Ponderosa Pine
NM-PIF Species of High Responsibility in Mixed Conifer
NM-PIF Species of High Responsibility in Spruce-Fir

The Broad-tailed Hummingbird is the most abundant hummingbird species in the southern Rocky Mountain region and breeds in a variety of montane habitats, including, ponderosa pine, mixed conifer, and mid- to high-elevation riparian habitats. We detected 58 Broad-tailed Hummingbirds in seven habitats on the *MBCNF* project and 12 in four habitats on the VV project.



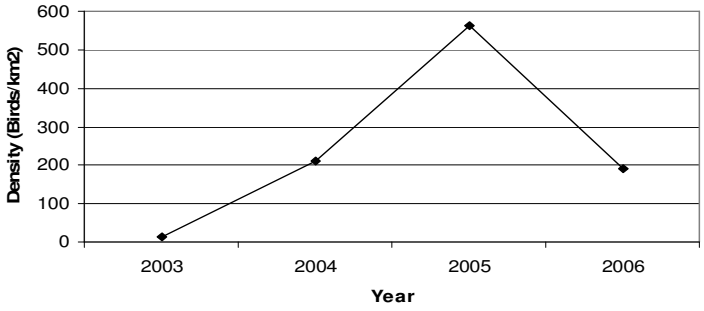
Map showing Index of Abundance for Broad-tailed Hummingbird on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Broad-tailed Hummingbird for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
PJ	189	74	485	62	33	41

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

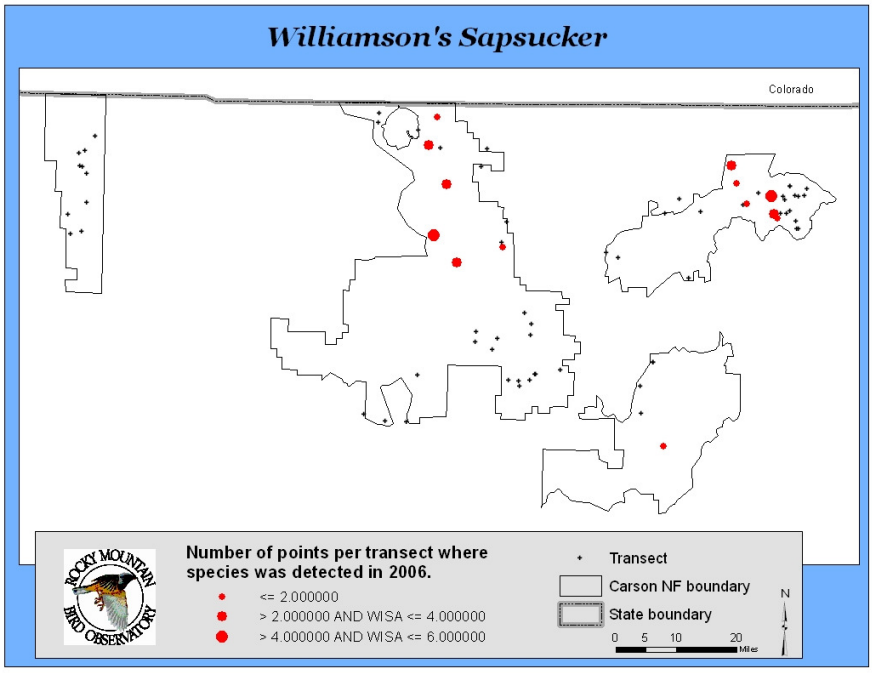
Estimated densities of Broad-tailed Hummingbird in pinyon-juniper for *MBCNF* monitoring project, 2003-2006.



Williamson's Sapsucker
(Sphyrapicus thyroideus)

PIF Continental Stewardship Species
PIF Regional Stewardship Species
NM-PIF Highest Priority Management Species for Mixed Conifer
NM-PIF Priority management species for Ponderosa Pine
USFWS Bird of Conservation Concern
NMDGF - Species of Greatest Conservation Need

The Williamson's Sapsucker will nest in a variety of habitats, but prefers mid-elevation coniferous forests. It also occasionally breeds in stands of pure aspen. We detected 21 Williamson's Sapsuckers in four habitats on the *MBCNF* project and 18 in two habitats on the VV project. Due to the low density of this species, estimation of population trend would require a larger number of point transects than we sampled in the past.

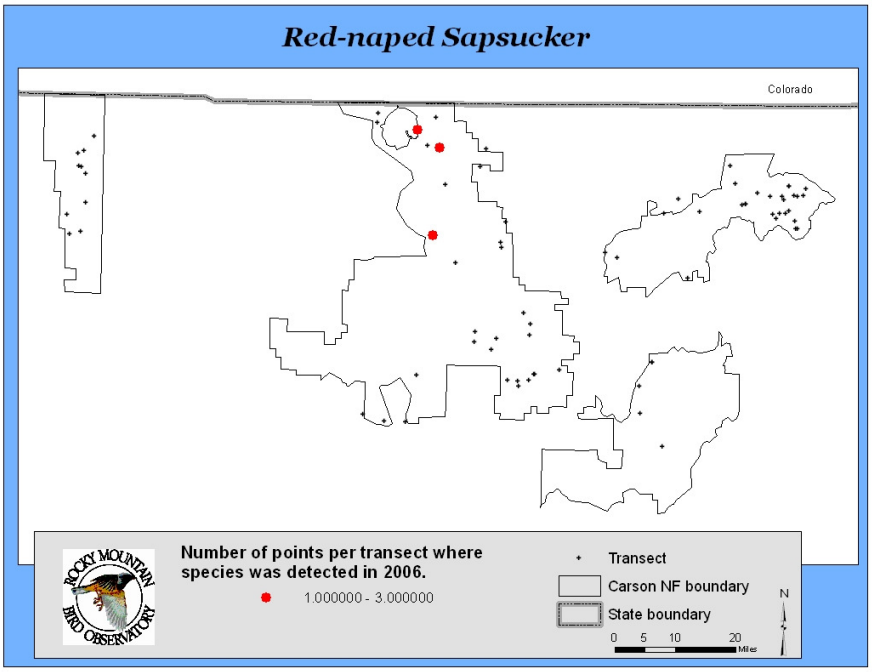


Map showing Index of Abundance for Williamson's Sapsucker on transects in the Carson National Forest, 2006.

Red-naped Sapsucker
(Sphyrapicus nuchalis)

NM-PIF Priority management species for Mixed Conifer
NM-PIF Priority management species for Spruce-Fir

The Red-naped Sapsucker nests more commonly in aspen than in other high-elevation forested areas. In 2006, we detected eight Red-naped Sapsuckers in two habitats on the *MBCNF* project. We observed Red-naped Sapsuckers on transects AS03, AS04 and MC02. We also recorded this species on each of these transects in previous years. Due to the low density of this species, estimation of population trend would require a larger number of point transects than we sampled in the past.

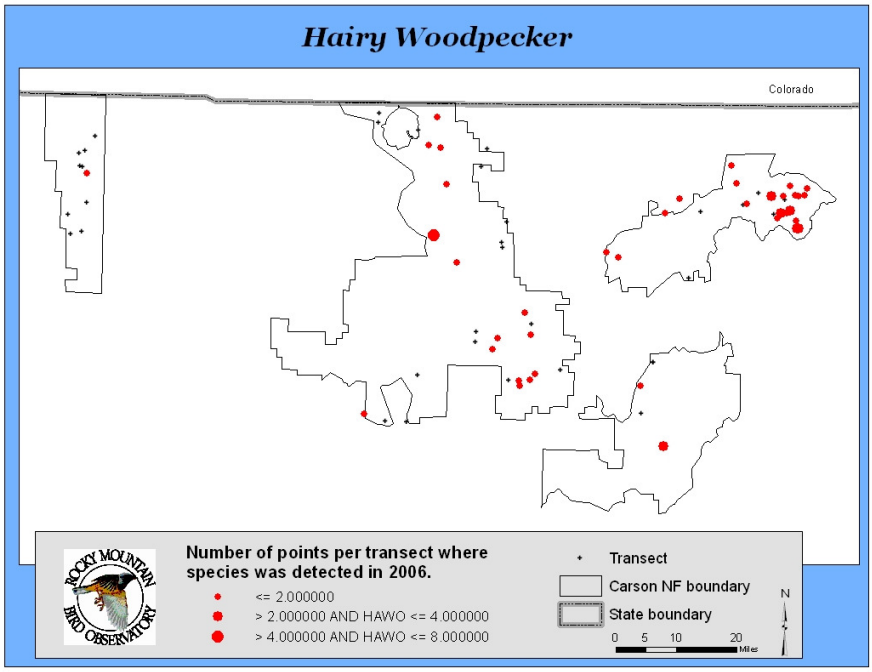


Map showing Index of Abundance for Red-naped Sapsucker on transects in the Carson National Forest, 2006.

Hairy Woodpecker
(Picoides villosus)
CNF Management Indicator Species

The Hairy Woodpecker is most commonly found nesting in aspen, but will nest in any forested habitat including pinyon-juniper. Populations of this species have shown dramatic increases after natural disasters, such as large burns or major insect outbreaks.

In 2004 we detected sufficient numbers of this species to provide a density estimate in the beetle infested pinyon-juniper habitat. In 2006 we detected 53 Hairy Woodpeckers in five habitats on the *MBCNF* project and 36 in four habitats on the VV project. This year we provided density estimates for this species in pinyon-juniper for the *MBCNF* project and in ponderosa pine for the VV project. The number of detections was less than our minimum threshold in the pinyon-juniper habitat but we calculated density because it is a MIS for the CNF.



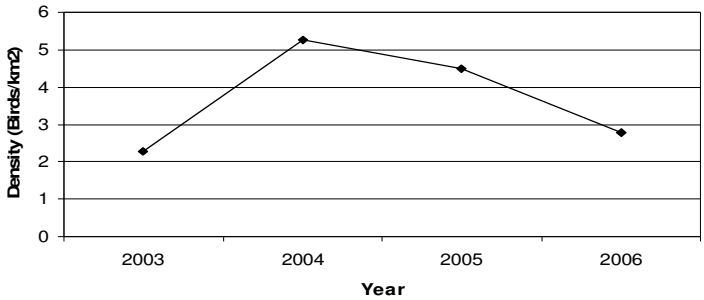
Map showing Index of Abundance for Hairy Woodpecker on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Hairy Woodpecker for the *MBCNF* and VV monitoring project, 2006.

Project	Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
MBCNF	PJ	2.8	1.5	5.1	37	12	21
VV	PP	15	5.4	43	66	17	26

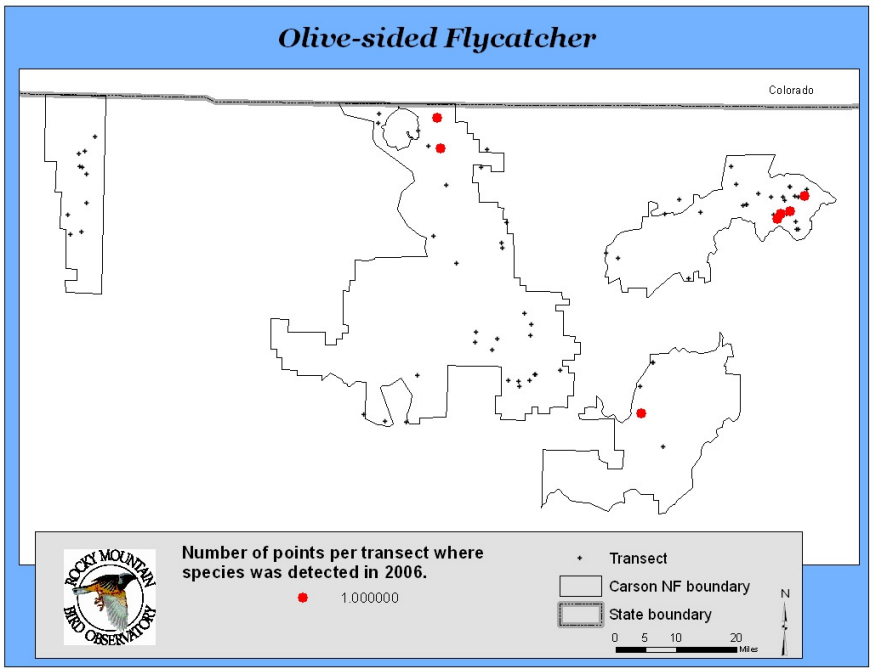
D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

Estimated densities of Hairy Woodpecker in pinyon-juniper for *MBCNF* monitoring project, 2003-2006.



Olive-sided Flycatcher
(Contopus cooperi)

PIF Species of Continental Concern
NM-PIF Highest Priority Management Species in Mixed Conifer
NM-PIF Priority management species in Ponderosa Pine and Spruce-Fir
NMDGF - Species of Greatest Conservation Need



Map showing Index of Abundance for Olive-sided Flycatcher on transects in the Carson National Forest, 2006.

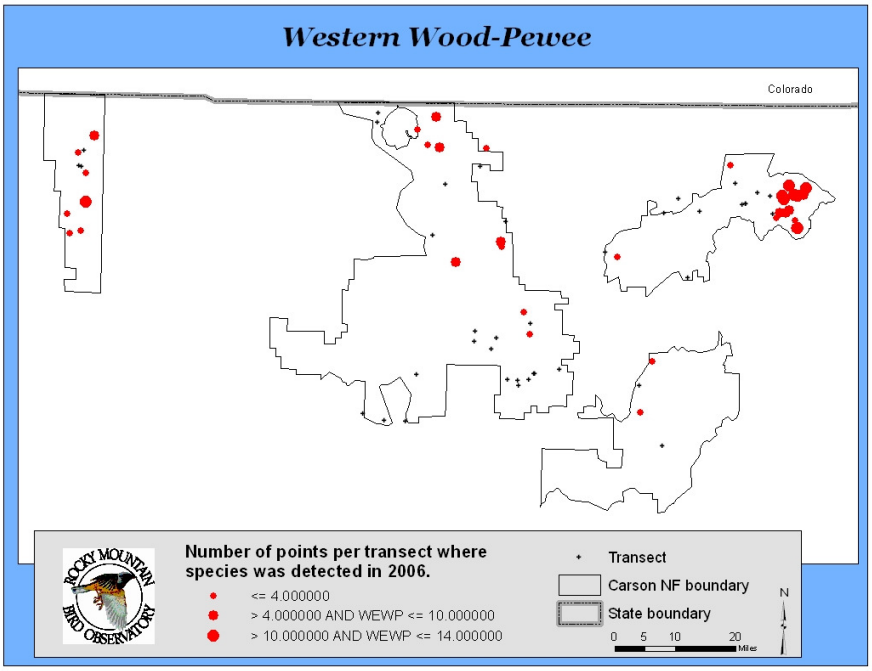
Olive-sided Flycatchers breed in a variety of forest types where snags and conifers are present, and often nest near forest clearings, bogs, stream and lake shores with dead trees, forest burns and logged areas (Kingery 1998). In this region, it is one of the most abundant species in young burned forests and clear-cuts, provided snags are available (Kingery 1998). Due to the low density of this species, estimation of population trend would require a larger number of point transects than we sampled in the past.

In 2006, we detected one Olive-sided Flycatcher in aspen (AS04), one in mixed conifer (MC01), and one in ponderosa pine (PP01) on the *MBCNF* project. On the VV project, we detected one Olive-sided Flycatcher in mixed conifer and four in ponderosa pine.

Western Wood-Pewee
(Contopus sordidulus)

NM-PIF Species of High Responsibility for Ponderosa Pine

The Western Wood-Pewee is found most frequently in deciduous habitats during the breeding season, but it will also nest in mid-elevation coniferous habitats. We are able to provide a density estimate for both CNF monitoring projects in ponderosa pine habitat from data collected this year.



Map showing Index of Abundance for Western Wood-Pewee on transects in the Carson National Forest, 2006.

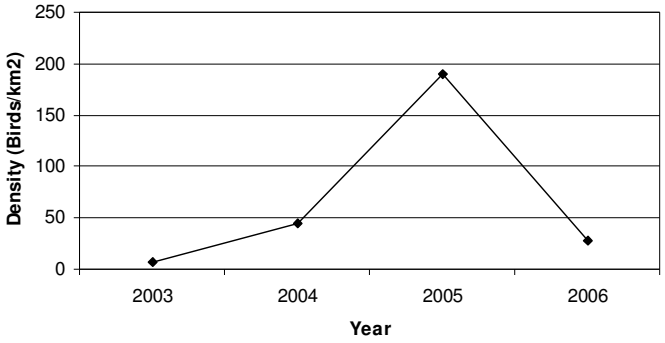
In 2006, we detected 189 Western Wood-Pewees across all habitats except spruce-fir on the *MBCNF* project and we detected 157 in three habitats on the VV project. As long as we continue to conduct the current number of transects in ponderosa pine in the CNF, this species should be sufficiently-monitored in this habitat.

Habitat-specific density estimates for Western Wood-Pewee for the *MBCNF* and VV monitoring projects, 2006.

Project	Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
MBCNF	PP	28	18	45	27	98	120
VV	PP	42	30	60	21	137	152

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

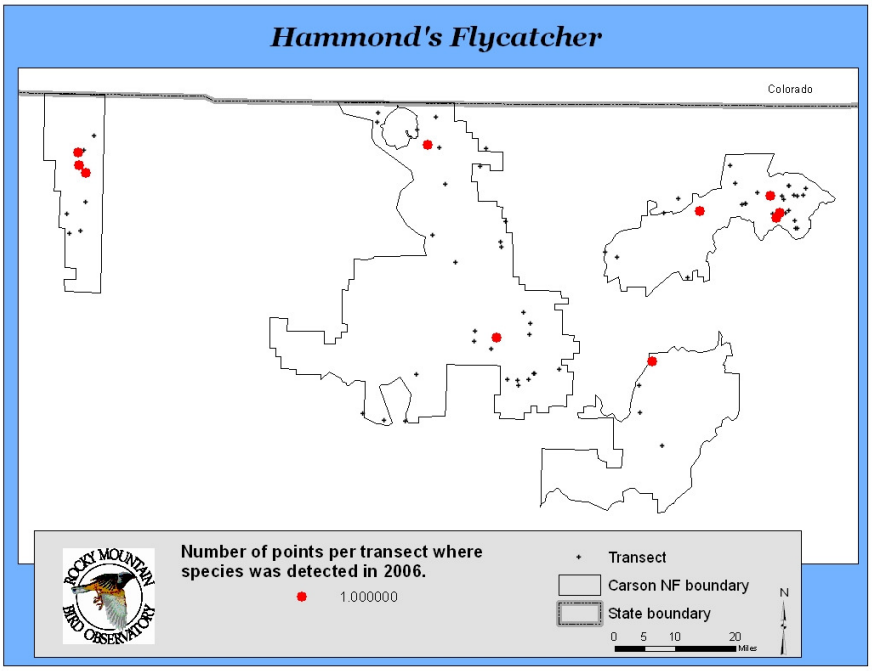
Estimated densities of Western Wood-Pewee in ponderosa pine for *MBCNF* monitoring project, 2003-2006.



Hammond's Flycatcher
(Empidonax hammondii)

NM-PIF Priority management species in Mixed Conifer

The Hammond's Flycatcher typically nests in high-elevation coniferous forest in the southern Rocky Mountain region. In contrast to the Dusky Flycatcher, this species prefers an open understory in which to forage. As some have a difficult time distinguishing between the songs of Hammond's and Dusky Flycatchers, noting the amount of understory in an area can aid in correctly identifying these birds.



Map showing Index of Abundance for Hammond's Flycatcher on transects in the Carson National Forest, 2006.

