

Executive Summary

In 2003, Rocky Mountain Bird Observatory (RMBO), in conjunction with its funding partner, the U.S.D.A. Forest Service, initiated a bird monitoring project on the Carson National Forest (CNF) in the southern Rocky Mountains of New Mexico. The main reason for this cooperative effort is to monitor bird populations in the CNF during the current severe drought conditions. Because of this drought, one species of tree, the Pinyon Pine (*Pinus edulis*), has been weakened to such a degree that an outbreak of an Ips beetle (*Ipps confusus*) has killed a large percentage of this species in the CNF. The objectives of this project are to monitor the population trends, primarily in the Pinyon-Juniper habitat type, and distributions of all birds at the scale of the National Forest. With this information, land-management decisions can be directed in a more effective manner to conserve birds of the CNF.

We surveyed nine habitats on the CNF using habitat-based point-count transects which we placed randomly throughout the forest. The habitat-stratified transects provided excellent data on 40 breeding species, of which 16 have been classified as species of management concern by the New Mexico Working Group of Partners in Flight (NMPIF)(Appendix A). In addition to data on the breeding birds, we recorded general habitat characteristics: primary and secondary habitats and the seral stage and canopy cover of each at each point, primary and secondary understory type and the percentage of area occupied by each at each point. We also obtained the Universal Transverse Mercator coordinate at each point and whether or not the point was within 100 meters of a road.

Introduction

In 2003, RMBO, in cooperation with CNF, implemented the first year of a habitat-based, bird monitoring program designed to provide population trend data on most diurnal, regularly occurring breeding bird species in this part of the southern Rocky Mountain region. This program is modeled after *Monitoring Colorado's Birds* (Leukering et al. 2000) and is consistent with goals emphasized in the Partners in Flight National Landbird Monitoring Strategy (Bart et al. 2001). In addition to monitoring bird populations, the program will generate a wealth of information useful in managing bird populations (e.g., habitat associations and spatial distribution). This report details the findings from the first year of what is intended to be a long-term, cooperative effort to monitor bird populations in the CNF.

Methods

We used habitat-based point count transects to obtain population data for the breeding birds of the CNF. We established 55 randomly-selected transects of 15 point counts each in eight habitats (Aspen, Alpine Tundra, Grassland, Mixed Conifer, Pinyon-Juniper, Ponderosa Pine, Sage, and Spruce-Fir). We recorded all birds detected on the points and

recorded a measurement of radial distance from the point to each bird for all habitats except Mid-elevation Riparian (see below). Whenever possible, distances to birds were measured using rangefinders. In cases when using rangefinders was not possible, we would use rangefinders to measure a distance to an object near the bird to determine an accurate estimate. For species of low density (determined a priori; Appendix B) detected on points, we also recorded the bearing (in degrees) from the observer to the bird. In order to increase our sample size for low-density species, we also recorded the bearing and distance from the observer to each individual of target species that we detected while traversing the distances between points so that the entire 15-point transect served as a 3.5 kilometer line transect.

Mid-elevation Riparian transects – We randomly selected four one-kilometer stretches of riparian habitat and determined their locations. We conducted line transects by walking near the river for one kilometer, recording all birds seen and/or heard and the distance to each bird perpendicular to the line of the transect.

We used Program DISTANCE to determine density estimates for individual species in the forest (40 species). In this report, all references to density estimates are values provided by DISTANCE from our data. The notation, concepts, and analysis methods of the program were developed by Buckland et al. (1993, 2001). The program can analyze several forms of distance-sampling data, fitting a detection curve to the data set to be analyzed. The program limits some serious biases inherent in traditional analysis of point-count data (e.g., variable detectability among species, habitats, or years), but comes with three assumptions: 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. We conducted an initial analysis of species for which we observed sample sizes of at least 23 individuals. We did this to examine the fit of the detection-function curve and then truncated where needed to eliminate outliers. When analyzing data, we often found it necessary to eliminate outliers prior to final analysis and therefore the number of observations (n) used to estimate densities may be smaller than the total number of individuals observed.

Results

Transects – We conducted 59 transects in nine habitats (Table 1). We observed 112 species on the transects and provide summary data in each habitat discussion section for 40 species (Appendix C). Table 1 shows effort in each habitat and totals of species and individuals detected per habitat. We urge caution when interpreting estimates based on small sample sizes. However, we provide these data because any information on rare or low-density species can be useful.

