Monitoring Birds of Coconino National Forest: 2008 Field Season Report

February 2009

Rocky Mountain Bird Observatory
PO Box 1232
Brighton, CO 80603
303.659.4348
www.rmbo.org
Tech. Report # M-Coconino08-01

In Cooperation With:

ROCKY MOUNTAIN BIRD OBSERVATORY

***Mission**: To conserve birds and their habitats*

***Vision**: Native bird populations are sustained in healthy ecosystems*

***Core Values**: (Our goals for achieving our mission)*

1. ***Science** provides the foundation for effective bird conservation.*
2. ***Education** is critical to the success of bird conservation.*
3. ***Stewardship** of birds and their habitats is a shared responsibility.*

RMBO accomplishes its mission by:

***Partnering** with state and federal natural resource agencies, private landowners, schools, and other nonprofits for conservation.*

***Studying** bird responses to habitat conditions, ecological processes, and management actions to provide scientific information that guides bird conservation efforts.*

***Monitoring** long-term trends in bird populations for our region.*

***Providing** active, experiential, education programs that create an awareness and appreciation for birds.*

***Sharing** the latest information in land management and bird conservation practices.*

***Developing** voluntary, working partnerships with landowners to engage them in conservation.*

***Working** across political and jurisdictional boundaries including, counties, states, regions, and national boundaries. Our conservation work emphasizes the Western United States, including the Great Plains, as well as Latin America.*

***Creating** informed publics and building consensus for bird conservation needs.*

Suggested Citation:

Hanni David J., J. Birek, R. Sparks, J. Blakesley. 2008 *Monitoring Birds of Coconino National Forest: 2008 Field Season Report.* Tech. Rep. # M-Coconino08-01. Rocky Mountain Bird Observatory, Brighton, CO, 17 pp.

***Cover Photo**:* Black-throated Gray Warbler by Gary Woods http://www.woodshots.com

Contact Information:

David Hanni david.hanni@rmbo.org
Jeff Birek jeff.birek@rmbo.org
RMBO
PO Box 1232
Brighton, CO 80603
303-659-4348

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 2008, Rocky Mountain Bird Observatory (RMBO), in conjunction with Coconino National Forest (CNF), began the first year of *Monitoring Birds of Coconino National Forest* (MBCNF), a partnership effort using a protocol similar to other RMBO monitoring programs (Panjabi 2006). RMBO designed this program to provide statistically rigorous long-term trend data for populations of most diurnal, regularly breeding bird species in CNF, including some U.S. Forest Service (USFS) Region 3 Sensitive Species and CNF Management Indicator Species (MIS). In the short term, this program provides information needed to effectively manage and conserve bird populations in CNF, including the spatial distribution, abundance, and relationship to important habitat characteristics for bird species. This cooperative project supports 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 Mountain and Great Plains regions.

This year, RMBO staff conducted 58 point transects (690 point counts) in three habitats (Aspen, Pinyon-Juniper, and Ponderosa Pine) within CNF. RMBO staff completed an average of 11.9 point counts per transect and recorded 90 bird species throughout CNF. ((insert summary of separate habitat results)) Observers detected many of the species on only a few occasions. We calculated density estimates for species with at least 60 utilizable detections in a sampled habitat. We were able to calculate density estimates for 20 bird species, including two MIS: Juniper Titmouse and Pygmy Nuthatch.

ACKNOWLEDGEMENTS

The USFS funded this project through a challenge cost-share agreement between CNF and RMBO

We sincerely thank Cecelia Overby and Liz Vensel of CNF and Bill Noble and Kristin Bratland of Kaibab National Forest. Their support and involvement in the program was vital to the success of this year's monitoring effort. We also thank Ariel Leonard and Robert Richardson of the USFS for providing GIS information. We are grateful to the 2008 field crew: Greg Levandoski, Chris Nicholson, and Shawn Carroll who spent many weeks in the field, sometimes under difficult conditions, conducting surveys and seeking out birds. Rob Sparks provided essential GIS and Microsoft Access support for pre-season preparations. Thanks to John Stevenson for providing radios, and therefore a safer season, for both of our crews in Arizona. We are especially appreciative to Chandman Sambuu for managing the database; his efforts were essential to the successful completion of this report.

TABLE OF CONTENTS

INTRODUCTION

Reasons for Monitoring

Birds are excellent indicators of biological integrity and ecosystem health (Morrison 1986, Bureau of Land Management 1998, Hutto 1998, O'Connell et al. 2000, Rich 2002, U.S. EPA 2002, Birdlife International 2003). Birds comprise a diverse group of niche specialists and generalists, 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. Thus, they are useful for measuring environmental change and 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. Birds are generally abundant, conspicuous, and relatively easy to identify; monitoring their populations can be more efficient than monitoring other taxonomic groups.

Population monitoring forms the backbone of avian conservation. Without current monitoring data, conservation efforts may be misguided and inefficient. For these and other reasons, legislation such as the National Environmental Policy Act (1969), Endangered Species Act (ESA; 1973), the Forest Management Act (1976), various state laws, Forest plans, preserve management plans, and other long-range plans require population monitoring (Sauer 1993, Manley et al. 1993).