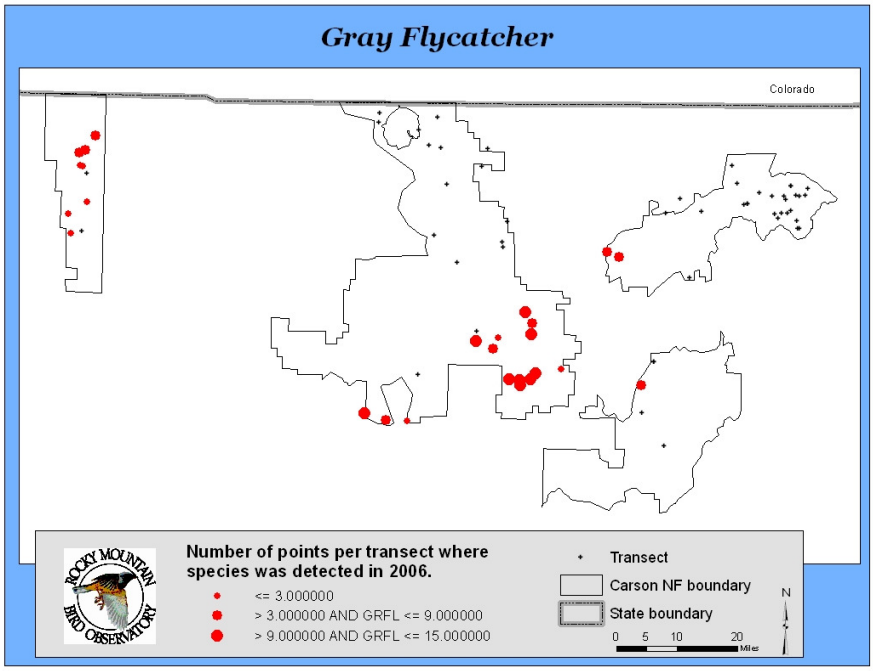
In 2006, we detected seven Hammond's Flycatchers in four habitats on the *MBCNF* project and four individuals in two habitats on the VV project. Due to the low density of this species, estimation of population trend would require a larger number of point transects than we sampled in the past.

Gray Flycatcher
(Empidonax wrightii)

NM-PIF Highest Priority Management Species in Pinyon-Juniper

The Gray Flycatcher is a pinyon-juniper specialist that is rarely found in other habitats. This species is considered vulnerable because of the fact that it relies almost exclusively on this habitat.

We recorded 310 Gray Flycatchers in three habitats on the *MBCNF* projects. This species should be well-monitored in the CNF in pinyon-juniper habitat.



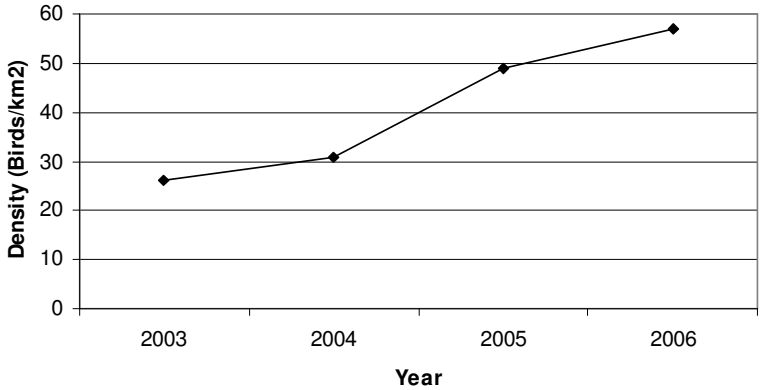
Map showing Index of Abundance for Gray Flycatcher on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Gray Flycatcher for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
PJ	57	41	79	20	275	298

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

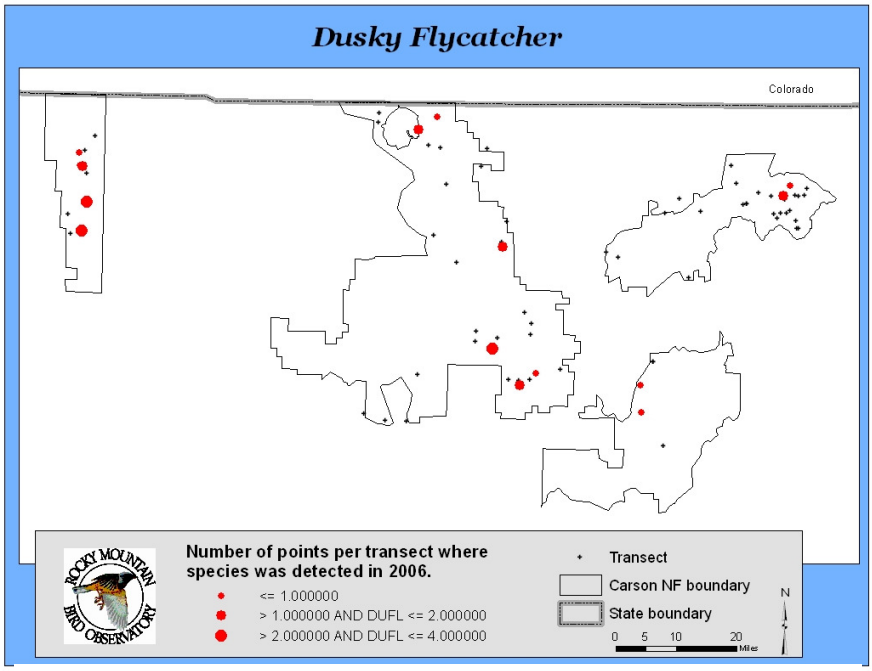
Estimated densities of Gray Flycatcher in pinyon-juniper for *MBCNF* monitoring project, 2003-2006.



Dusky Flycatcher
(Empidonax oberholseri)

NM-PIF Highest Priority Management Species in Mixed Conifer
NM-PIF Priority management species in Ponderosa Pine

The Dusky Flycatcher occupies a variety of habitats, including oak shrubland, willow riparian, aspen groves, coniferous forests and open brushy areas (Kingery 1998). In 2006, we detected 28 Dusky Flycatchers in five habitats on the *MBCNF* project and one individual in ponderosa pine on the VV project.

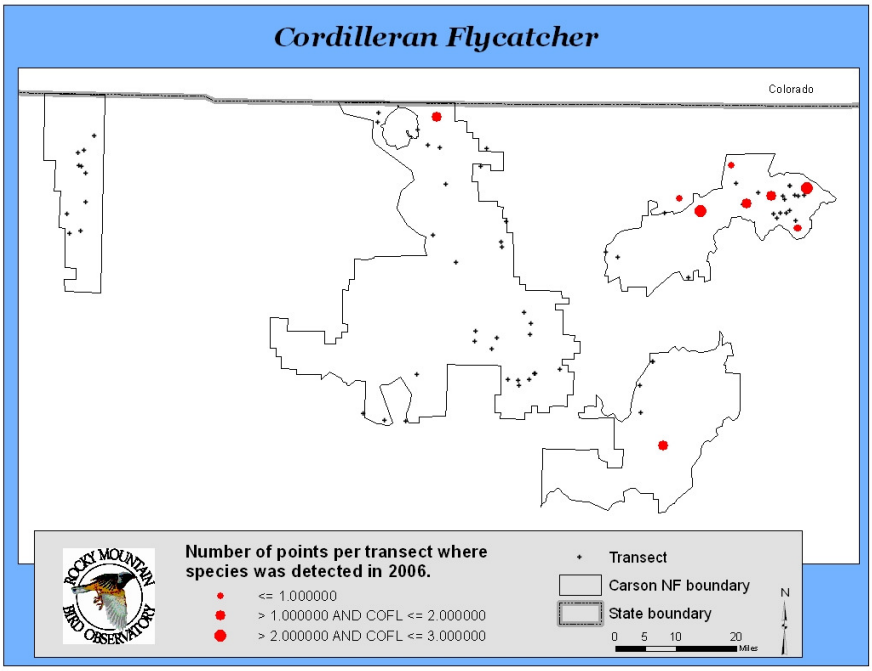


Map showing Index of Abundance for Dusky Flycatcher on transects in the Carson National Forest, 2006.

Cordilleran Flycatcher
(Empidonax occidentalis)

PIF Regional Stewardship Species
NM-PIF Priority management species for Mixed Conifer

Cordilleran Flycatchers in the southern Rocky Mountains breed primarily in montane and subalpine forests, especially where cliffs, rocky ledges, or suitable boulders are present (Kingery 1998). The species is also found as a breeder in montane riparian areas with many vertical surfaces, such as cut banks (Kingery 1998).



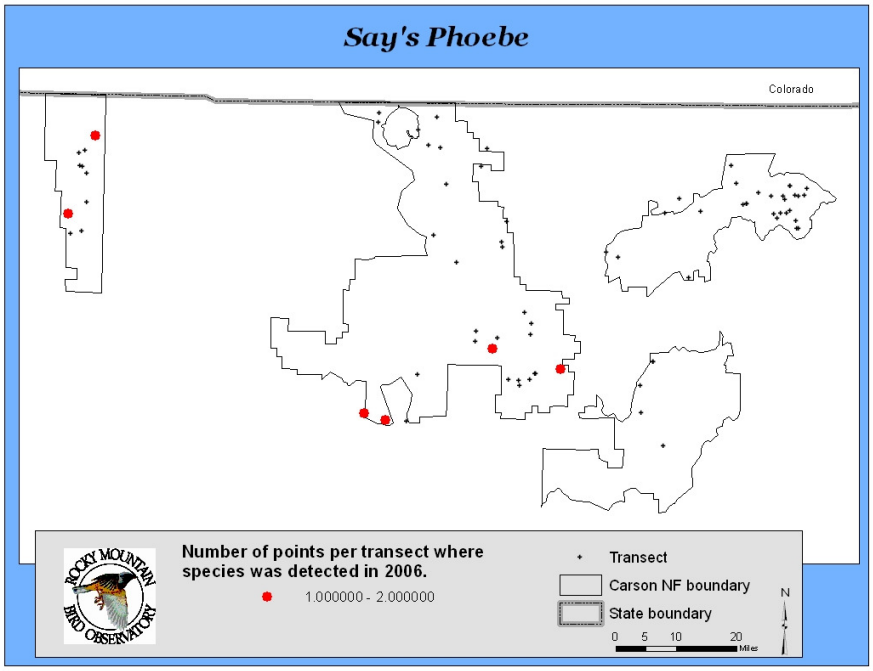
Map showing Index of Abundance for Cordilleran Flycatcher on transects in the Carson National Forest, 2006.

In 2006, we recorded 12 Cordilleran Flycatchers in three habitats on the *MBCNF* project and seven individuals in three habitats on the VV project. Due to the low density of this species, estimation of population trend would require a larger number of point transects than we sampled in the past.

Say's Phoebe
(Sayornis saya)

PIF Regional Stewardship Species
NM-PIF Species of High Responsibility for Plains and Mesa
NM-PIF Species of High Responsibility for Pinyon-Juniper

The Say's Phoebe nests in rocky areas where there are niches to hide its nest. It is also frequently found nesting in barns or other human structures (Andrews and Righter 1992). This species arrives on its breeding grounds earlier that most other migrants, and as a result of this we may miss the period when it is most actively singing because we are not conducting our surveys until mid-May. In 2006, we detected nine Say's Phoebes in two habitats on the *MBCNF* project.



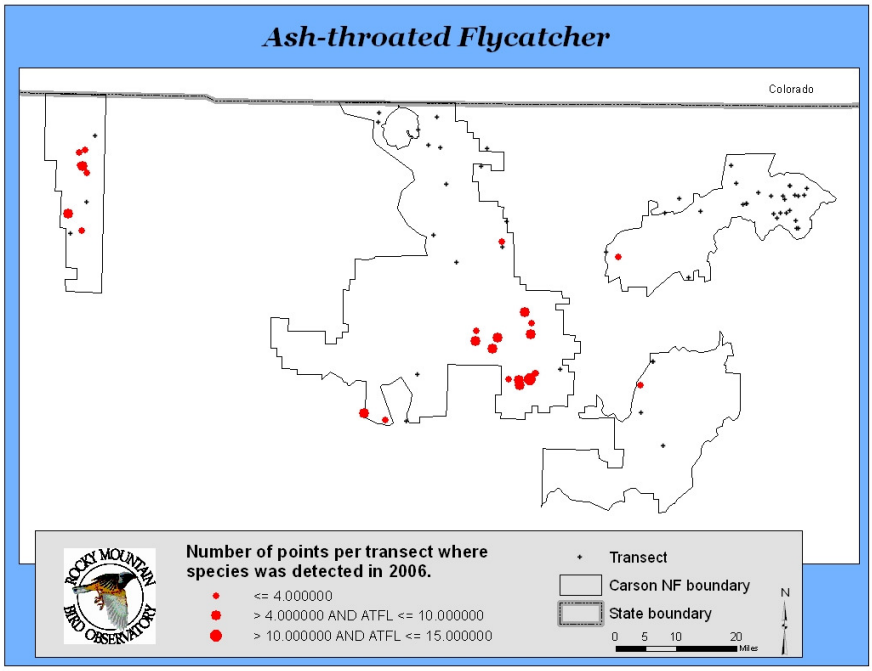
Map showing Index of Abundance for Say's Phoebe on transects in the Carson National Forest, 2006.

Ash-throated Flycatcher
(Myiarchus cinerascens)

NM-PIF Species of High Responsibility for Montane Shrub
NM-PIF Species of High Responsibility for Great Basin Desert Shrub
NM-PIF Species of High Responsibility for Pinyon-Juniper

The Ash-throated Flycatcher is a pinyon-juniper specialist that nests in cavities made by other species or in natural cavities. This species will also nest in man-made boxes if they are present (Righter et al. 2004).

In 2006, we recorded 151 Ash-throated Flycatchers in three habitats on the *MBCNF* project. This species is well-monitored in pinyon-juniper and ponderosa pine habitats in the CNF. We have been able to provide a density estimate in pinyon-juniper habitat all four years of this project.



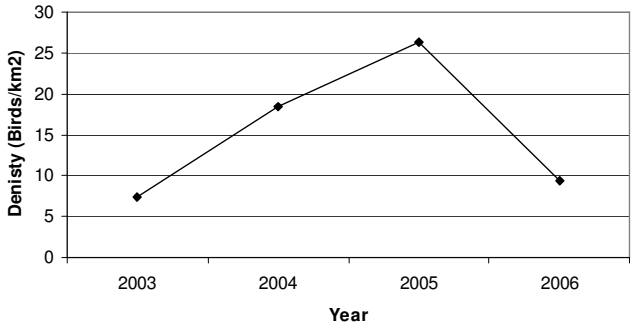
Map showing Index of Abundance for Ash-throated Flycatcher on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Ash-throated Flycatcher for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
PJ	9.4	6.3	14	25	130	140

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

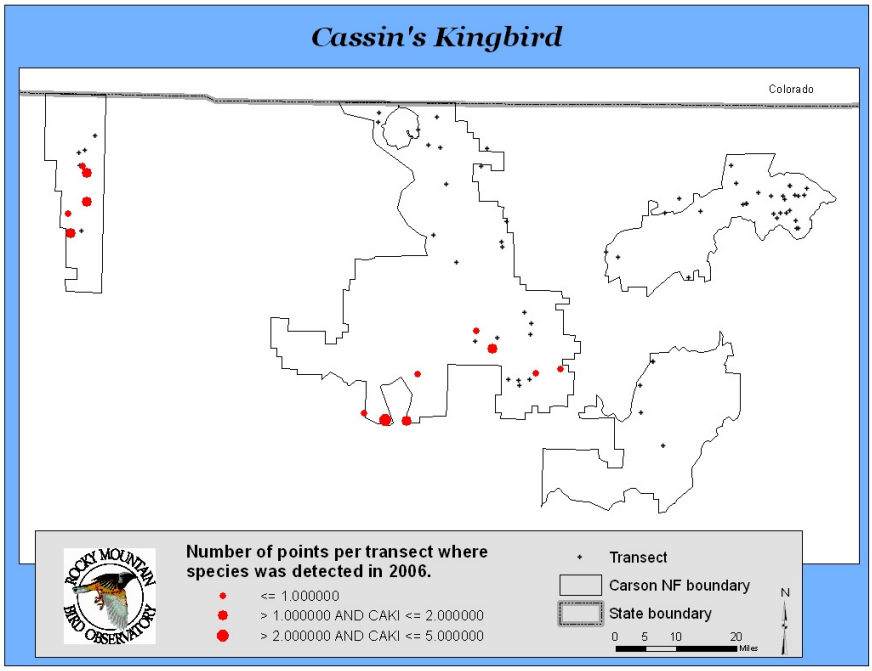
Estimated densities of Ash-throated Flycatcher in pinyon-juniper for *MBCNF* monitoring project, 2003-2006.



Cassin's Kingbird
(Tyrannus vociferans)

NM-PIF Species of High Responsibility for Plains and Mesa Grassland
NM-PIF Species of High Responsibility for Pinyon-Juniper

We detected 29 Cassin's Kingbirds in three habitats on the *MBCNF* projects in 2006. We provided a density estimate in pinyon-juniper habitat the first year of this project, however we have been unable to repeat this subsequently. Due to the low density of this species, estimation of population trend would require a larger number of point transects than we sampled in the past.



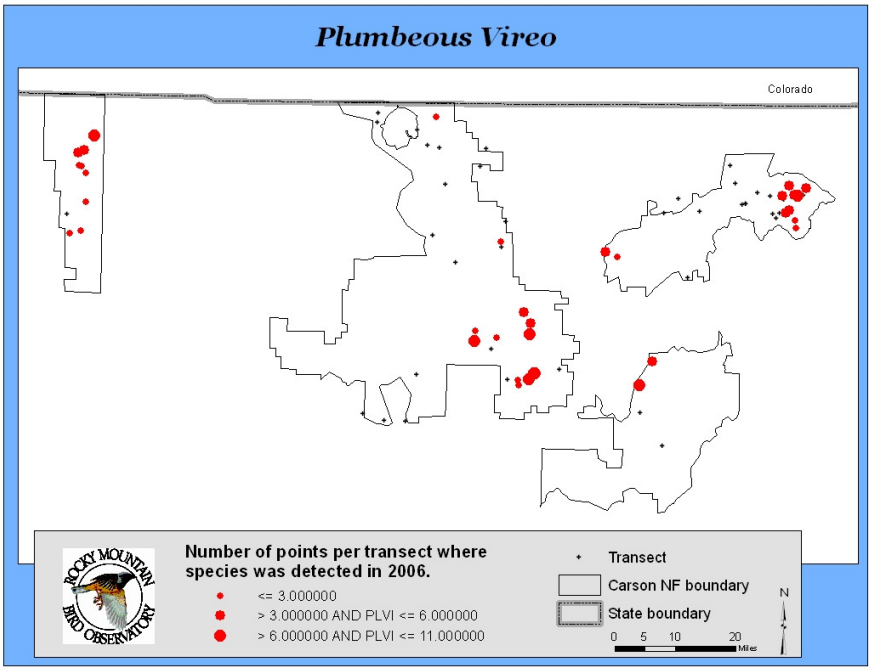
Map showing Index of Abundance for Cassin's Kingbird on transects in the Carson National Forest, 2006.

Plumbeous Vireo
(Vireo plumbeous)

PIF Regional Stewardship Species
NM-PIF Species of High Responsibility in Ponderosa Pine

The Plumbeous Vireo nests in a variety of habitats, including pinyon-juniper, ponderosa pine, and riparian cottonwood galleries. In the CNF, this species reaches it highest densities in ponderosa pine habitat.

In 2006, we detected 176 Plumbeous Vireos in four habitats on the *MBCNF* project and 17 individuals in ponderosa pine on the VV project. This species should be effectively monitored under *MBCNF* by point transects in ponderosa pine and pinyon-juniper habitat.