Table 1. Number of transects conducted in each habitat with totals of species and individuals detected (excluding flyovers) on the Carson National Forest, summer 2003.

Habitat	No. of transects run	No. of points established	No. of species detected	No. of individuals
Aspen	3	45	36	397
Alpine Tundra	2	30	24	117
Grassland	2	30	37	207
Mixed Conifer	5	75	48	576
Mid-elevation Riparian	4	*	34	192
Pinyon-Juniper	30	450	81	2724
Ponderosa	6	90	64	665
Sage	4	57	49	460
Spruce-Fir	3	45	47	401
Totals	59	822	112	5739

* Mid-elevation Riparian transects are line transects.

Aspen (AS): The Aspen transects traverse stands of a wide range of age classes and seral stages. Aspen is seldom a climax vegetation type, and the transects contain significant incursions of spruce-fir and other conifers. As a result, these transects provide detections of a number of species generally associated with conifers. We conducted three Aspen transects in 2003. We detected at least 23 individuals of seven species (Table 2).

Table 2. Estimated densities of breeding birds on three transects in Aspen in the Carson National Forest, Summer 2003.

Species	D	LCL	UCL	CV	n	K
Warbling Vireo	0.2213	0.1203	0.4070	31%	31	3
Mountain Chickadee	0.2989	0.1595	0.5601	32%	31	3
House Wren	0.1770	0.0922	0.3399	33%	29	3
Ruby-crowned Kinglet	0.2153	0.1243	0.3728	28%	26	2
Hermit Thrush	0.1168	0.0583	0.2343	36%	31	3
Yellow-rumped Warbler	0.3312	0.1905	0.5760	28%	44	3
Western Tanager	0.1999	0.1081	0.3697	31%	31	3

D = density estimate in birds/hectare; LCL and UCL = lower and upper 95% confidence limits on D; CV = coefficient of variation of D; n = number of observations used to estimate D; K = number of transects on which the species was detected.

Alpine Tundra (AT): This habitat is composed of open areas above treeline that are generally composed of grasses and forbs. We did not obtain data on the species that are target species in this habitat in Colorado and which we detect in fairly large numbers on the Colorado Alpine Tundra transects. The only species for which we obtained sufficient sample size was Vesper Sparrow (Table 3).

Table 3. Estimated densities of breeding birds on two transects in Alpine Tundra in the Carson National Forest, summer 2003.

Species	D	LCL	UCL	CV	n	K
Vesper Sparrow	0.0693	0.0351	0.1369	34%	23	2

D = density estimate in birds/hectare; LCL and UCL = lower and upper 95% confidence limits on D; CV = coefficient of variation of D; n = number of observations used to estimate D; K = number of transects on which the species was detected.

Grassland (GR): This habitat is composed of lower-elevation, open areas where various grass species dominate. The areas surveyed in the Carson National Forest were typically

near forested areas and we recorded many forest birds on these transects. We did not obtain sufficient sample size for any species in this habitat on the two transects this season. We did detect 21 Western Wood-Pewees, 21 Chipping Sparrows, and 16 Green-tailed Towhees on the “grassland” transects. We detected 10 Vesper Sparrows, 8 Mountain Bluebirds, and 7 Brewer’s Sparrows, which are typical grassland species, on these transects.

Mixed Conifer (MC): This designation is aimed at stands of coniferous trees where there is a variety of coniferous tree species, such as White Fir (*Abies concolor*), Douglas-fir (*Pseudotsuga menziesii*), and Ponderosa Pine (*Pinus ponderosa*), but also includes other tree species such as aspen. We conducted five transects in this habitat this season and were able to estimate densities of seven species (Table 4).

Table 4. Estimated densities of breeding birds on five transects in Mixed Conifer in the Carson National Forest, summer 2003.

Species	D	LCL	UCL	CV	n	K
Warbling Vireo	0.9905	0.6442	1.5229	22%	50	5
Mountain Chickadee	0.6652	0.3655	1.2105	31%	24	5
Ruby-crowned Kinglet	0.1527	0.0938	0.2487	25%	39	5
Hermit Thrush	0.0887	0.0466	0.1689	33%	29	4
American Robin	0.2871	0.1922	0.4288	20%	47	5
Yellow-rumped Warbler	0.8062	0.5560	1.1689	19%	53	5
Western Tanager	0.4281	0.2998	0.6113	18%	64	5

D = density estimate in birds/hectare; LCL and UCL = lower and upper 95% confidence limits on D; CV = coefficient of variation of D; n = number of observations used to estimate D; K = number of transects on which the species was detected.