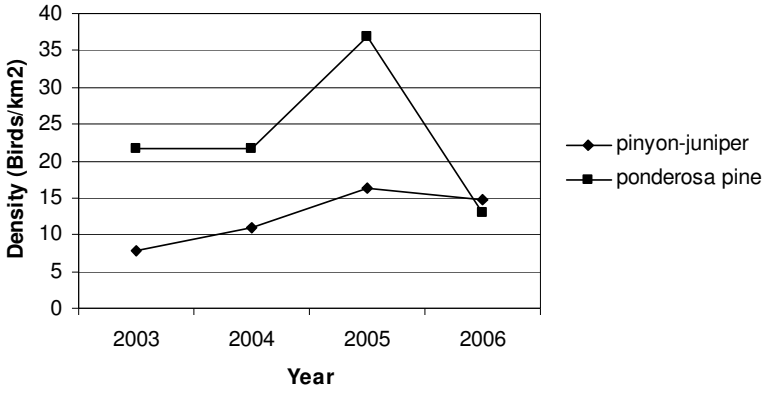
Map showing Index of Abundance for Plumbeous Vireo on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Plumbeous Vireo for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
PJ	15	11	20	18	119	132
PP	13	7.3	23	35	31	36

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

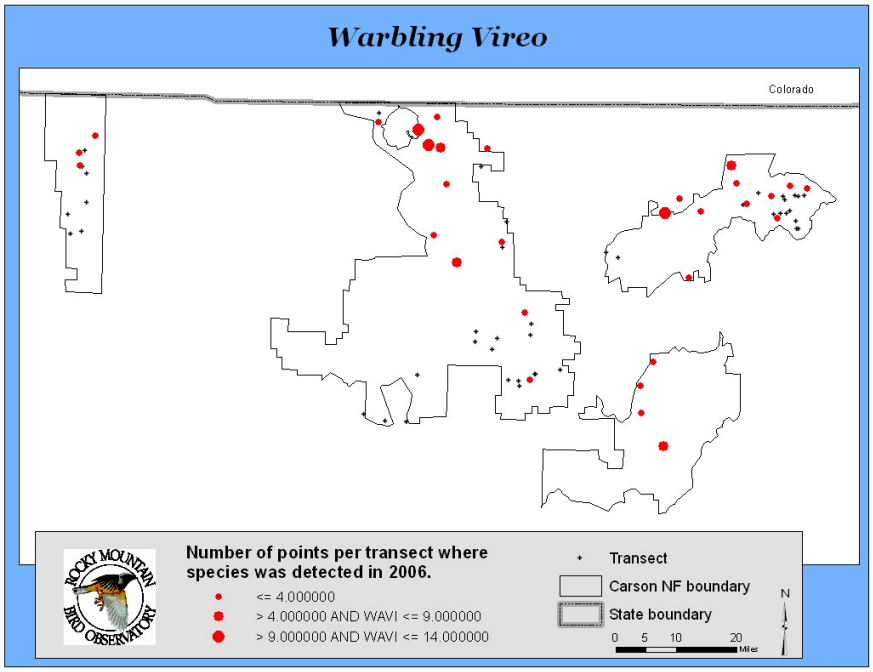
Estimated densities of Plumbeous Vireo in pinyon-juniper and ponderosa pine for *MBCNF* monitoring project, 2003-2006.



Warbling Vireo
(Vireo gilvus)
PIF Regional Stewardship Species

Warbling Vireos nest in a variety of habitats, including pinyon-juniper, ponderosa pine, and riparian cottonwood galleries. We are able to provide density estimates in aspen and mixed conifer this year. Overall, this species should be well-monitored in four habitats under *MBCNF*.

In 2006, we detected 148 Warbling Vireos in six habitats on the *MBCNF* project and 23 individuals in four habitats on the VV project.



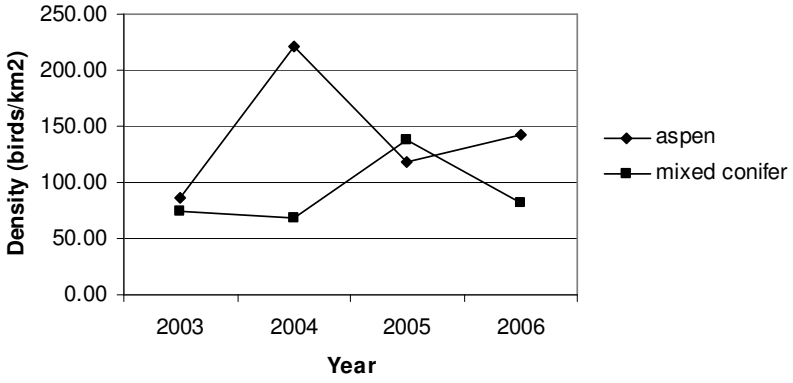
Map showing Index of Abundance for Warbling Vireo on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Warbling Vireo for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
AS	142	87	231	23	49	63
MC	81	27	247	52	42	45

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

Estimated densities of Warbling Vireo in aspen and mixed conifer for *MBCNF* monitoring project, 2003-2006.

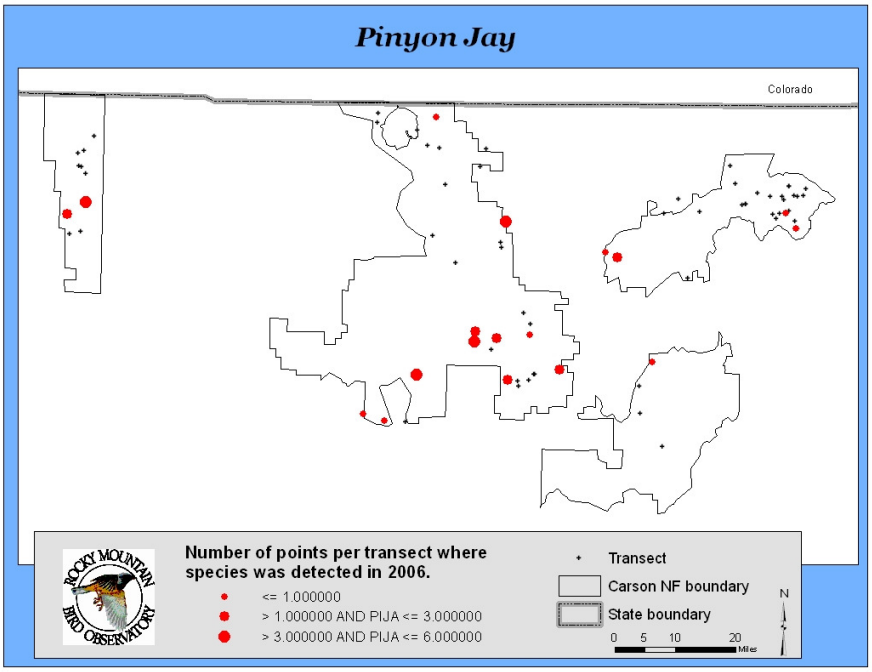


Pinyon Jay
(Gymnorhinus cyanocephalus)

PIF Species of Continental Concern
PIF Species of Regional Concern
PIF Continental Stewardship Species
PIF Regional Stewardship Species
NM-PIF Species of High Responsibility for Pinyon-Juniper
USFWS Bird of Conservation Concern
NMDGF - Species of Greatest Conservation Need

Pinyon Jays are rarely found in areas without pinyon pines. This species is very important for the overall health of pinyon forests as they cache large amounts of pinyon seeds that often germinate.

In 2006, we detected 135 Pinyon Jays in three habitats on the *MBCNF* project and 28 in ponderosa pine on the VV project. The Pinyon Jay should be effectively monitored under *MBCNF* in Pinyon-Juniper. Because the Pinyon Jay is an early season breeder, it important to distinguish adult from juvenile birds to accurately estimate the number of breeding individuals.



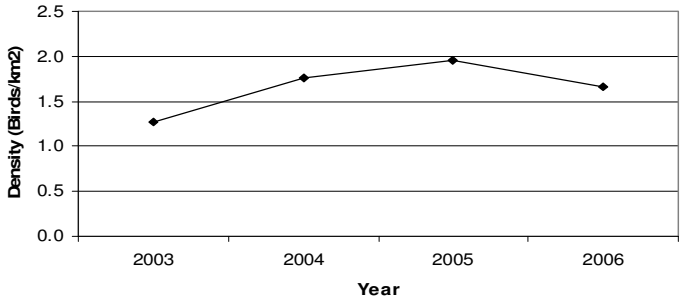
Map showing Index of Abundance for Pinyon Jay on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Pinyon Jay for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
PJ	1.7	0.9	3.1	39	39	66

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

Estimated densities of Pinyon Jay in pinyon-juniper for *MBCNF* monitoring project, 2003-2006.



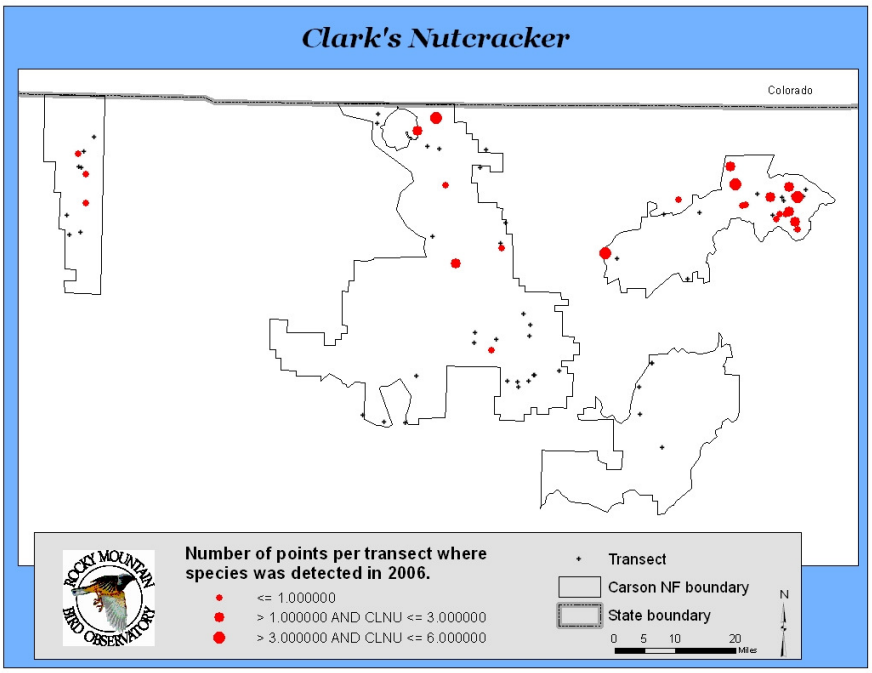
Clark's Nutcracker

(Nucifraga columbiana)

NM-PIF Priority management species for Mixed Conifer
NM-PIF Priority management species for Spruce-Fir
PIF Continental Stewardship Species
PIF Regional Stewardship Species

Clark's Nutcracker nests in all coniferous habitats and, when not nesting, travels widely in search of food. Pinyon-juniper is a habitat in which the nutcracker breeds infrequently; however, we detected sufficient numbers to calculate a density estimate in 2005 in the CNF.

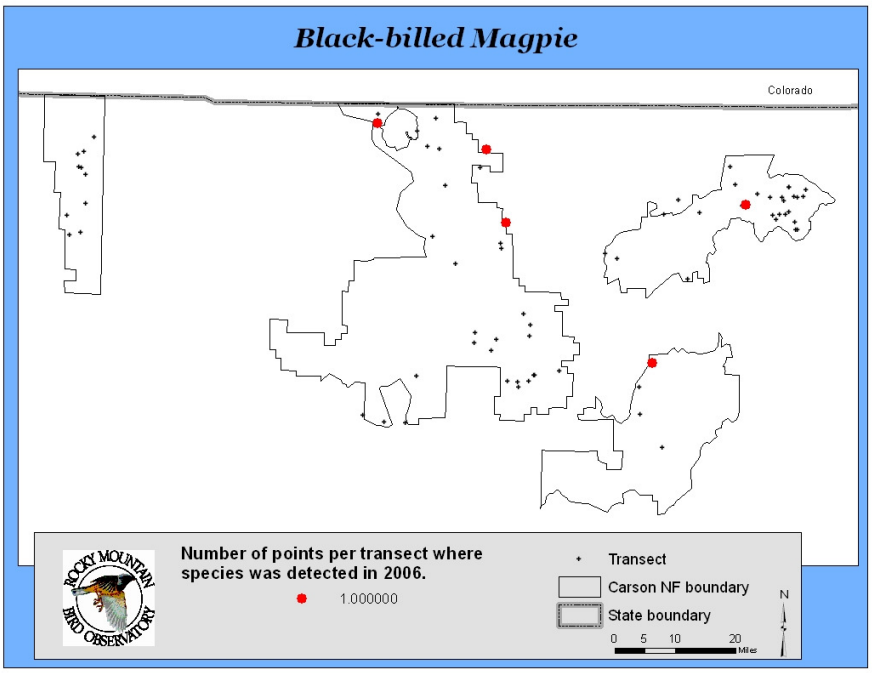
We detected 35 Clark's Nutcrackers in six habitats and 24 individuals in four habitats on the VV project in 2006.



Map showing Index of Abundance for Clark's Nutcracker on transects in the Carson National Forest, 2006.

Black-billed Magpie
(Pica hudsonia)
PIF Regional Stewardship Species

The Black-billed Magpie requires a supply of mud which it uses to construct large nests that will last for years. These nests are often used by other species after the magpies abandon them, including Great Horned and Long-eared Owls (Righter et al. 2004). Magpies have adapted well to man-made circumstances and are often seen foraging along roads on roadkill and refuse. Even though this species is considered a fairly common bird of open areas, we do not detect it in high numbers on transects.

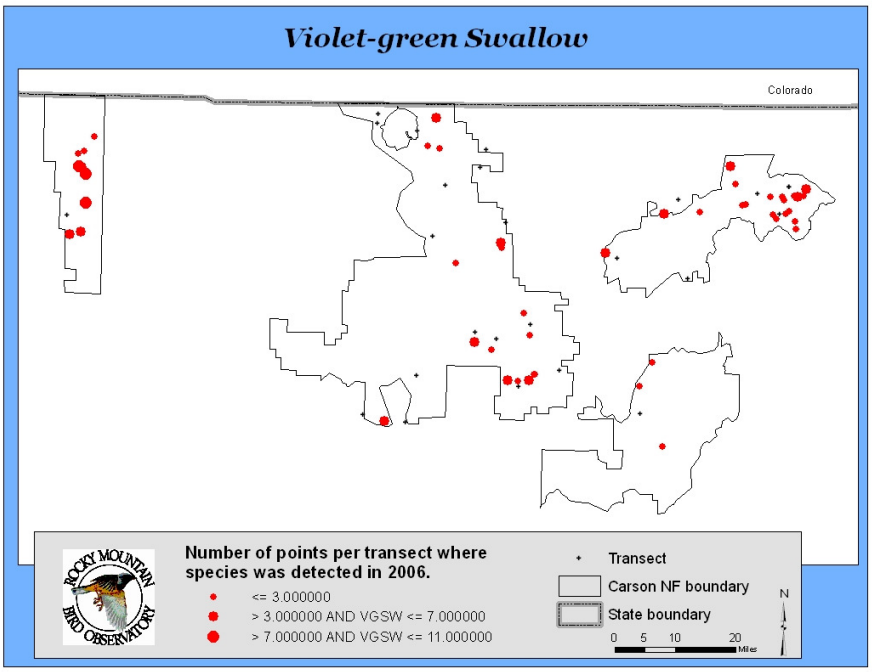


Map showing Index of Abundance for Black-billed Magpie on transects in the Carson National Forest, 2006.

In 2006, we detected four Black-billed Magpies in three habitats on the *MBCNF* project and four individuals in grassland on the VV project. Two of the transects where we detected Black-billed Magpie in 2006, we also detected the species on in previous years: GR04 in 2005 and 2006, and PJ38 in 2004, 2005, and 2006.

Violet-green Swallow
(Tachycineta thalassina)
PIF Regional Stewardship Species

The Violet-green Swallow often nests on cliffs and sometimes near White-throated Swifts. It will also nest near Tree Swallows in aspen stands or in ponderosa pine snags (Righter et al. 2004).



Map showing Index of Abundance for Violet-green Swallow on transects in the Carson National Forest, 2006.

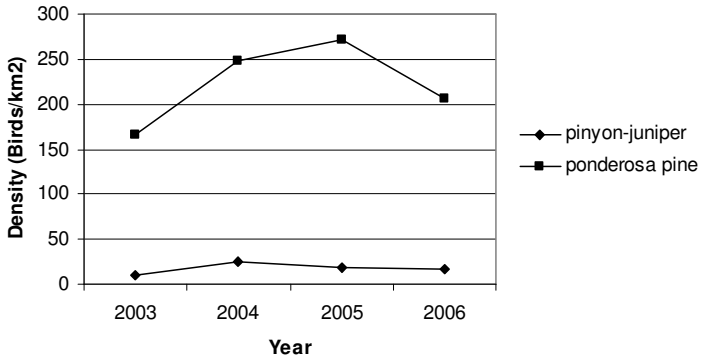
We detected 240 Violet-green Swallows in six habitats on the *MBCNF* project and 32 in four habitats on the VV project in 2006. We were able to provide a density estimate in pinyon-juniper and ponderosa pine for this species. This species should be well-monitored in pinyon-juniper and in ponderosa pine habitats under *MBCNF*.

Habitat-specific density estimates for Violet-green Swallow for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
PJ	16	10	26	28	55	80
PP	206	112	380	38	60	111

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

Estimated densities of Violet-green Swallow in pinyon-juniper and ponderosa pine for *MBCNF* monitoring project, 2003-2006.

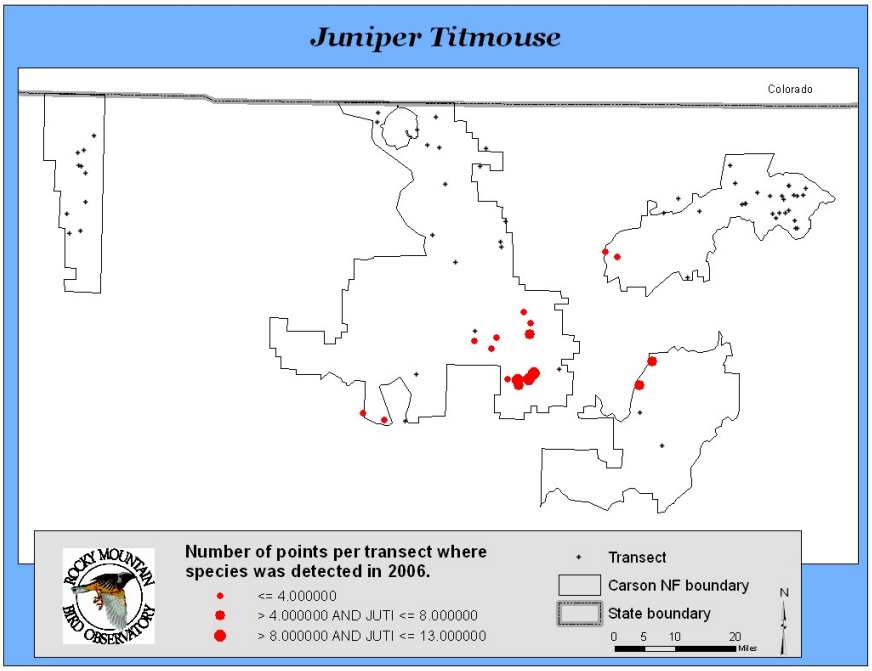


Juniper Titmouse
(Baeolophus ridgwayi)

CNF Management Indicator Species
PIF Species of Regional Concern
PIF Regional Stewardship Species
NM-PIF Species of High Responsibility for pinyon-juniper

The Juniper Titmouse is a pinyon-juniper specialist that is rarely found in other habitats, and nests in cavities which are constructed by other species. We have provided a density estimate in pinyon-juniper habitat for all four years of the *MBCNF* project.

We recorded 133 Juniper Titmouse in two habitats on the *MBCNF* project in 2006. The Juniper Titmouse should be well-monitored in pinyon-juniper under *MBCNF*.



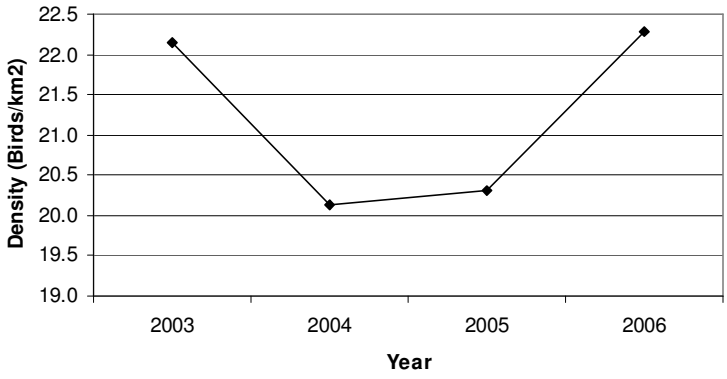
Map showing Index of Abundance for Juniper Titmouse on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Juniper Titmouse for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
PJ	22	15	33	24	116	131

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

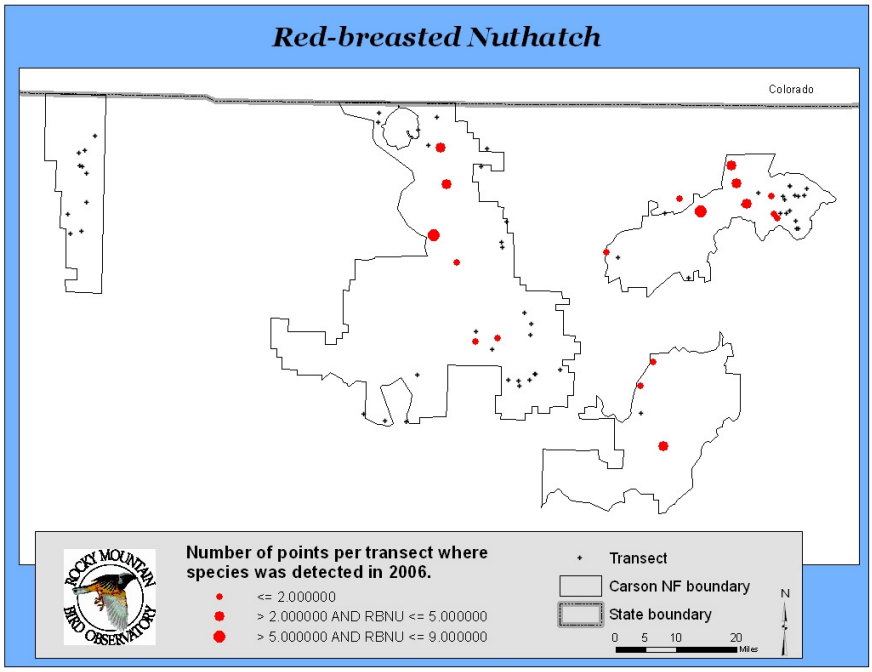
Estimated densities of Juniper Titmouse in pinyon-juniper for *MBCNF* monitoring project, 2003-2006.



Red-breasted Nuthatch
(Sitta canadensis)

NM-PIF Habitat Representative Species for Mixed Conifer

Red-breasted Nuthatches breed in high-elevation conifer forests, especially where aspen are present (Kingery 1998). We detected 38 Red-breasted Nuthatches in five habitats on the *MBCNF* project and 16 in three habitats on the VV project in 2006. Due to the low density of this species, estimation of population trend would require a larger number of point transects than we sampled in the past.

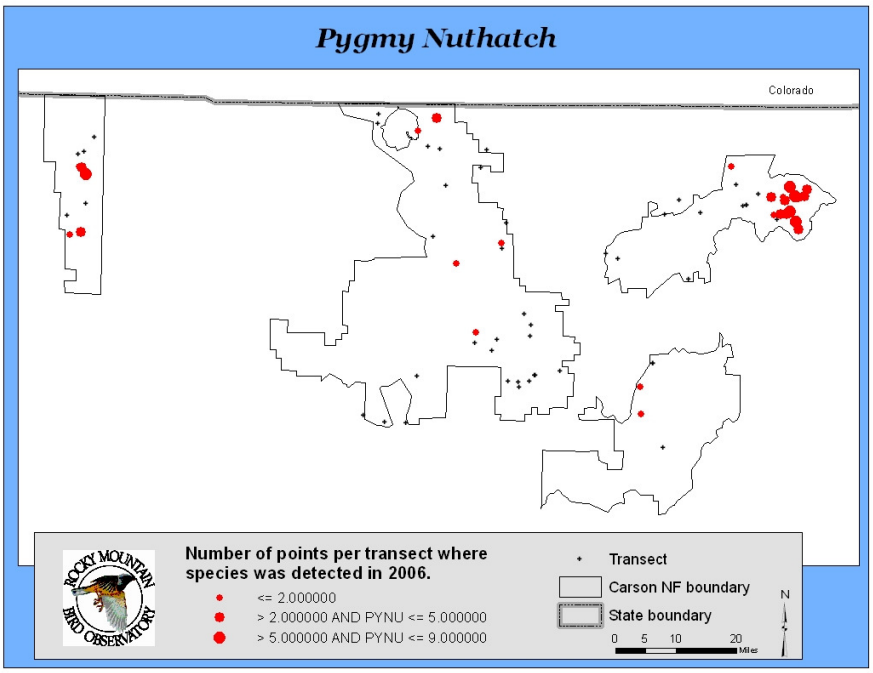


Map showing Index of Abundance for Red-breasted Nuthatch on transects in the Carson National Forest, 2006.

Pygmy Nuthatch
(Sitta pygmaea)

PIF Species of Regional Concern
NM-PIF Priority Species for Ponderosa Pine

The Pygmy Nuthatch relies almost exclusively on ponderosa pine. Rarely is this species detected where ponderosa pine is not present, and it frequently nests in ponderosa pine snags.



Map showing Index of Abundance for Pygmy Nuthatch on transects in the Carson National Forest, 2006.

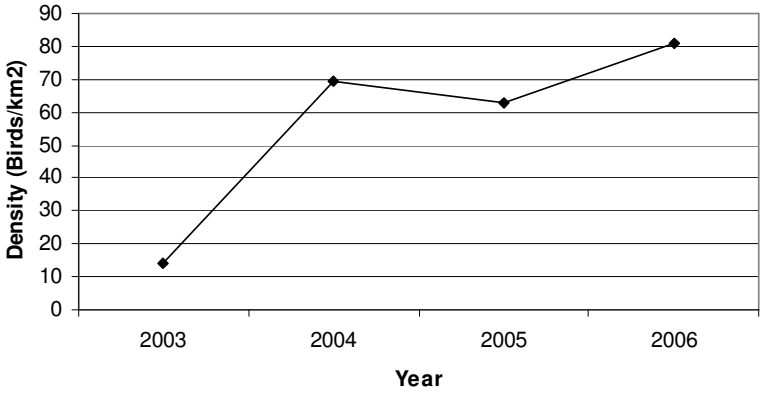
In 2006, we detected 67 Pygmy Nuthatches in four habitats on the *MBCNF* project and 61 in three habitats on the VV project. This species should be effectively monitored under *MBCNF* by point transects in at least ponderosa pine and possibly mixed conifer habitat.

Habitat-specific density estimates for Pygmy Nuthatch for the *MBCNF* monitoring project, 2006.

Project	Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
MBCNF	PP	81	40	164	44	40	51
VV	PP	78	51	120	26	47	56

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

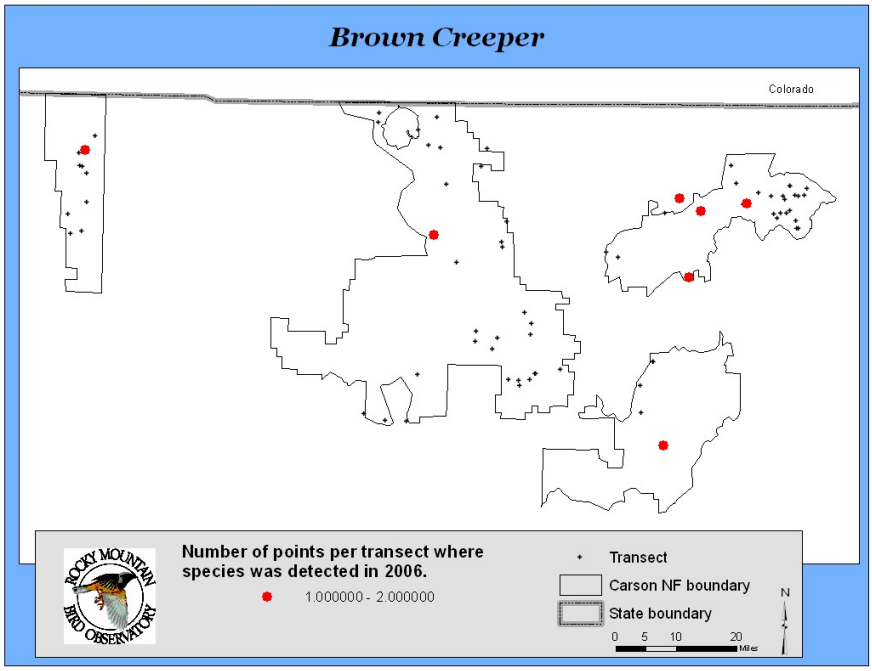
Estimated densities of Pygmy Nuthatch in ponderosa pine for MBCNF monitoring project, 2003-2006.



Brown Creeper
(Certhia Americana)

NM-PIF Representative Species for Spruce-Fir

The Brown Creeper is believed to be dependent on mature or old-growth coniferous forests (Cornell 2003). In 2006, we detected six Brown Creepers in three habitats on the *MBCNF* project and three individuals in mixed conifer on the VV project. Due to the low density of this species, estimation of population trend would require a larger number of point transects than we sampled in the past.

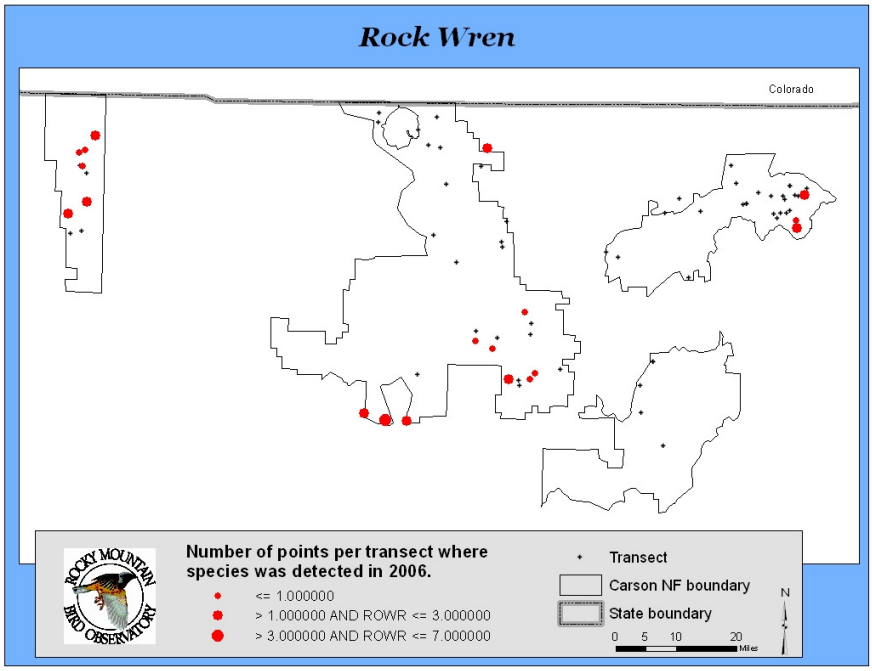


Map showing Index of Abundance for Brown Creeper on transects in the Carson National Forest, 2006.

Rock Wren
(Salpinctes obsoletus)

PIF Regional Stewardship Species
NM-PIF Species of High Responsibility for Montane Shrub, Great Basin Desert Shrub and Cliff/Cave/Rock

Rock Wrens are found in arid or semi-arid areas, in rocky canyons and cliffs, on rock slides and boulder-strewn slopes, and in arroyos with sparse vegetation (Kingery 1998). The species nests in cavities or crevices in rocks and it will sometimes "pave" the nest entrance with small, flat rocks.



Map showing Index of Abundance for Rock Wren on transects in the Carson National Forest, 2006.

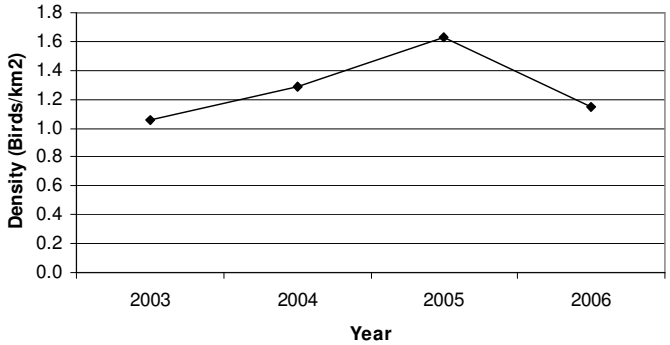
In 2006, we 42 detected Rock Wrens in three habitats on the *MBCNF* project and were able to calculate a density estimate in pinyon-juniper. We also detected six individuals on ponderosa pine transects on the VV project. We detect this species in sufficient numbers to monitor it effectively under the *MBCNF* project in pinyon-juniper habitat.

Habitat-specific density estimates for Rock Wren for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
PJ	1.1	0.6	2.2	41	30	36

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

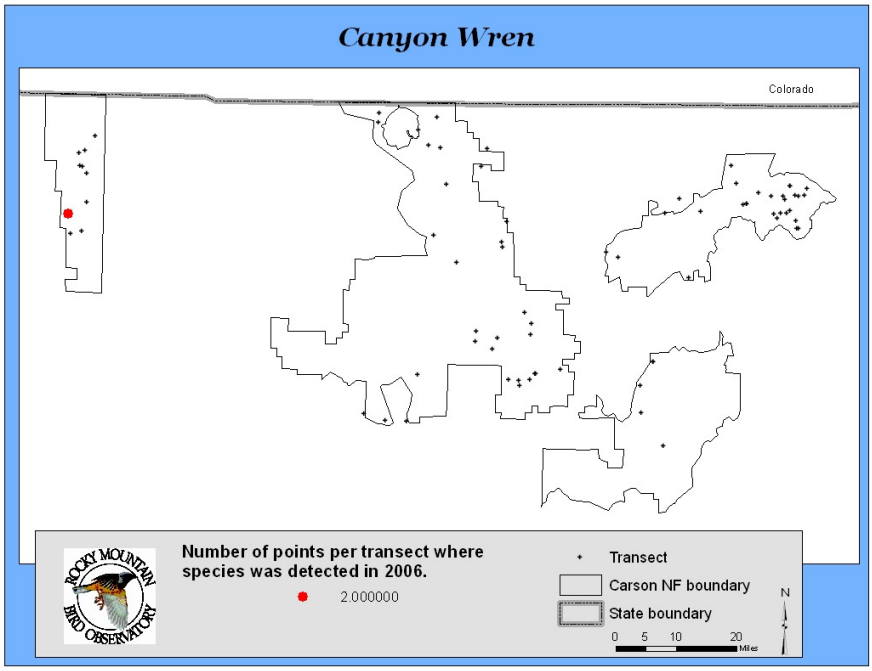
Estimated densities of Rock Wren in pinyon-juniper for *MBCNF* monitoring project, 2003-2006.



Canyon Wren
(Catherpes mexicanus)

PIF Species of Regional Concern
NM-PIF Species of High Responsibility for Cliff/Cave/Rock

The Canyon Wren breeds in rocky areas with crevices for nesting and foraging for prey. Its secluded habitat generally protects the species from most human activities, except recreational rock climbing which may disturb nesting grounds.



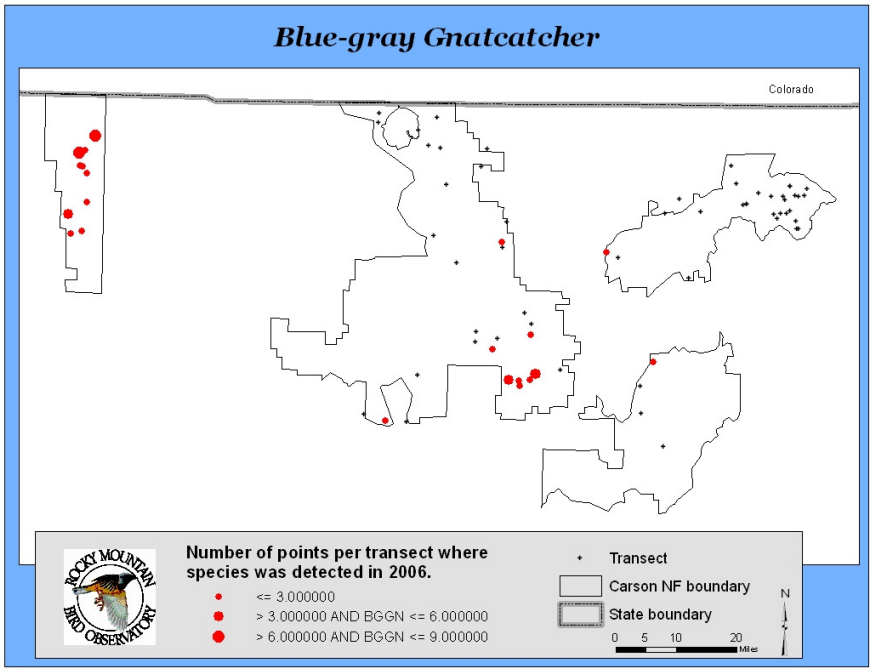
Map showing Index of Abundance for Canyon Wren on transects in the Carson National Forest, 2006.

In 2006, we detected two Canyon Wrens on one pinyon-juniper transect, PJ03, on the *MBCNF* project. We also detected this species on this transect in 2005. We detect this species every year in very low numbers in pinyon-juniper habitat on the *MBCNF* project. Canyon Wrens are too rare and localized on the CNF to be adequately monitored by point transects in any habitat; however, under the current point transect sampling design, we will be able to continue to provide location information for this species.

Blue-gray Gnatcatcher
(Polioptila caerulea)
NM-PIF Habitat Representative Species

Blue-gray Gnatcatchers are most frequently encountered in pinyon-juniper habitat but can be found in any low-elevation areas with an abundance of shrubs.

In 2006, we detected 76 Blue-gray Gnatcatchers in three habitats on the *MBCNF* project. This species should be well-monitored in pinyon-juniper habitat on the *MBCNF* project.



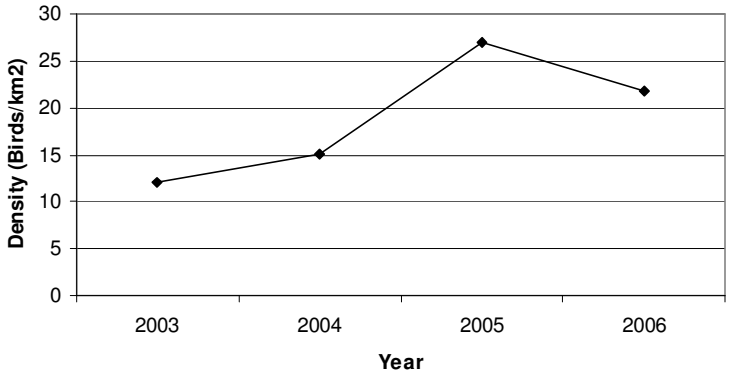
Map showing Index of Abundance for Blue-gray Gnatcatcher on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Blue-gray Gnatcatcher for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
PJ	22	14	35	29	59	64

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

Estimated densities of Blue-gray Gnatcatcher in pinyon-juniper for *MBCNF* monitoring project, 2003-2006.

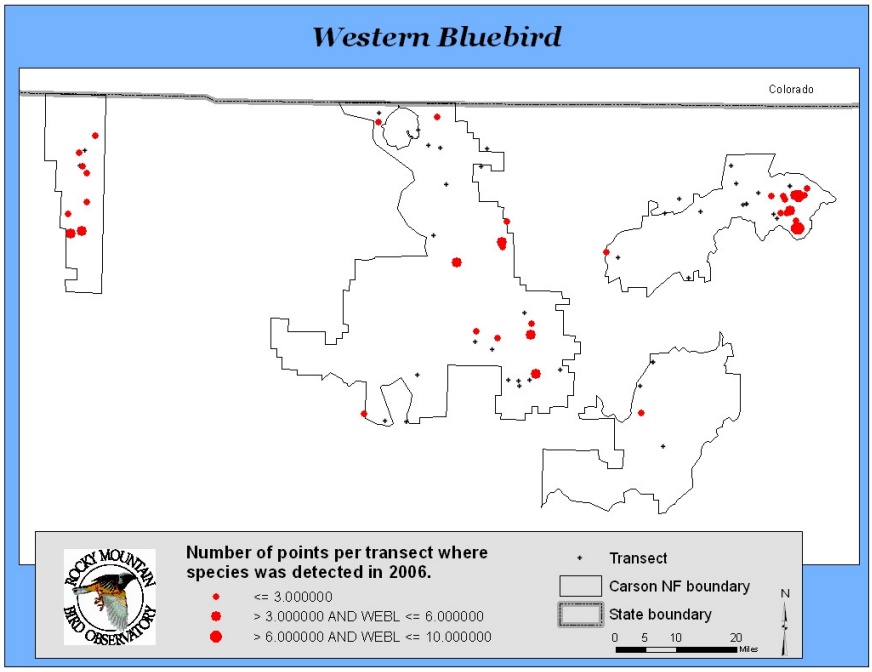


Western Bluebird
(Sialia mexicana)

PIF Regional Stewardship Species

The Western Bluebird is a cavity-nester that, in the southern Rocky Mountain area, prefers ponderosa pine habitat for nesting. This species occasionally nests in other habitats including aspen, grassland and pinyon-juniper (Kingery 1998).