Mid-elevation Riparian (MR): This habitat consists of wooded corridors along perennial streams or rivers. Dominant over-story tree species typically include narrowleaf cottonwood (*Populus angustifolia*) and willow (*Salix* sp.). Four transects were run in riparian areas in the CNF. Portions of Rio Santa Barbara, Rio Chiquito, Rio de los Trampas, and the Red River were surveyed. We obtained sufficient data on 3 species and were able to estimate densities for three species (Table 5).

Table 5. Estimated densities of breeding birds on four transects in Mid-elevation Riparian in the Carson National Forest, Summer 2003.

Species	D	LCL	UCL	CV	n	K
Cordilleran Flycatcher	0.6377	0.3902	1.0424	23%	25	4
Warbling Vireo	0.6745	0.3121	1.4577	32%	25	4
American Robin	0.4231	0.1991	0.8990	33%	29	4

D = density estimate in birds/hectare; LCL and UCL = lower and upper 95% confidence limits on D; CV = coefficient of variation of D; n = number of observations used to estimate D; K = number of transects on which the species was detected.

Pinyon-Juniper (PJ): Arid forested areas dominated by Pinyon Pine (*Pinus edulis*) and Juniper (*Juniperus* sp.) make up this habitat type. We conducted 30 transects in this habitat this year and were able to estimate densities for 27 species (Table 6).

Table 6. Estimated densities of breeding birds on 30 transects in Pinyon-Juniper in the Carson National Forest, summer 2003.

Species	D	D LCL	D UCL	D CV	n	K
Mourning Dove	0.0150	0.0100	0.0223	21%	49	17
Western Wood-Pewee	0.0109	0.0055	0.0219	36%	36	11
Gray Flycatcher	0.1640	0.1018	0.2643	25%	164	26
Ash-throated Flycatcher	0.0848	0.0542	0.1328	23%	165	27
Cassin's Kingbird	0.0122	0.0068	0.0218	30%	24	7
Plumbeous Vireo	0.0696	0.0515	0.0941	15%	79	22
Western Scrub-Jay	0.0471	0.0354	0.0628	15%	93	27
Pinyon Jay	0.0034	0.0020	0.0059	29%	36	12
Common Raven	0.0050	0.0036	0.0070	17%	71	27
Violet-green Swallow	0.0295	0.0183	0.0475	25%	38	15
Mountain Chickadee	0.0472	0.0286	0.0779	26%	35	12
Juniper Titmouse	0.1767	0.1372	0.2274	13%	138	21
Bushtit	0.1856	0.1107	0.3112	27%	55	19
White-breasted Nuthatch	0.0231	0.0124	0.0432	32%	27	11
Rock Wren	0.0140	0.0092	0.0212	21%	39	11
Bewick's Wren	0.0784	0.0581	0.1057	15%	111	21
Blue-gray Gnatcatcher	0.1233	0.0742	0.2049	26%	41	17
Northern Mockingbird	0.1312	0.0859	0.2004	22%	42	10
Virginia's Warbler	0.0434	0.0264	0.0712	26%	44	11
Black-throated Gray Warbler	0.2227	0.1816	0.2731	10%	232	21
Western Tanager	0.0434	0.0307	0.0614	18%	95	21
Spotted Towhee	0.2425	0.1958	0.3003	11%	257	29
Chipping Sparrow	0.1609	0.1259	0.2056	13%	181	26
Vesper Sparrow	0.0173	0.0100	0.0299	28%	52	9
Lark Sparrow	0.0292	0.0154	0.0555	33%	29	7
Black-headed Grosbeak	0.0578	0.0429	0.0780	15%	117	17
Brown-headed Cowbird	0.0115	0.0056	0.0235	37%	24	10

D = density estimate in birds/hectare; **LCL** and **UCL** = lower and upper 95% confidence limits on **D**; **CV** = coefficient of variation of **D**; **n** = number of observations used to estimate **D**; **K** = number of transects on which the species was detected.

Ponderosa Pine (PP): This arid habitat consists of conifer stands dominated by ponderosa pine (*Pinus ponderosa*). This habitat also incorporates natural variations in the landscape, such as small stands of Gambel's oak, pinyon-juniper, or aspen. We conducted six transects in this habitat this year and estimated densities of ten species (Table 7).

Table 7. Estimated densities of breeding birds on six transects in Ponderosa Pine in the Carson National Forest, summer 2003.