We detected 112 Western Bluebirds in five habitats on the *MBCNF* project and 52 in two habitats on the VV project in 2006. The Western Bluebird should be effectively monitored through point transects under *MBCNF* in ponderosa pine habitat.



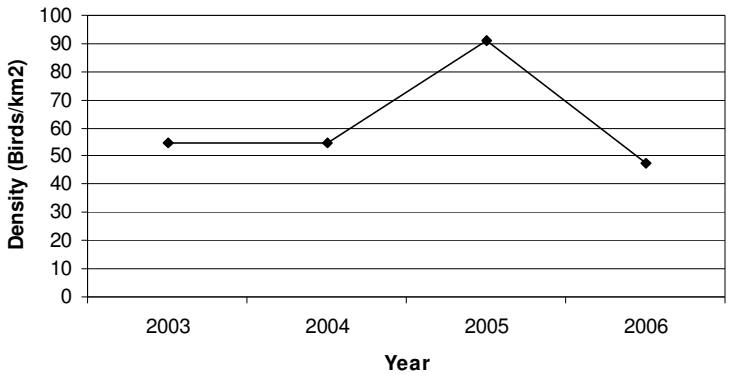
Map showing Index of Abundance for Western Bluebird on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Western Bluebird for the *MBCNF* and VV monitoring projects, 2006.

Project	Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
MBCNF	PP	47	26	85	36	52	64
VV	PP	63	33	119	39	43	51

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

Estimated densities of Western Bluebird in ponderosa pine for *MBCNF* monitoring project, 2003-2006.



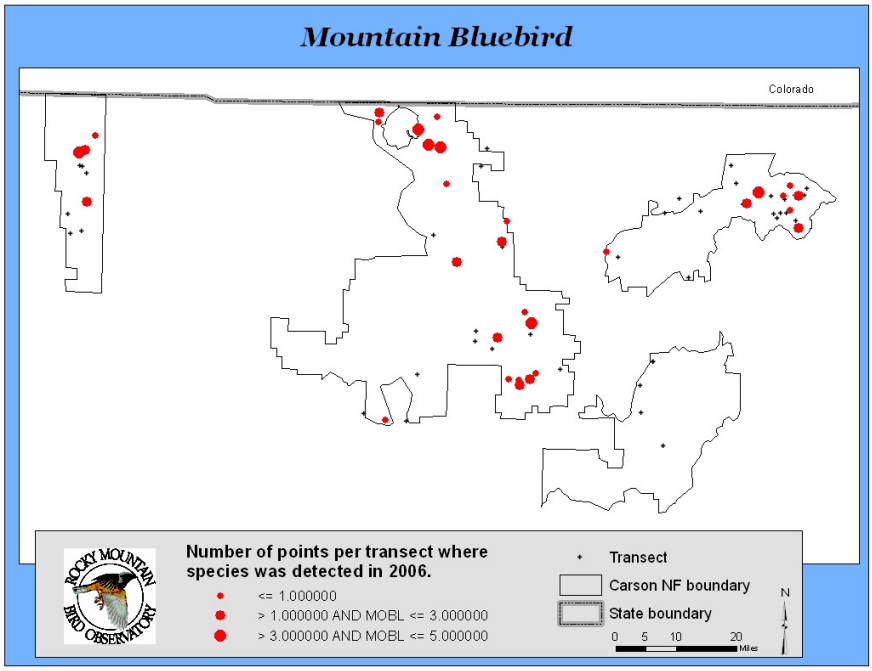
Mountain Bluebird

(Sialia currocoides)

NM-PIF Priority management species
PIF Species of Regional Concern
PIF Continental Stewardship Species
PIF Regional Stewardship Species

Mountain Bluebirds are secondary cavity nesters that rely largely on woodpecker cavities and nest boxes for nest sites, and breed most commonly in pinyon-juniper (Kingery 1998).

We recorded 75 Mountain Bluebirds on the *MBCNF* project in all seven habitats and 17 in two habitats in 2006. This species should be effectively monitored through point transects under *MBCNF* in pinyon-juniper.



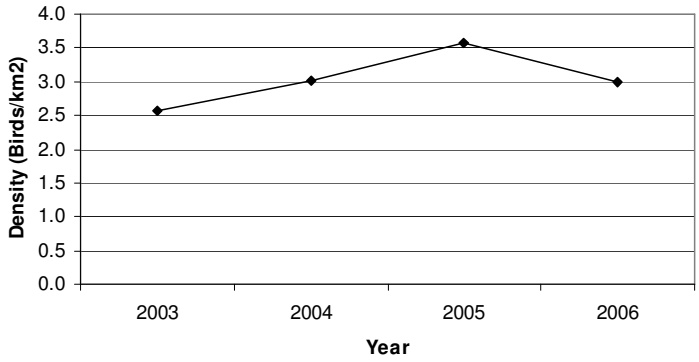
Map showing Index of Abundance for Mountain Bluebird on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Mountain Bluebird for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
PJ	3.0	1.7	5.4	37	21	30

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

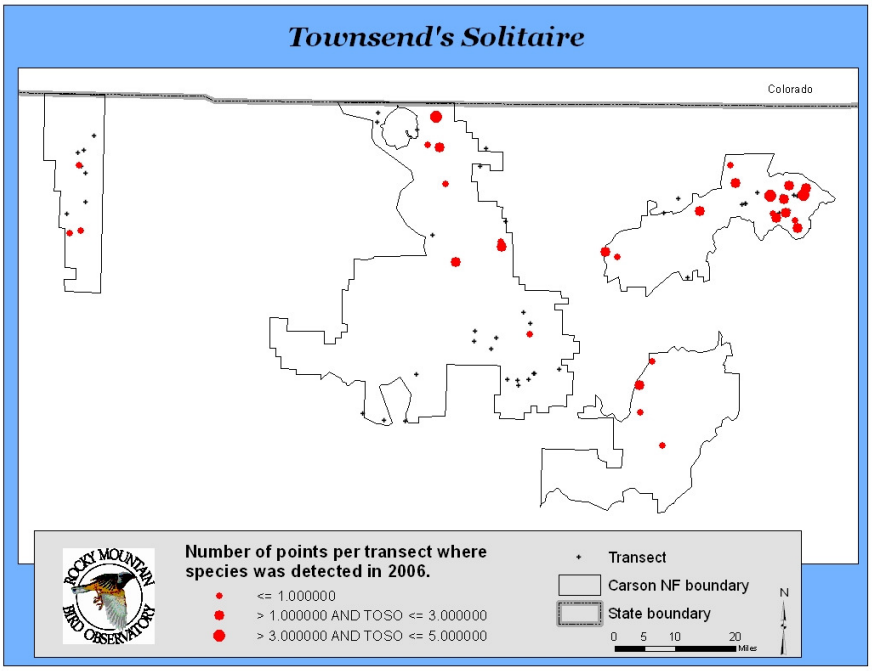
Estimated densities of Mountain Bluebird in pinyon-juniper for *MBCNF* monitoring project, 2003-2006.



Townsend's Solitaire
(Myadestes townsendi)

NM-PIF Priority management species

The Townsend's Solitaire nests in all forested habitats in relatively low densities. This species nests on the ground in steep areas or in small niches on rocky cliffs.



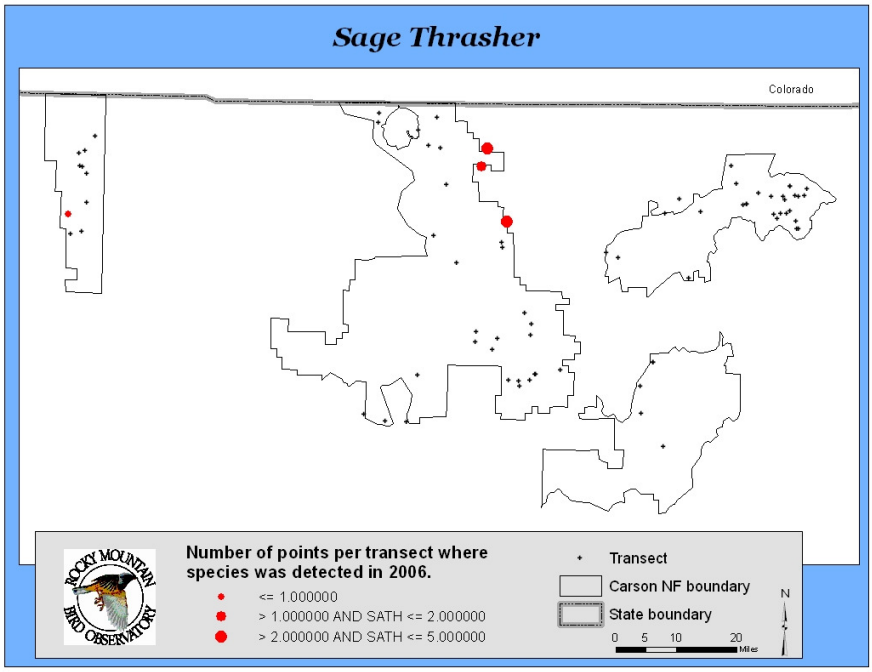
Map showing Index of Abundance for Townsend's Solitaire on transects in the Carson National Forest, 2006.

In 2006, we detected 32 Townsend's Solitaires in five habitats on the *MBCNF* project and 30 individuals in three habitats on the VV project. Due to the low density of this species, estimation of population trend would require us to survey a larger number of point transects than we have in previous years.

Sage Thrasher
(Oreoscoptes montanus)

NM-PIF Highest Priority Species
NMDGF - Species of Greatest Conservation Need

Sage Thrashers are most frequently found in sage-dominated grasslands and shrubby arid lands. Detections of Sage Thrasher are too low to monitor this species in any one habitat on the *MBCNF* project. Establishing more transects in sage shrubland in the CNF may enable us to monitor this species more effectively.



Map showing Index of Abundance for Sage Thrasher on transects in the Carson National Forest, 2006.

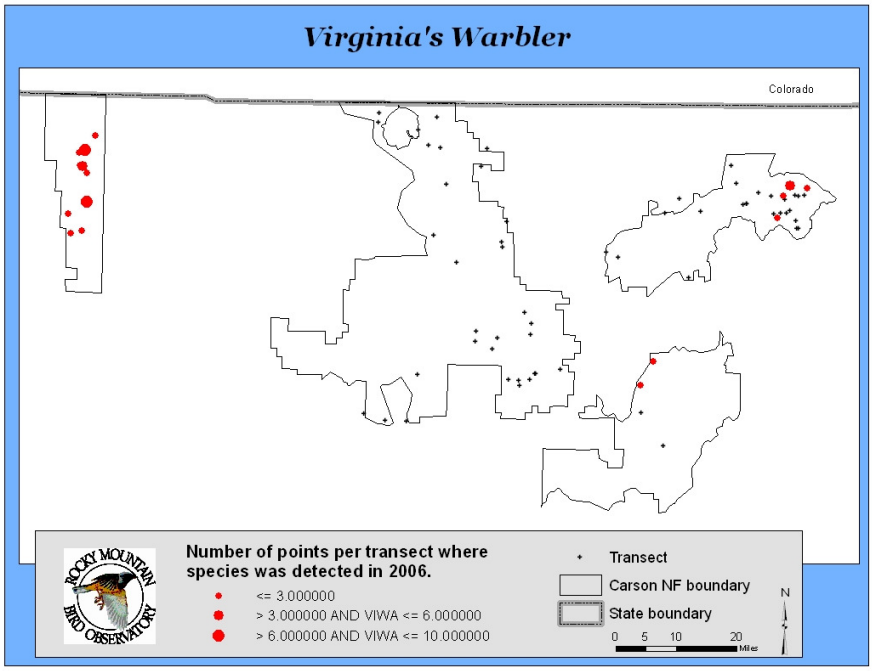
In 2006, we detected 14 Sage Thrashers in three habitats on the *MBCNF* project. Three of the transects where we detected Sage Thrasher in 2006, GR03, GR04, and SA05, we also detected the species on in 2004 and 2005.

Virginia's Warbler
(Vermivora virginiae)

PIF Species of Continental and Regional Concern
PIF Regional Stewardship Species
NM-PIF Highest Priority Species for Ponderosa Pine
NM-PIF Priority Species for Pinyon-Juniper and Montane Shrub
USFWS Bird of Conservation Concern

The Virginia's Warbler is most often found in ponderosa pine forest, pinyon-juniper woodlands, and riparian thickets that have a well-developed herbaceous or woody understory (Kingery 1998).

In 2006, we detected 61 Virginia's Warblers in three habitats on the *MBCNF* project and 13 in two habitats on the VV project. The Virginia's Warbler should be effectively monitored under the *MBCNF* project in pinyon-juniper habitat and possibly also in ponderosa pine.



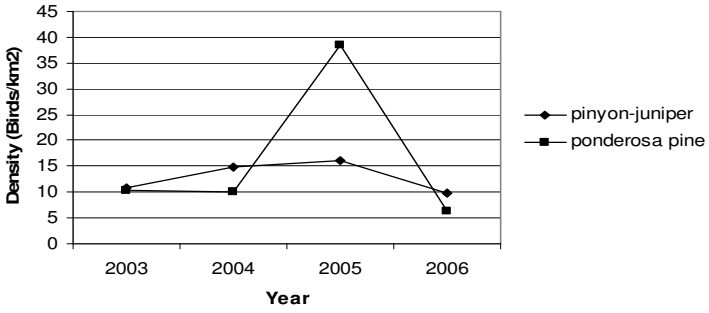
Map showing Index of Abundance for Virginia's Warbler on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Virginia's Warbler for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
PJ	9.9	4.3	23	53	30	38
PP	6.3	3.2	13	42	11	11

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

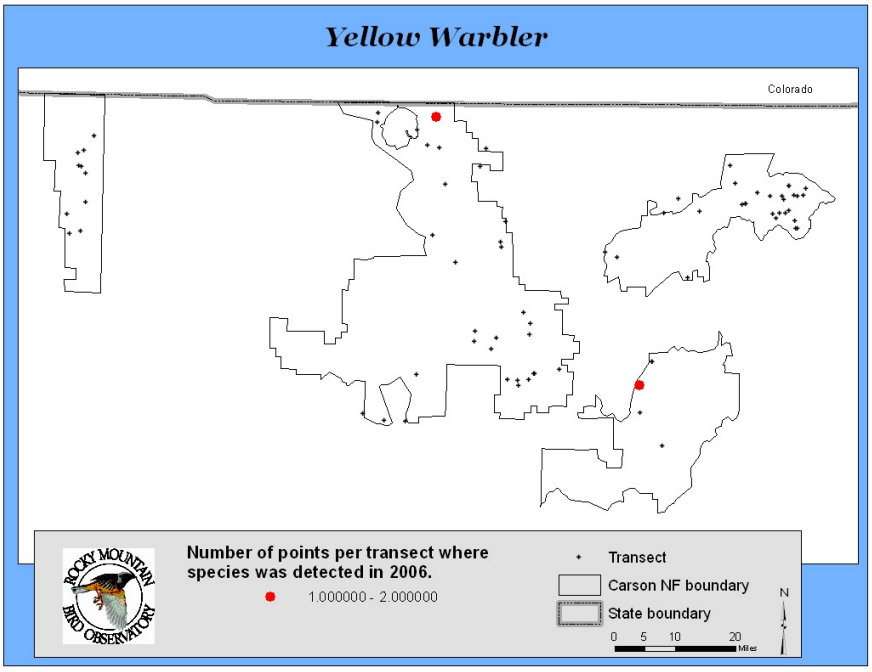
Estimated densities of Virginia's Warbler in pinyon-juniper and ponderosa pine for *MBCNF* monitoring project, 2003-2006.



Yellow Warbler
(Dendroica petechia)

NMDGF - Species of Greatest Conservation Need

The Yellow Warbler occurs in moist habitats with a high insect abundance and often a willow component. It will also nest in aspen stands with a multi-layered understory (Kingery 1998).



Map showing Index of Abundance for Yellow Warbler on transects in the Carson National Forest, 2006.

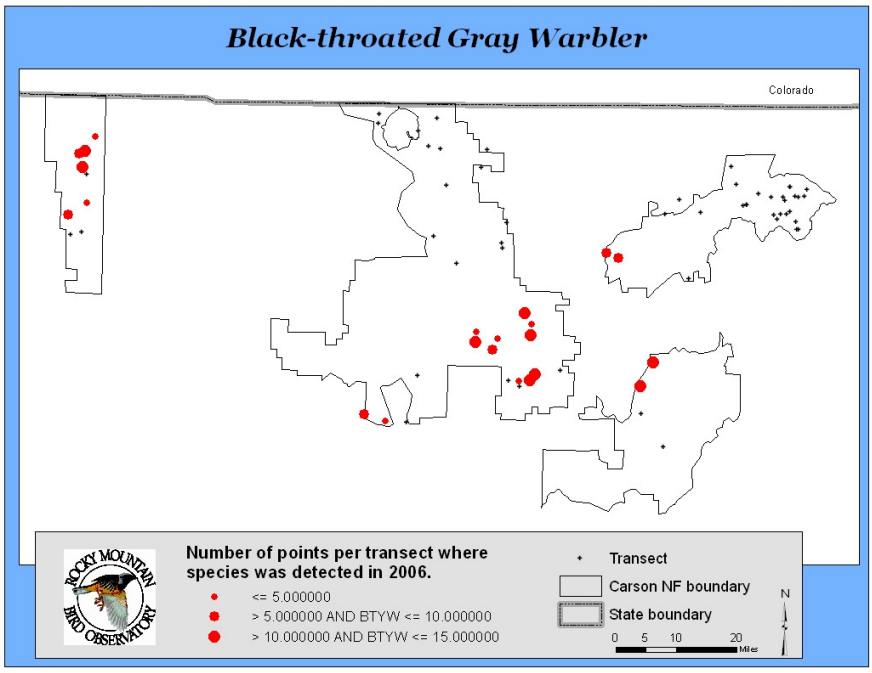
We do not survey the preferred habitat of Yellow Warbler on the *MBCNF* project; therefore, we infrequently detect this species and are not able to effectively monitor its status on the CNF. We may be able to detect this species in greater numbers by establishing more aspen and riparian transects as funding allows. However, given current funding levels we will only be able to track the presence or absence of this species in the current habitats.

In 2006, we detected four Yellow Warblers in two habitats on the *MBCNF* project. The two transects where we detected Yellow Warbler in 2006, MC01 and PJ45, we also detected the species on these transects in previous years.

Black-throated Gray Warbler
(Dendroica nigrescens)

PIF Species of Regional Concern
NM-PIF Highest Priority Species for Pinyon-Juniper
USFWS Bird of Conservation Concern

The Black-throated Gray Warbler prefers large stands of pinyon-dominated woodland. Rarely is this species found outside of pinyon-juniper habitat during the breeding season. As in previous years, Black-throated Gray Warblers were one of the most abundant species in pinyon-juniper habitat in 2006 on the *MBCNF* project.



Map showing Index of Abundance for Black-throated Gray Warbler on transects in the Carson National Forest, 2006.

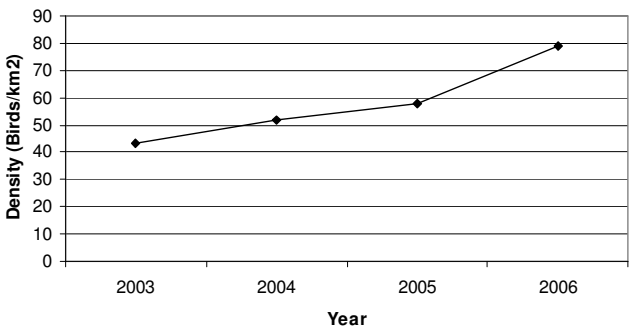
In 2006, we detected 380 Black-throated Gray Warblers in two habitats on the *MBCNF* project. We should effectively monitor this species under *MBCNF* through point-transects in pinyon-juniper.

Habitat-specific density estimates for Black-throated Gray Warbler for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
PJ	79	58	107	18	312	373

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

Estimated densities of Black-throated Gray Warbler in pinyon-juniper for *MBCNF* monitoring project, 2003-2006.

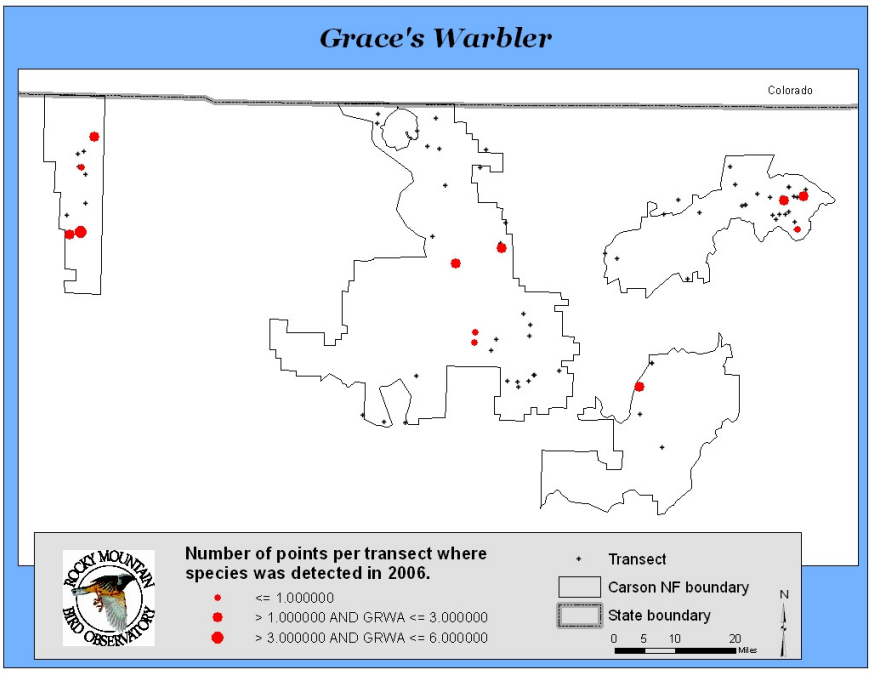


Grace's Warbler

(Dendroica graciae)

PIF Species of Continental and Regional Concern
NM-PIF Highest Priority Species
USFWS Bird of Conservation Concern
NMDGF - Species of Greatest Conservation Need

The Grace's Warbler breeds in older, mature ponderosa pine stands often with an understory of Gambel's oak. Since the inception of *MBCNF* we've detected Grace's Warbler in sufficient numbers in ponderosa pine habitat every year to calculate a density estimate.



Map showing Index of Abundance for Grace's Warbler on transects in the Carson National Forest, 2006.

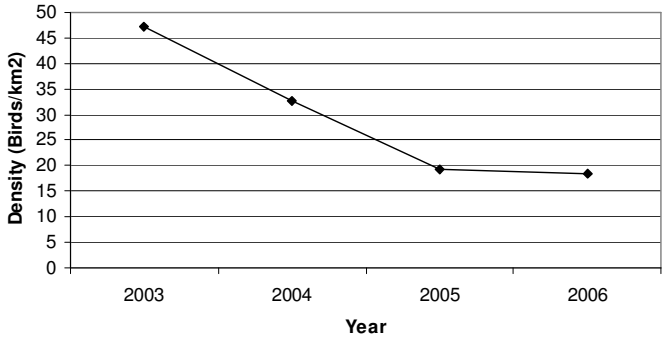
In 2006, we detected 30 Grace's Warblers in two habitats on the *MBCNF* project and seven in ponderosa pine habitat on the VV project. The Grace's Warbler should be effectively monitored through point-transects in ponderosa pine habitat under *MBCNF*.

Habitat-specific density estimates for Grace's Warbler for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
PP	19	6.7	51	63	22	22

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

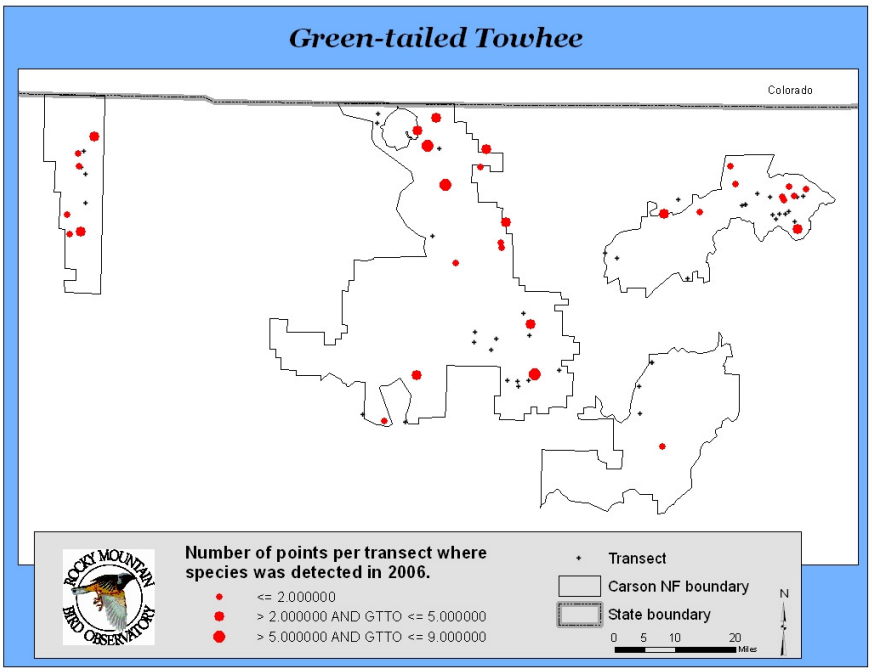
Estimated densities of Grace's Warbler in ponderosa pine for *MBCNF* monitoring project, 2003-2006.



Green-tailed Towhee
(Pipilo chlorurus)

PIF Continental and Regional Stewardship Species
NM-PIF Priority Species for Great Basin Desert Shrub

At low elevations on the CNF, Green-tailed Towhees nest in more mesic areas with a high diversity of shrub species, including sagebrush and pinyon-juniper. At higher elevations it uses more xeric shrub-dominated areas.



Map showing Index of Abundance for Green-tailed Towhee on transects in the Carson National Forest, 2006.

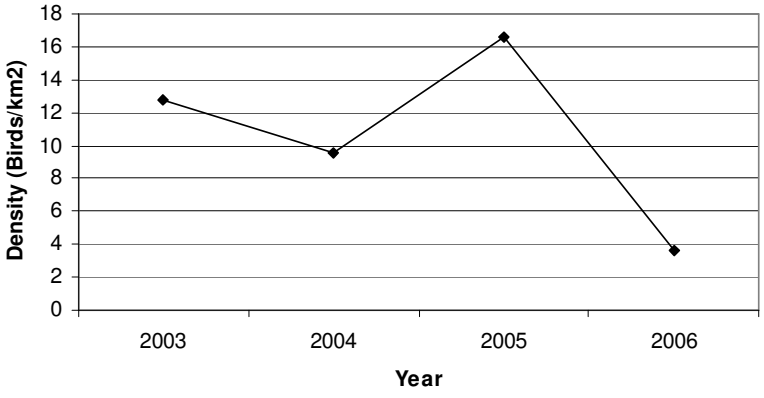
In 2006, we detected 93 Green-tailed Towhees in all seven habitats on the *MBCNF* project and eleven in two habitats on the VV project. The Green-tailed Towhee should be effectively monitored in both pinyon-juniper and sage shrubland under *MBCNF*.

Habitat-specific density estimates for Green-tailed Towhee for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
SA	3.7	1.4	9.4	48	11	13

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

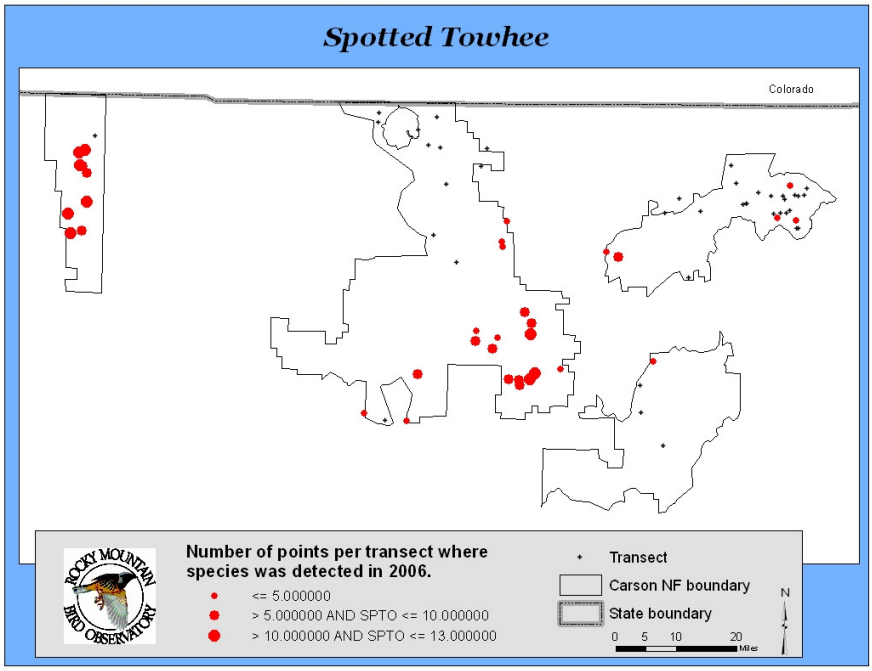
Estimated densities of Green-tailed Towhee in sage shrubland for *MBCNF* monitoring project, 2003-2006.



Spotted Towhee
(Pipilo maculatus)

NM-PIF Habitat Representative Species for Montane Shrub

The Spotted Towhee prefers dense, shrubby growth offering shade and is most common in low-elevation shrubby areas with a pinyon-juniper component (Righter et al. 2004).



Map showing Index of Abundance for Spotted Towhee on transects in the Carson National Forest, 2006.

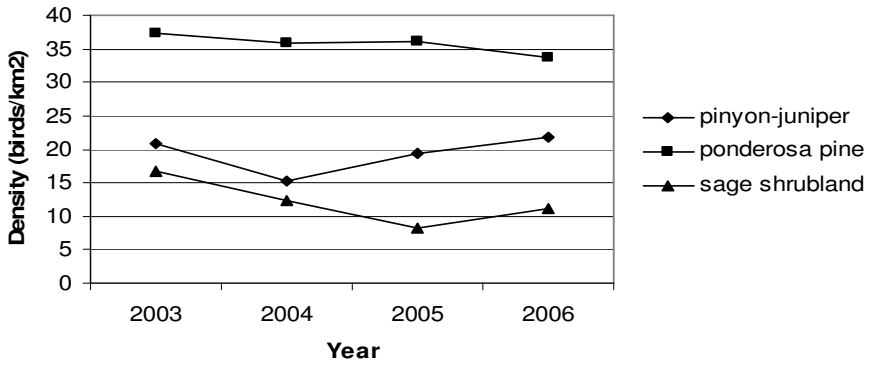
In 2006, we detected 377 Spotted Towhees in three habitats on the *MBCNF* project and four individuals in two habitats on the VV project. In sage shrubland habitat, Spotted Towhee is one of the most abundant species detected on point-transects for the *MBCNF* project. We detect this species in sufficient numbers to monitor it effectively under *MBCNF* in this habitat, as well as in pinyon-juniper and ponderosa pine.

Habitat-specific density estimates for Spotted Towhee for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
PJ	22	16	29	18	210	261
PP	34	17	69	42	74	76
SA	11	6.6	19	27	37	40

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

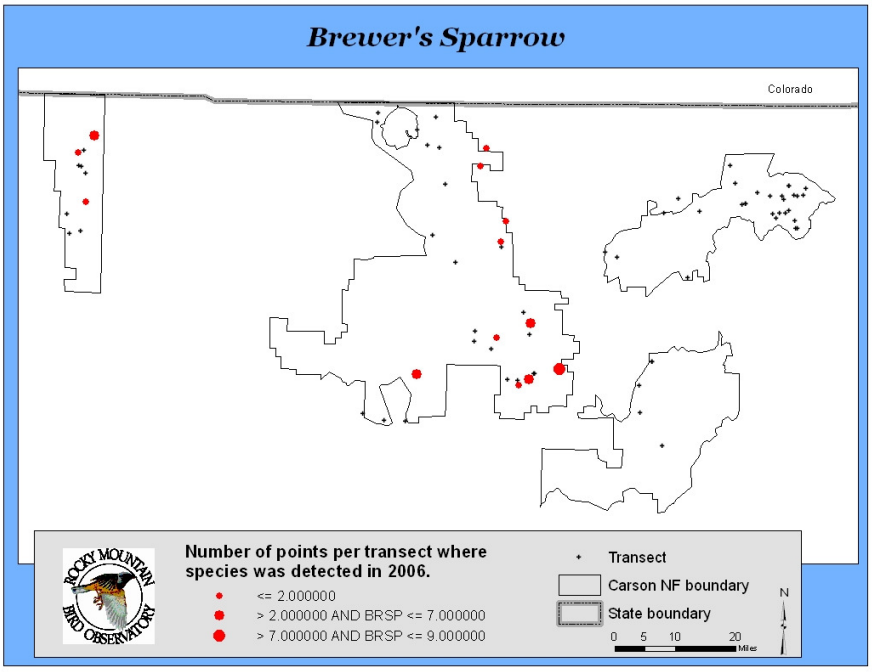
Estimated densities of Spotted Towhee among habitats for *MBCNF* monitoring project, 2003-2006.



Brewer's Sparrow
(Spizella breweri)

CNF Management Indicator Species
PIF Species of Continental and Regional Concern
NM-PIF Habitat Representative Species for Great Basin Desert Shrub

The Brewer's Sparrow prefers sagebrush habitat but may also breed in shrublands with mountain mahogany and other shrubs (Andrews and Righter 1992). Interestingly, this species is occasionally detected above timberline in shrubby areas and it is possible that the high-altitude individuals may constitute a different species.



Map showing Index of Abundance for Brewer's Sparrow on transects in the Carson National Forest, 2006.

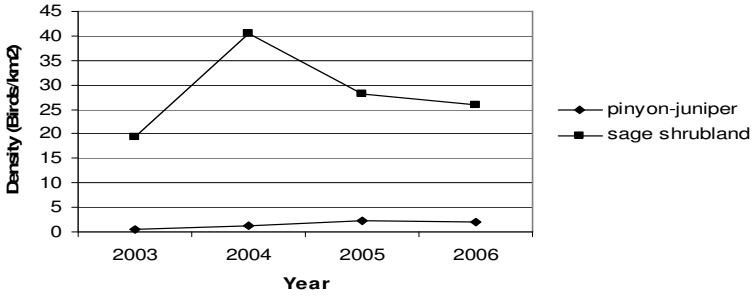
In 2006, we detected 77 Brewer's Sparrows in four habitats on the *MBCNF* project. The Brewer's Sparrow should be effectively monitored under *MBCNF* through point-transects in sage shrubland, and in pinyon-juniper habitat.

Habitat-specific density estimates for Brewer's Sparrow for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
PJ	2.0	0.8	4.7	54	26	31
SA	26	11	63	47	37	39

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

Estimated densities of Brewer's Sparrow in pinyon-juniper and ponderosa pine for *MBCNF* monitoring project, 2003-2006.

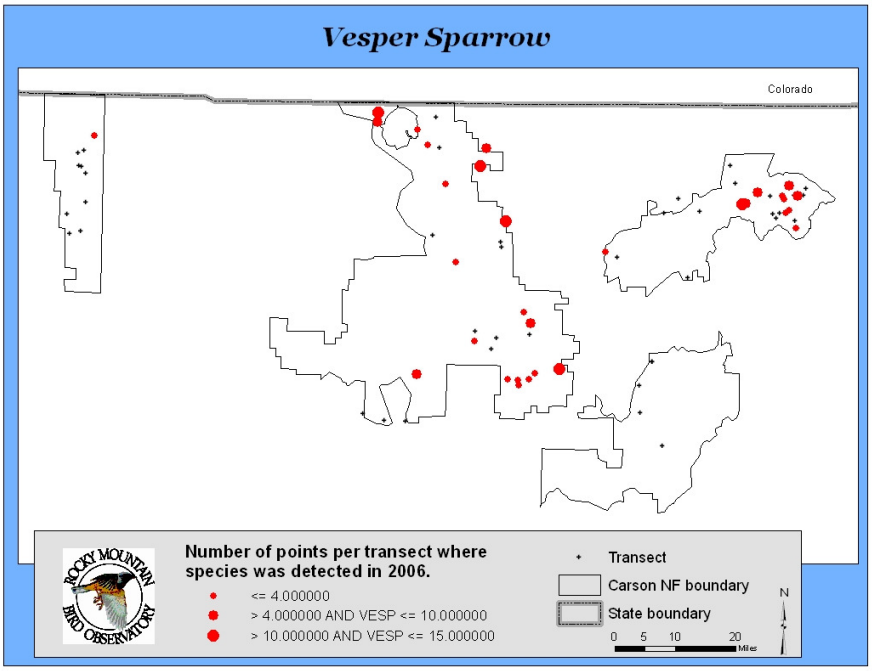


Vesper Sparrow
(Pooecetes gramineus)

NM-PIF Habitat Representative Species for Plains and Mesa Grassland

Vesper Sparrows prefer dry grasslands and open shrublands, and occasionally open pinyon-juniper woodland (Righter et al 2004).

In 2006, we recorded 213 Vesper Sparrows in six habitats on the *MBCNF* project and 58 in two habitats on the VV project. The Vesper Sparrow should be effectively monitored under *MBCNF* through point-transects in grassland, pinyon-juniper and sage shrubland habitats.



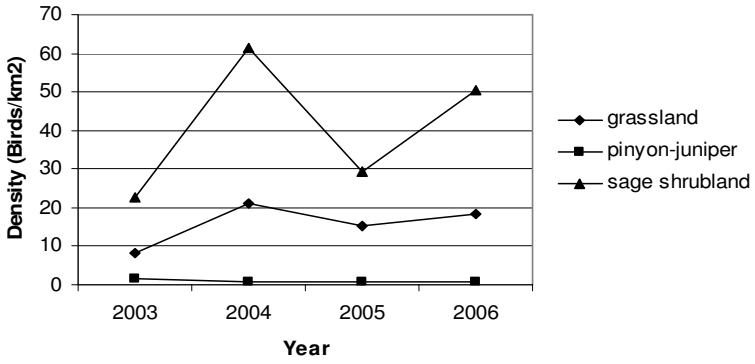
Map showing Index of Abundance for Vesper Sparrow on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Vesper Sparrow for the *MBCNF* and VV monitoring project, 2006.

Project	Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
MBCNF	GR	19	12	28	20	70	76
MBCNF	PJ	0.8	0.4	1.5	43	19	22
MBCNF	SA	50	21	120	43	87	96
VV	GR	26	15	44	29	40	42

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

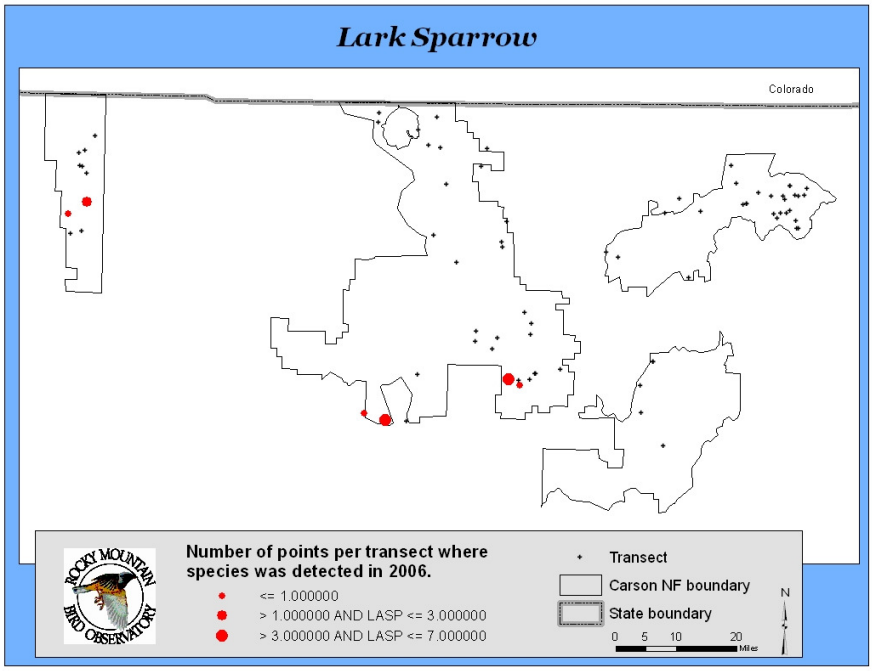
Estimated densities of Vesper Sparrow among habitats for *MBCNF* monitoring project, 2003-2006.