Species	D	D LCL	D UCL	D CV	n	K
Western Wood-Pewee	0.0822	0.0450	0.1504	31%	47	6
Dusky Flycatcher	0.0844	0.0446	0.1598	33%	31	4
Ash-throated Flycatcher	0.0639	0.0314	0.1301	37%	24	3
Plumbeous Vireo	0.1253	0.0708	0.2214	29%	32	6
American Robin	0.1282	0.0723	0.2273	29%	38	6
Grace's Warbler	0.1268	0.0687	0.2341	32%	33	5
Western Tanager	0.1078	0.0591	0.1965	31%	30	6
Spotted Towhee	0.1831	0.1100	0.3048	26%	51	4
Chipping Sparrow	0.0521	0.0244	0.1113	39%	26	6
Black-headed Grosbeak	0.1141	0.0740	0.1759	22%	41	6

D = density estimate in birds/hectare; LCL and UCL = lower and upper 95% confidence limits on D; CV = coefficient of variation of D; n = number of observations used to estimate D; K = number of transects on which the species was detected.

Sage Shrubland (SA): Open landscapes dominated by big sagebrush (*Artemisia tridentata*) make up this habitat. The stands of sage that we surveyed in the CNF are generally narrow “fingers” of pure sage and have forested areas nearby. Therefore, we detected many forest birds on the transects. We conducted four sage transects this season and obtained sufficient data on seven species (Table 8).

Table 8. Estimated densities of breeding birds on four transects in Sage Shrubland in the Carson National Forest, summer 2003.

Species	D	LCL	UCL	CV	n	K
Ash-throated Flycatcher	0.0537	0.0266	0.1083	36%	24	3
Green-tailed Towhee	0.1338	0.0672	0.2662	35%	29	4
Spotted Towhee	0.1671	0.0947	0.2947	29%	44	4
Chipping Sparrow	0.0875	0.0471	0.1625	32%	30	4
Brewer's Sparrow	0.0935	0.0524	0.1666	30%	27	4
Vesper Sparrow	0.1278	0.0770	0.2119	26%	45	4
Sage Sparrow	0.0735	0.0332	0.1629	41%	23	1

D = density estimate in birds/hectare; LCL and UCL = lower and upper 95% confidence limits on D; CV = coefficient of variation of D; n = number of observations used to estimate D; K = number of transects on which the species was detected.

Spruce-Fir: This habitat is found at higher elevations and is composed of coniferous tree species, such as, englemann spruce, blue spruce, sub-alpine fir, and douglas fir. We conducted three transects in this habitat and estimated densities for seven species (Table 9).

Table 9. Estimated densities of breeding birds on three transects in Spruce-Fir in the Carson National Forest, Summer 2003.

Species	D	D LCL	D UCL	D CV	n	K
Mountain Chickadee	0.3206	0.1932	0.5319	26%	36	3
Ruby-crowned Kinglet	0.1511	0.0747	0.3055	36%	23	2
Hermit Thrush	0.0650	0.0302	0.1403	39%	26	3
American Robin	0.2442	0.1327	0.4492	31%	35	2
Yellow-rumped Warbler	0.3700	0.2286	0.5990	25%	45	3
Western Tanager	0.1213	0.0596	0.2466	37%	24	3
Dark-eyed Junco	0.2792	0.1491	0.5227	32%	34	3

D = density estimate in birds/hectare; LCL and UCL = lower and upper 95% confidence limits on D; CV = coefficient of variation of D; n = number of observations used to estimate D; K = number of transects on which the species was detected.

Overall, the estimated densities that we provide for the CNF are similar to those that are typical for the Monitoring Colorado's Birds project. We provide a comparison of estimated densities from the summer of 2003 for both areas at the conclusion of this report (Appendix D). We urge caution in using these data as the Colorado numbers are derived from data gathered from an entire state, including several national forests, and not just one national forest.

Species Accounts

Here we present 57 one-page accounts for bird species that we detected at least 25 individuals in all habitats or species that are listed by NMPIF as a species of management concern for the state of New Mexico.

In this section, we have included maps that show locations where we detected each species and which indicate the locations of those transects on which we did not detect the species in 2003. The circles or triangles marked on the maps show where our transects are located and are color coded for each type of habitat. Circles indicate that a species was detected and a triangle indicates that a species was not detected on that specific transect. The location of the circle or triangle represents the mid-point (point number 8) on the 15 point transects. These maps show the locations of our transects and are not meant to be interpreted as range maps for the bird species of the CNF.