Lark Sparrow
(Chondestes grammacus)
PIF Species of Regional Concern

Lark Sparrows prefer arid, open areas with some shrub component and breed in a variety of locations including prairies, roadsides, farms, open woodlands, and mesas.

In 2006, we detected 34 Lark Sparrows in two habitats on the *MBCNF* project. Due to the low density of this species, estimation of population trend would require us to survey a larger number of point transects than we have in previous years.



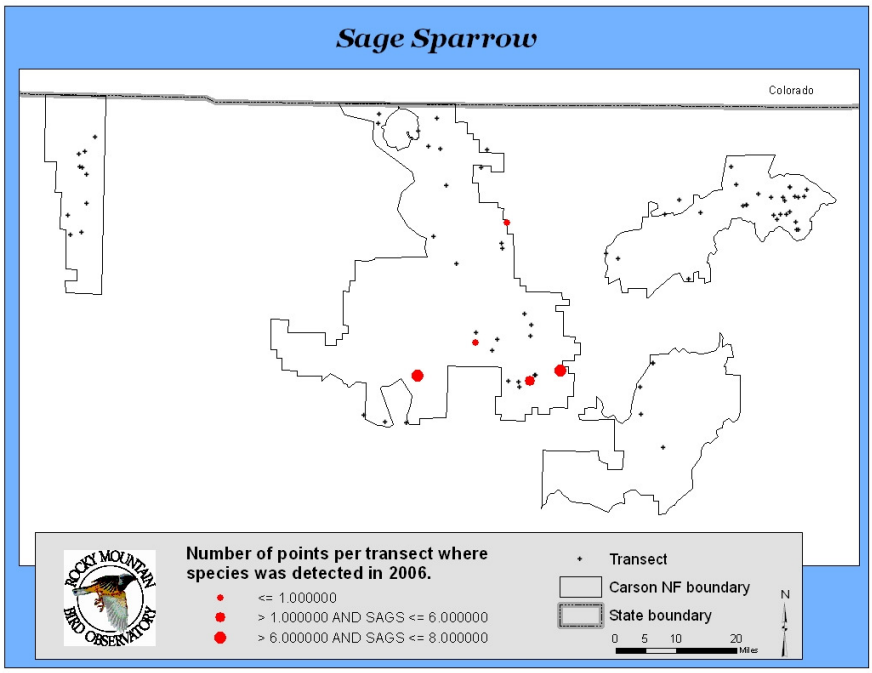
Map showing Index of Abundance for Lark Sparrow on transects in the Carson National Forest, 2006.

Sage Sparrow
(Amphispiza belli)

PIF Species of Regional Concern
NM-PIF Highest Priority Management Species
USFWS Bird of Conservation Concern
NMDGF - Species of Greatest Conservation Need

Sage Sparrows prefer semi-open habitat with evenly spaced shrubs, and is closely tied to big sagebrush where it nests almost exclusively (Kingery 1998).

In 2006, we detected 33 Sage Sparrows in two habitats on the *MBCNF* project.



Map showing Index of Abundance for Sage Sparrow on transects in the Carson National Forest, 2006.

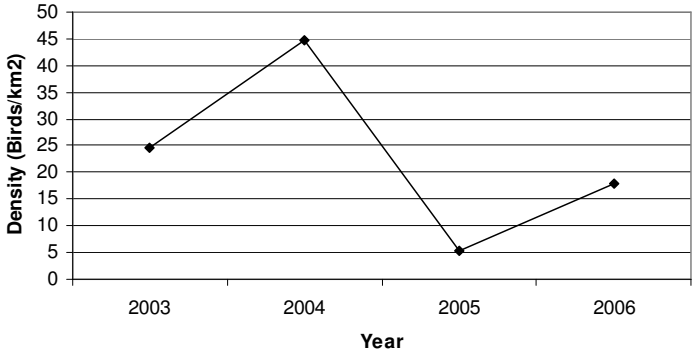
Since the inception of *MBCNF* we have detected Sage Sparrow in sufficient numbers in sage shrubland to calculate density estimates and we should be able to monitor this species effectively through point-transects under *MBCNF* in sage shrubland.

Habitat-specific density estimates for Sage Sparrow for the *MBCNF* monitoring project, 2006.

Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
SA	18	5.5	57	72	21	25

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

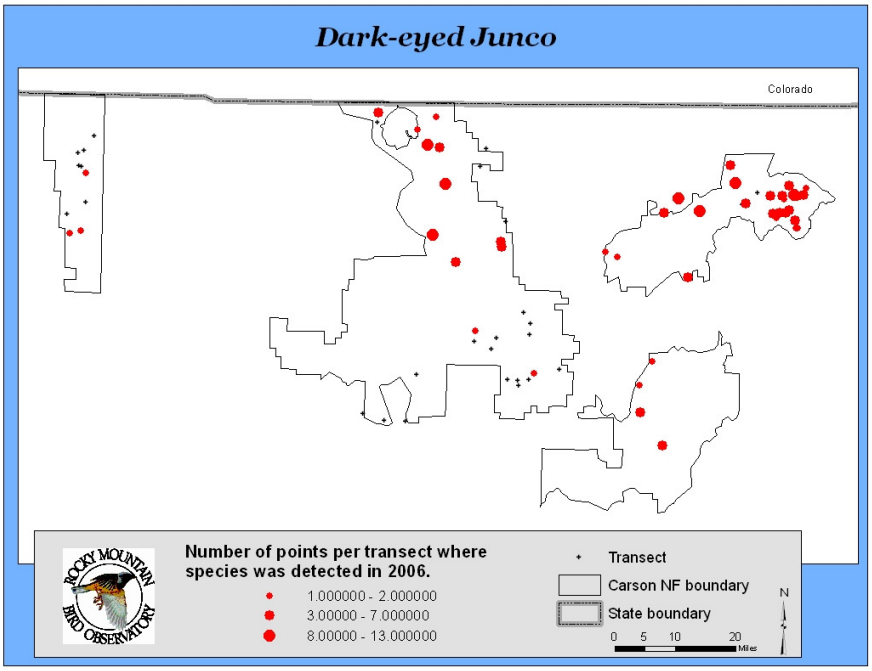
Estimated densities of Sage Sparrow in sage shrubland for *MBCNF* monitoring project, 2003-2006.



Dark-eyed Junco
(Junco hyemalis)

NM-PIF High Responsibility Species for Spruce-Fir

Dark-eyed Juncos breed in all high-elevation forested habitats. The "Gray-headed" subspecies is the only Dark-eyed Junco subspecies that breeds in the CNF.



Map showing Index of Abundance for Dark-eyed Junco on transects in the Carson National Forest, 2006.

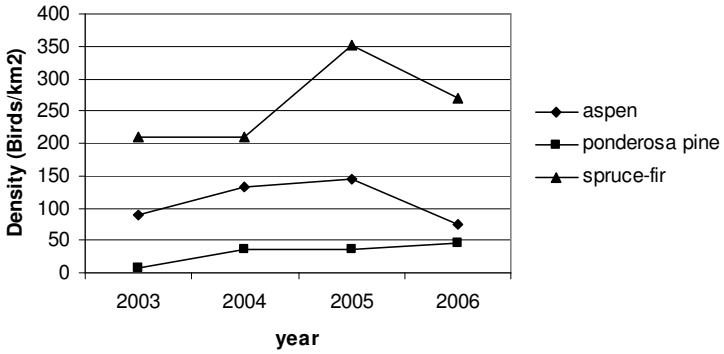
In 2006, we detected 180 Dark-eyed Juncos in six habitats on the *MBCNF* project and 112 in three habitats on the VV project. Detections of Dark-eyed Juncos are sufficient to be monitored under *MBCNF* through point-transects across a range of habitats, including aspen, mixed conifer, ponderosa pine, and spruce-fir.

Habitat-specific density estimates for Dark-eyed Junco for the *MBCNF* and VV monitoring projects, 2006.

Project	Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
MBCNF	AS	75	40	139	30	16	18
MBCNF	MC	30	11	78	46	24	29
MBCNF	PP	45	28	71	27	59	64
MBCNF	SF	269	158	460	32	46	53
VV	PP	91	37	221	57	58	65

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

Estimated densities of Dark-eyed Junco among habitats for *MBCNF* monitoring project, 2003-2006.

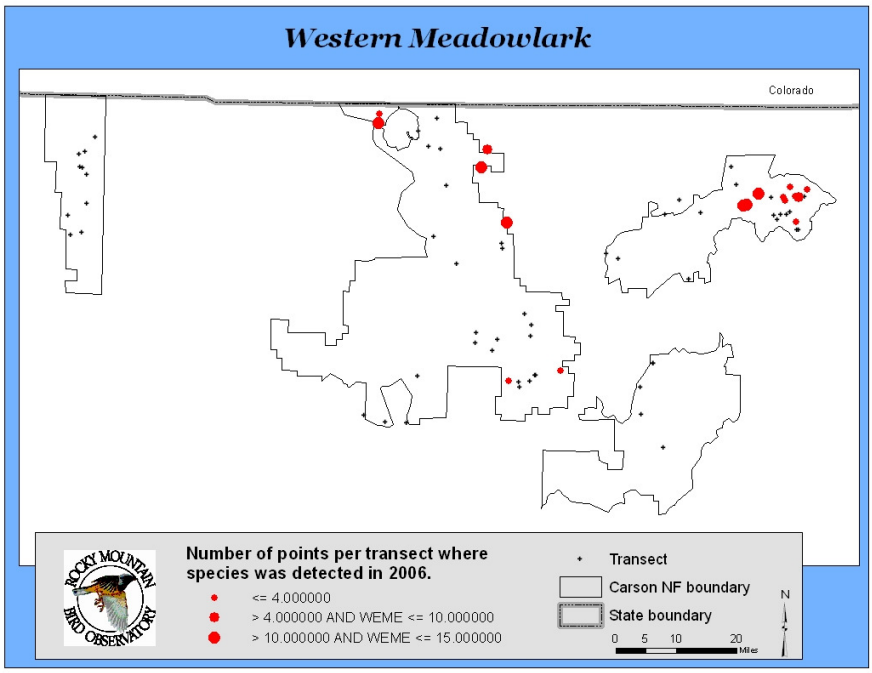


Western Meadowlark
(Sturnella neglecta)

NM-PIF Habitat Representative Species for Plains and Mesa Grassland

The Western Meadowlark primarily nests in native grasslands, and semi-desert and sagebrush shrublands, with good grass and litter cover, and some shrub cover (Kingery 1998).

In 2006, we detected 129 Western Meadowlarks in four habitats on the *MBCNF* project and 142 in two habitats on the VV project. Western Meadowlark should be effectively monitored under *MBCNF* through point-transects in grassland habitat.



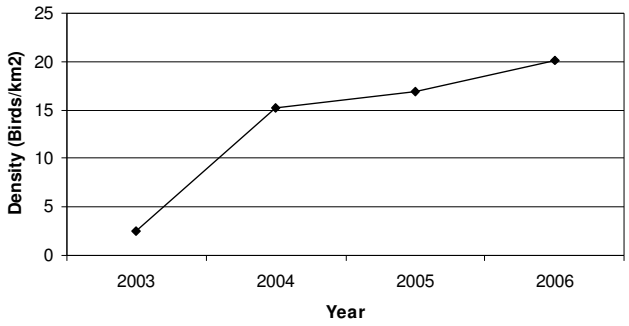
Map showing Index of Abundance for Western Meadowlark on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Western Meadowlark for the *MBCNF* and VV monitoring projects, 2006.

Project	Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
MBCNF	GR	20	9.3	43	35	81	91
VV	GR	88	51	152	34	128	135

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected.

Estimated densities of Western Meadowlark in grassland for *MBCNF* monitoring project, 2003-2006.



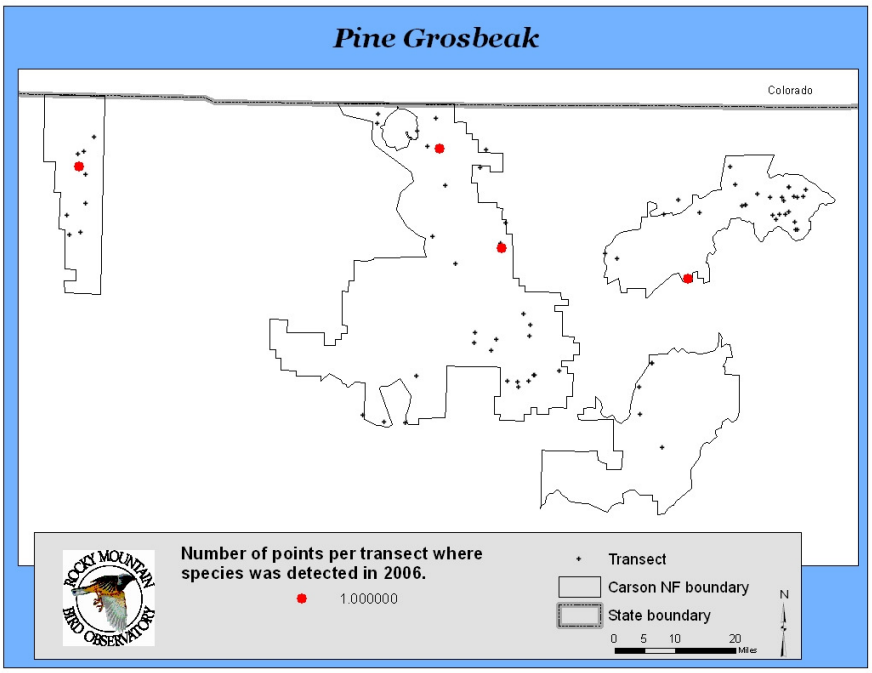
Pine Grosbeak

(Pinicola enucleator)

NM-PIF Habitat Representative Species

Pine Grosbeaks are a high-elevation conifer forest specialist and rarely occupy areas of low-elevation even in the winter.

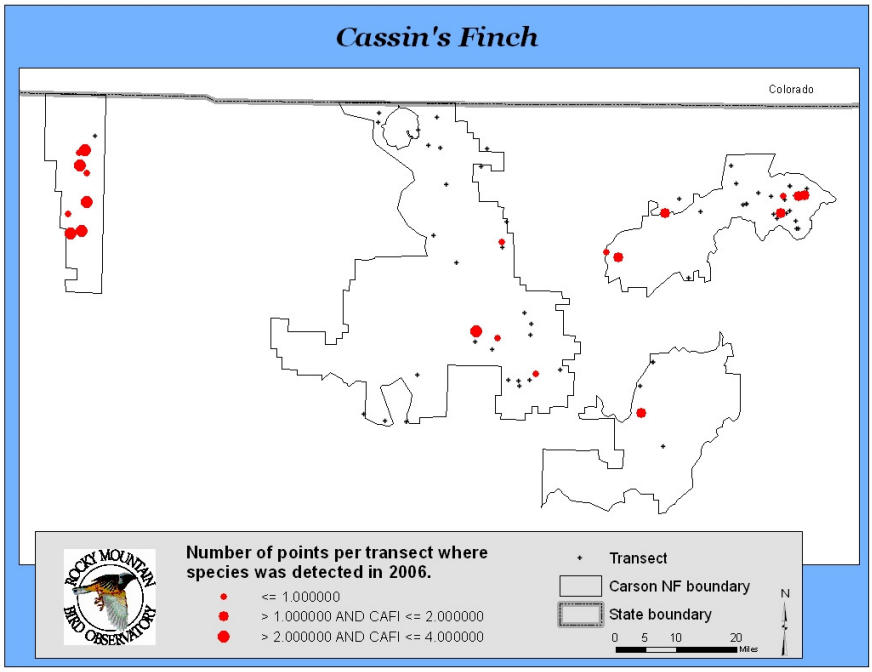
In 2006, we detected Pine Grosbeaks five times in three habitats on the *MBCNF* project. Due to the low density of this species, estimation of population trend would require a larger number of point transects than we sampled in the past.



Map showing Index of Abundance for Pine Grosbeak on transects in the Carson National Forest, 2006.

Cassin's Finch
(Carpodacus cassinii)
PIF Species of Regional Concern

The Cassin's Finch nests in all coniferous forests, but prefers high elevation conifers. We detected 63 Cassin's Finches in four habitats on the *MBCNF* project in 2006. Due to the low density of this species, estimation of population trend would require a larger number of point transects than we sampled in the past.

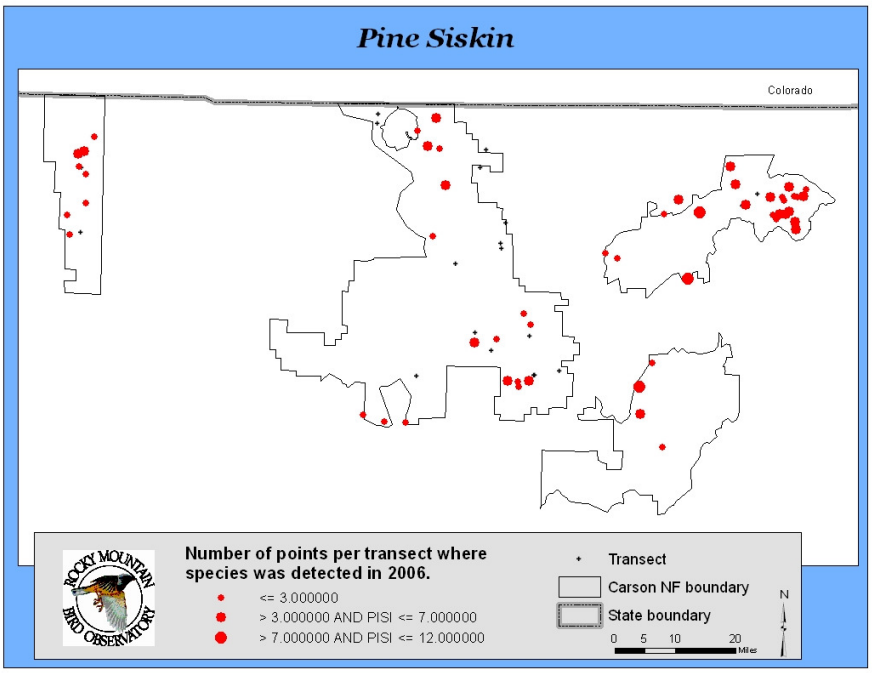


Map showing Index of Abundance for Cassin's Finch on transects in the Carson National Forest, 2006.

Pine Siskin
(Carduelis pinus)

PIF Species of Regional Concern
PIF Regional Stewardship Species

Pine Siskins nest in all coniferous forests but prefer to breed at high elevations. We detected 191 Pine Siskins in six habitats on the *MBCNF* project and 74 individuals in four habitats in 2006. This species should be effectively monitored in four habitats in the CNF.



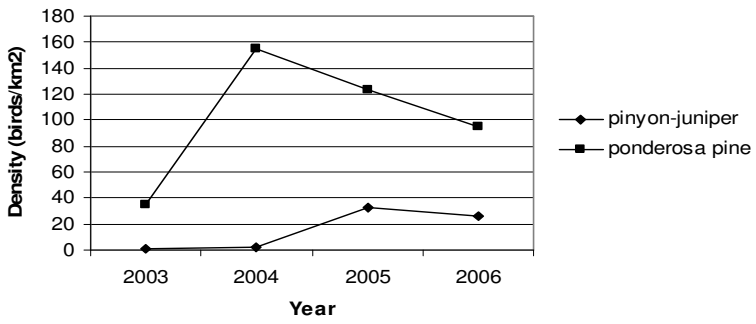
Map showing Index of Abundance for Pine Siskin on transects in the Carson National Forest, 2006.

Habitat-specific density estimates for Pine Siskin for the *MBCNF* and VV monitoring projects, 2006.

Project	Habitat	*D*	*LCL*	*UCL*	*CV%*	*n*	*N*
MBCNF	MC	61	34	109	35	14	17
MBCNF	PJ	26	12	55	48	52	73
MBCNF	PP	95	23*	397*	105*	21	28
MBCNF	SF	387	223	673	31	48	59
VV	PP	48	29	79	30	41	46

D = Density (birds/square kilometer); *LCL* = lower 90% confidence interval of the density; *UCL* = upper 90% confidence interval of the density; *CV%* = coefficient of variation of the density; *n* = number of independent detections; *N* = total number of individuals detected; * = variance not estimable.

Estimated densities of Pine Siskin in pinyon-juniper and ponderosa pine for *MBCNF* monitoring project, 2003-2006.



APPENDIX B. List of all bird species observed in the Carson National Forest from 2003-2006, with management designation and species totals.

Species[1]	Special Management Designation[2]				Status[3]	Total # individuals observed per habitat[4], 2006							Total # individuals observed per year (in all habitats surveyed[5])			
	USFS	PIF	USFWS	SGCN		AS	GR	MC	PJ	PP	SA	SF	2003	2004	2005	2006
Canada Goose					B	--	--	--	--	--	--	--	16	0	0	0
Green-winged Teal					B	--	--	--	--	--	--	--	0	0	1	0
Dusky Grouse		PR, CC		SMC	B	--	--	--	--	--	--	1	2	19	6	1
Wild Turkey					B	--	--	--	--	1	--	1	0	0	2	2
Scaled Quail		CC, RC			B	--	--	--	--	--	--	--	1	2	0	0
Turkey Vulture					B	--	2	--	7	8	1	--	17	15	10	18
Sharp-shinned Hawk					B	--	--	--	--	--	--	--	0	0	2	0
Cooper's Hawk					B	--	1	--	7	1	1	--	4	2	1	10
Northern Goshawk					B	--	--	--	1	1	--	--	0	0	1	2
Swainson's Hawk		CC, RC	BCC-BCR16		B	--	--	--	--	--	--	--	1	2	0	0
Red-tailed Hawk					B	--	--	--	--	4	1	--	9	7	5	5
Golden Eagle		RC	BCC-BCR16	SMC	B	--	--	--	--	--	1	--	0	1	0	1
American Kestrel					B	--	--	--	2	--	--	--	8	9	2	2
Peregrine Falcon			BCC-BCR16	SMC	B	--	--	--	--	--	--	--	1	1	0	0
Prairie Falcon		RC	BCC-BCR16		B	--	--	--	--	--	--	--	0	1	0	0
Killdeer					B	--	--	--	--	--	--	--	1	0	1	0
Band-tailed Pigeon		CC		SMC	B	--	--	--	--	--	--	--	2	5	13	0
Mourning Dove				SMC	B	1	1	19	132	156	25	--	74	147	59	334
Greater Roadrunner					VB	--	--	--	1	--	--	--	0	0	0	1
Northern Pygmy-Owl					B	--	--	--	--	1	--	--	1	1	0	1
Common Nighthawk		HR,RC			B	--	--	--	1	6	--	--	14	5	16	7
White-throated Swift		HR, CC, RS			B	--	--	--	9	--	2	--	25	16	15	11
Black-chinned Hummingbird					B	--	--	--	5	--	--	--	5	5	12	5
Broad-tailed Hummingbird		RS			B	1	1	7	41	4	2	2	19	105	189	58
Rufous Hummingbird					TM	1	--	--	--	--	--	--	1	1	1	1
Belted Kingfisher					B	--	--	--	--	--	--	--	1	2	0	0
Lewis's Woodpecker		CC, RC, CS, RS	BCC-BCR16		B	--	--	--	--	--	--	--	0	2	0	0

Species[1]	Special Management Designation[2]				Status[3]	Total # individuals observed per habitat[4], 2006							Total # individuals observed per year (in all habitats surveyed[5])			
	USFS	PIF	USFWS	SGCN		AS	GR	MC	PJ	PP	SA	SF	2003	2004	2005	2006
Acorn Woodpecker					B	--	--	--	--	4	--	--	2	1	3	4
Williamson's Sapsucker		PR, CS, RS	BCC-BCR16	SMC	B	3	--	8	--	6	--	4	20	23	19	21
Red-naped Sapsucker		PR			B	7	--	1	--	--	--	--	38	16	9	8
Ladder-backed Woodpecker					B	--	--	--	--	--	--	--	0	1	0	0
Downy Woodpecker					B	--	--	--	8	1	--	--	3	10	2	9
Hairy Woodpecker	MIS				B	2	--	19	21	8	--	3	33	85	51	53
American Three-toed Woodpecker					B	--	--	3	--	--	--	8	5	5	6	11
Northern Flicker					B	30	4	7	26	53	8	8	52	97	31	136
Olive-sided Flycatcher		PR, CC		SMC	B	1	--	1	--	1	--	--	6	19	7	3
Western Wood-Pewee		HR			B	19	1	10	20	120	19	--	134	145	205	189
Hammond's Flycatcher		PR			B	1	--	--	3	2	--	1	12	10	14	7
Gray Flycatcher		HP			B	--	--	--	298	2	10	--	178	172	273	310
Dusky Flycatcher		PR			B	2	--	1	11	10	4	--	55	44	53	28
Cordilleran Flycatcher		PR, RS			B	--	--	5	--	3	--	4	54	99	38	12
Say's Phoebe		HR, RS			B	--	--	--	8	--	1	--	20	13	17	9
Ash-throated Flycatcher		HR			B	--	--	--	140	8	3	--	232	197	256	151
Cassin's Kingbird		HR			B	--	--	--	19	4	6	--	36	36	16	29
Western Kingbird					B	--	--	--	12	--	--	--	1	0	10	12
Gray Vireo		HP, CC, RC, RS	BCC-BCR16		VB	--	--	--	--	--	--	--	1	2	3	0
Plumbeous Vireo		HR, RS			B	--	--	1	132	36	7	--	133	145	260	176
Hutton's Vireo					TM	--	--	--	1	--	--	--	0	0	0	1
Warbling Vireo		RS			B	63	2	45	10	17	--	11	141	241	194	148
Gray Jay					B	--	--	5	--	--	--	3	12	17	5	8
Steller's Jay					B	6	--	8	8	39	--	4	50	82	82	65
Western Scrub-Jay					B	--	--	--	83	3	10	--	112	53	69	96
Pinyon Jay		HR, CC, RC, CS, RS	BCC-BCR16	SMC	B	--	--	1	66	--	68	--	71	184	132	135
Clark's Nutcracker		PR, CS, RS			B	2	--	5	10	14	1	3	26	46	122	35
Black-billed Magpie		RS			B	--	2	--	1	--	1	--	27	9	4	4
American Crow					B	6	2	6	1	3	--	3	30	32	13	21

Species[1]	Special Management Designation[2]				Status[3]	Total # individuals observed per habitat[4], 2006							Total # individuals observed per year (in all habitats surveyed[5])			
	USFS	PIF	USFWS	SGCN		AS	GR	MC	PJ	PP	SA	SF	2003	2004	2005	2006
Chihuahuan Raven					VB	--	--	--	--	--	--	--	0	0	7	0
Common Raven					B	10	4	12	136	34	61	11	141	150	156	268
Horned Lark					B	--	41	--	--	--	1	--	1	51	23	42
Purple Martin					B	--	--	--	7	42	14	--	22	66	27	63
Tree Swallow					B	--	--	--	--	--	--	--	3	0	0	0
Violet-green Swallow		RS			B	7	--	14	80	111	27	1	165	276	274	240
Northern Rough-winged Swallow					B	--	--	--	3	--	--	--	12	6	3	3
Bank Swallow					B	--	--	--	--	--	2	--	1	0	1	2
Cliff Swallow					B	--	--	--	6	--	--	--	1	50	24	6
Barn Swallow					B	--	--	--	1	--	--	--	0	1	3	1
Black-capped Chickadee					B	--	--	1	--	5	--	--	0	4	0	6
Mountain Chickadee					B	20	--	29	69	29	--	51	157	373	250	198
Juniper Titmouse	MIS	HR, RC, RS			B	--	--	--	131	--	2	--	152	123	132	133
Bushtit					B	--	--	--	64	2	--	--	107	159	94	66
Red-breasted Nuthatch		RS			B	3	--	13	7	1	--	14	29	70	60	38
White-breasted Nuthatch					B	1	--	1	46	33	1	--	59	81	84	82
Pygmy Nuthatch		PR, RC			B	1	--	4	11	51	--	--	0	135	80	67
Brown Creeper		HR			B	--	--	2	1	--	--	3	14	49	10	6
Rock Wren		HR, RS			B	--	2	--	36	--	4	--	59	50	59	42
Canyon Wren		HR, RC			B	--	--	--	2	--	--	--	3	6	10	2
Bewick's Wren					B	--	--	--	154	--	1	--	129	54	93	155
House Wren					B	10	--	3	--	4	1	6	70	61	68	24
American Dipper					B	--	--	--	--	--	--	--	1	3	0	0
Golden-crowned Kinglet		RS			B	--	--	--	--	--	--	--	10	25	10	0
Ruby-crowned Kinglet					B	5	1	18	1	3	--	18	96	71	63	46
Blue-gray Gnatcatcher		RS			B	--	--	--	64	11	1	--	60	69	111	76
Western Bluebird		PR, RS			B	--	1	1	38	64	8	--	44	114	72	112
Mountain Bluebird		PR, RC, CS, RS			B	18	4	1	30	9	12	1	65	72	52	75
Townsend's Solitaire		PR			B	3	--	6	9	11	--	3	10	29	11	32

Species[1]	Special Management Designation[2]				Status[3]	Total # individuals observed per habitat[4], 2006							Total # individuals observed per year (in all habitats surveyed[5])			
	USFS	PIF	USFWS	SGCN		AS	GR	MC	PJ	PP	SA	SF	2003	2004	2005	2006
Swainson's Thrush					B	1	--	--	--	--	--	--	4	0	0	1
Hermit Thrush					B	29	1	32	19	39	--	61	118	207	136	181
American Robin					B	38	15	48	42	115	15	33	185	235	223	306
Gray Catbird					B	--	--	--	--	--	--	--	0	1	0	0
Northern Mockingbird					B	--	--	--	70	--	21	--	43	18	11	91
Sage Thrasher		HP		SMC	B	--	8	--	1	--	5	--	0	28	23	14
American Pipit					B	--	--	--	--	--	--	--	0	61	0	0
Cedar Waxwing					B	--	--	--	2	--	--	--	0	0	2	2
Orange-crowned Warbler					B	--	--	2	--	1	--	--	10	19	35	3
Virginia's Warbler		HP, CC, RC, RS	BCC-BCR16		B	--	--	--	38	11	12	--	61	77	146	61
Yellow Warbler				SMC	B	--	--	2	2	--	--	--	2	8	1	4
Yellow-rumped Warbler					B	17	7	44	28	74	--	36	197	258	311	206
Black-throated Gray Warbler		HP, RC	BCC-BCR16		B	--	--	--	373	--	7	--	241	244	281	380
Grace's Warbler		HP, CC, RC	BCC-BCR16	SMC	B	--	--	--	8	22	--	--	38	41	35	30
MacGillivray's Warbler					B	--	--	--	--	--	--	--	17	19	1	0
Wilson's Warbler					B	--	--	--	--	--	--	--	1	6	0	0
Yellow-breasted Chat					B	--	--	--	--	--	--	--	0	1	1	0
Western Tanager					B	15	1	27	73	81	4	17	272	297	207	218
Green-tailed Towhee		PR, CS, RS			B	11	9	11	22	14	13	13	75	99	145	93
Spotted Towhee		RS			B	--	--	--	261	76	40	--	369	261	322	377
Canyon Towhee					B	--	--	--	--	--	--	--	2	1	0	0
Cassin's Sparrow					VB	--	--	--	--	--	--	--	0	1	0	0
Chipping Sparrow					B	16	2	18	193	50	16	19	307	271	426	314
Brewer's Sparrow	MIS	CC, RC			B	--	3	--	31	4	39	--	43	73	99	77
Black-chinned Sparrow		HP, CC			VB	--	--	--	--	--	--	--	0	0	2	0
Vesper Sparrow		RS			B	7	76	--	22	11	96	1	136	250	130	213
Lark Sparrow		HR			B	--	--	--	24	--	10	--	33	31	45	34
Black-throated Sparrow		HR, RC			B	--	--	--	--	--	--	--	0	6	1	0
Sage Sparrow		HP, RC	BCC-BCR16	SMC	B	--	--	--	8	--	25	--	40	47	24	33

Species[1]	Special Management Designation[2]				Status[3]	Total # individuals observed per habitat[4], 2006							Total # individuals observed per year (in all habitats surveyed[5])			
	USFS	PIF	USFWS	SGCN		AS	GR	MC	PJ	PP	SA	SF	2003	2004	2005	2006
Lark Bunting					TM	--	--	--	--	--	--	--	0	0	1	0
Savannah Sparrow					B	--	12	--	--	--	--	--	0	15	0	12
Fox Sparrow					VB	--	--	--	--	--	--	--	0	3	2	0
Song Sparrow					B	--	--	1	10	--	--	--	7	16	1	11
Lincoln's Sparrow					B	--	4	--	--	--	--	4	9	8	0	8
White-crowned Sparrow					B	--	9	--	--	--	--	6	14	70	3	15
Dark-eyed Junco		HR			B	18	7	29	9	64	--	53	80	233	187	180
Black-headed Grosbeak					B	1	--	6	68	13	4	--	206	119	151	92
Blue Grosbeak					B	--	--	--	--	--	--	--	2	2	1	0
Lazuli Bunting					B	--	--	--	5	--	--	--	0	1	3	5
Indigo Bunting					VB	--	--	--	1	--	--	--	6	0	0	1
Red-winged Blackbird					B	--	2	--	1	1	--	--	6	2	11	4
Western Meadowlark		RS			B	--	91	--	1	15	22	--	29	116	66	129
Brewer's Blackbird					B	--	22	--	--	4	30	--	38	70	19	56
Brown-headed Cowbird					B	1	1	2	57	13	7	--	48	37	67	81
Bullock's Oriole					B	--	--	--	2	--	--	--	0	1	2	2
Pine Grosbeak		RS			B	1	--	--	--	2	--	2	3	3	7	5
Cassin's Finch		RC			B	--	--	2	37	20	4	--	6	6	10	63
House Finch					B	--	--	--	50	1	--	--	21	17	34	51
Red Crossbill					B	--	--	8	19	--	--	1	62	194	82	28
White-winged Crossbill					VB	--	--	--	--	--	1	--	1	2	0	1
Pine Siskin		RC, RS			B	12	--	17	73	28	2	59	58	212	283	191
Lesser Goldfinch					B	--	--	--	--	--	2	--	22	9	32	2
American Goldfinch					B	--	--	--	11	--	--	--	0	0	2	11
Evening Grosbeak					B	--	--	2	7	--	--	4	21	17	35	13

[1] Common names are from the A.O.U. heck-list of North American Birds, Seventh Edition (2003).
[2] Special Management Designations: USFS, MIS=management indicator species; NM-PIF, HP=Highest Priority, PR=Priority, HP=High Responsibility, RS=Representative Species; Partners In Flight Species Assessment Database BCR 16 Species of

Concern, CC=continental concern, CS=continental stewardship, RC=regional concern, RS=regional stewardship; USFWS Bird of Conservation Concern - BCR 16; Species of Greatest Conservation Need - Science Forum, SMC=species of most concern.
[3]Residency status: B=(probably) breeds; VB=vagrant, possibly breeding; TM=transient migrant
[4]Habitats: AS=aspen; GR=grassland; MC=mixed conifer; PJ=pinyon-juniper; PP=ponderosa pine; SA=sage shrubland; SF=spruce-fir
[5] The number and types of habitats surveyed each year may vary.

APPENDIX C. List of all bird species observed in the Carson National Forest on the Valle Vidal project in 2006, with management designation and species totals.

Species[1]	special management designation[2]				Status[3]	Total # individuals observed per habitat[4], 2006				Total # individuals observed in 2006 (in all habitats surveyed)
	USFS	PIF	USFWS	SGCN		GR	MC	PP	SF	Total
Dusky Grouse		PR, CC		SMC	B				2	2
Wild Turkey					B			1		1
Turkey Vulture					B			5		5
Cooper's Hawk					B			3	1	4
Northern Goshawk					B			1		1
Red-tailed Hawk					B	1	1			2
American Kestrel					B	1		1		2
Mourning Dove				SMC	B	1	20	52		73
Northern Pygmy-Owl					B			1		1
Common Nighthawk		HR,RC			B			3		3
Broad-tailed Hummingbird		RS			B	2	1	8	1	12
Lewis's Woodpecker		CC, RC, CS, RS	BCC-BCR16		B	1				1
Williamson's Sapsucker		PR, CS, RS	BCC-BCR16	SMC	B		14		4	18
Hairy Woodpecker	MIS				B	1	6	26	3	36
American Three-toed Woodpecker					B	1		1	4	6
Northern Flicker					B	4	17	44	10	75
Olive-sided Flycatcher		HP, PR, CC		SMC	B		1	4		5
Western Wood-Pewee		HR			B		2	152	3	157
Hammond's Flycatcher		PR			B		3	1		4
Dusky Flycatcher		PR			B			1		1
Cordilleran Flycatcher		PR, RS			B		4	2	1	7
Plumbeous Vireo		HR, RS			B			17		17
Warbling Vireo		RS			B	2	10	1	10	23
Gray Jay					B				4	4
Steller's Jay					B		15	21	7	43
Pinyon Jay		HR, CC, RC, CS, RS	BCC-BCR16	SMC	B			28		28

Species[1]	special management designation[2]				Status[3]	Total # individuals observed per habitat[4], 2006				Total # individuals observed in 2006 (in all habitats surveyed)
	USFS	PIF	USFWS	SGCN		GR	MC	PP	SF	Total
Clark's Nutcracker		PR, CS, RS			B	2	4	11	7	24
Black-billed Magpie		RS			B	4				4
American Crow					B	12	2	4		18
Common Raven					B	4	6	25	4	39
Horned Lark					B	14		1		15
Violet-green Swallow		RS			B	3	6	17	6	32
Cliff Swallow					B	3				3
Mountain Chickadee					B	1	25	22	37	85
Red-breasted Nuthatch		RS			B	1	7		8	16
White-breasted Nuthatch					B		5	38	1	44
Pygmy Nuthatch		PR, RC			B		4	56	1	61
Brown Creeper		HR			B		3			3
Rock Wren		HR, RS			B			6		6
House Wren					B		7	25	7	39
Ruby-crowned Kinglet					B	3	9			12
Western Bluebird		PR, RS			B		1	51		52
Mountain Bluebird		PR, RC, CS, RS			B	9		8		17
Townsend's Solitaire		PR			B		9	17	4	30
Hermit Thrush					B	1	21	6	14	42
American Robin					B	2	47	58	9	116
Virginia's Warbler		HP, CC, RC, RS	BCC-BCR16		B		2	11		13
Yellow-rumped Warbler					B		48	66	4	118
Grace's Warbler		HP, CC, RC	BCC-BCR16	SMC	B			7		7
Western Tanager					B		45	62	16	123
Green-tailed Towhee		PR, CS, RS			B			9	2	11
Spotted Towhee		RS			B		2	2		4
Chipping Sparrow					B	2	24	31	10	67
Vesper Sparrow		RS			B	42		16		58

Species[1]	special management designation[2]				Status[3]	Total # individuals observed per habitat[4], 2006				Total # individuals observed in 2006 (in all habitats surveyed)
	USFS	PIF	USFWS	SGCN		GR	MC	PP	SF	Total
Savannah Sparrow					B	21				21
White-crowned Sparrow					B	2				2
Dark-eyed Junco		HR			B		23	65	24	112
Black-headed Grosbeak					B		10	8		18
Western Meadowlark		RS			B	135		7		142
Brewer's Blackbird					B	3		5		8
Brown-headed Cowbird					B			5		5
Cassin's Finch		RC			B			4		4
Red Crossbill					B			1		1
Pine Siskin		RC, RS			B	1	15	46	12	74
Evening Grosbeak					B		6	8	8	22

[1] Common names are from the A.O.U. heck-list of North American Birds, Seventh Edition (2003).
[2] Special Management Designations: USFS, MIS=management indicator species; NM-PIF, HP=Highest Priority, PR=Priority, HP=High Responsibility, RS=Representative Species; Partners In Flight Species Assessment Database BCR 16 Species of Concern, CC=continental concern, CS=continental stewardship, RC=regional concern, RS=regional stewardship; USFWS Bird of Conservation Concern - BCR 16; Species of Greatest Conservation Need - Science Forum, SMC=species of most concern.
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