Given the declines of many bird species that breed in North America, there is an urgent need for monitoring programs that serve as an "early-warning" system to identify declining species and causes of declines so that natural resource managers can proactively prevent further losses. RMBO's monitoring programs are 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 provide population trend or status data on regularly-occurring breeding species within the study areas. Initial data will provide "early-warning" information for all species that can be monitored through a habitat-based approach. After establishing this monitoring phase, 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.

Specific objectives of RMBO's initial "early-warning" monitoring program are:

1.) 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;
3.) to provide long-term trend or status data on most regularly occurring breeding bird species;
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.

Monitoring Birds of CNF Program History

Beginning in 2006, Coconino National Forest (CNF) monitored birds on 19 transects in Ponderosa Pine and Pinyon-Juniper following the habitat-stratified point transect protocol developed by RMBO (Leukering 2000, Panjabi 2006). In 2008, RMBO began the first year of *Monitoring Birds of Coconino National Forest* (MBCNF), a partnership effort with CNF. The new MBCNF program retained the original 19 transects and added 39 new transects, including transects in Aspen, for the 2008 season.

METHODS

Study Area

Habitats
In 2008, RMBO and biologists from CNF selected three vegetation cover types, Aspen, Pinyon-Juniper, and Ponderosa Pine, in which to place 60 point-count transects. We selected these habitats because:

1) they comprise the bulk of the CNF landscape;
2) the most active management occurs in these cover types; and
3) they help to fulfill the objectives of funding and logistical support.

Aspen (AS)
Aspen consists of stands including at least 10% cover of quaking aspen (*Populus tremuloides*). These stands are not homogeneous and most often are intermixed with coniferous trees. Shrub species include snowberry (*Symphoricarpos sp.*), thimbleberry (*Rubus parviflorus*), serviceberry (*Amelanchier sp.*), and manzanita (*Arctostaphylos sp.*).

Pinyon-Juniper (PJ)
Pinyon-Juniper is composed of arid, forested areas dominated by pinyon pine (*Pinus edulis*) and juniper (*Juniperus sp.*). Oaks such as gambel oak (*Quercus gambelii*), emory oak (*Quercus emoryi*), and gray oak (*Quercus grisea*) may be present. Ponderosa pine (*Pinus ponderosa*) is generally absent or sparse in this habitat. If present, understory layers are variable and may be dominated by shrubs or grasses. Some common shrubs in Pinyon-Juniper are sagebrush (*Artemesia sp.*), mountain mahogany (*Cercocarpus sp.*), rabbitbrush (*Chrysothamnus sp.*), serviceberry, chokecherry (*Prunus virginiana*), skunkbrush (*Rhus trilobata*), blackbrush (*Coleogyne ramosissima*), cliffrose (*Purshia sp.*), and manzanita.

Ponderosa Pine (PP)
Ponderosa Pine is composed of arid conifer stands dominated by ponderosa pine. In addition to ponderosa pine, douglas fir (*Pseudotsuga menziesii*), pinyon pine, and juniper may be present in the tree canopy. Sagebrush, manzanita, mountain mahogany, cliffrose, gambel oak, snowberry, chokecherry, serviceberry, and rose (*Rosa sp.*) are common shrub species (USGS 2007).

Field Personnel

RMBO staff, consisting of three experienced biological technicians with excellent aural and visual bird-identification skills, conducted the field work in 2008. Technicians completed a ten-day training program at the beginning of the field season to ensure full understanding of the field protocols, practice bird and vegetation identification, and calibrate distance estimation in a variety of habitats.

Site Selection

In 2008, RMBO technicians established 39 new transects, selecting transect locations randomly from areas stratified by habitat. CNF already had 19 established transects. We surveyed these transects during the 2008 season in addition to the 39 newly-established transects. Transect locations are displayed in Figure 1.

Point Transect Protocol

To sample bird populations in habitats selected for monitoring, RMBO staff conducted point transects (Buckland et al. 2001) following protocol established by Leukering (2000) and modified by Panjabi (2006). Observers conducted point transects in the morning, between ½-hour before sunrise and 11 AM. For new transects, observers established an access point, a randomly-selected bearing, and randomly-selected distance within 400 m of the access point to place the first point count location. On the morning of the sample, the observer began the point transect at the first count station and then continued along the randomly-selected bearing for all remaining points if possible. In some cases, the pre-selected bearing lead the observer out of the target habitat or to some obstruction (e.g. cliff or private land). When this happened, the observer returned to the last point and randomly turned the transect right or left 90 degrees and then alternated right or left if additional turns were necessary.

Observers conducted as many as 15 five-minute point counts 250 meters apart along point transects. For every bird detected, they recorded species, sex, distance from observer, time interval within the five-minute count, and type of detection (call, song or visual sighting). Observers measured distances using Bushnell® Yardage Pro 500 laser rangefinders. When it was not possible to measure distance to a bird, observers estimated distance by measuring to some nearby object. Observers treated the 250-m intervals between count stations as sections of a line transect and recorded certain bird and squirrel species that occur in low-densities (all grouse, raptors, woodpeckers, and a few other rare or uncommon species). They measured the distance and bearing to individuals of these low-density species from the transect line. Observers did not include low-density species in the line-transect data that were detected on a previous or subsequent point. Observers also recorded detections of birds flying over.

We considered all non-independent detections of birds, i.e., flocks or pairs of conspecific birds together in close proximity, as part of a 'cluster' rather than as separate independent observations. Observers recorded clusters as *C*, the number of birds detected within the cluster.

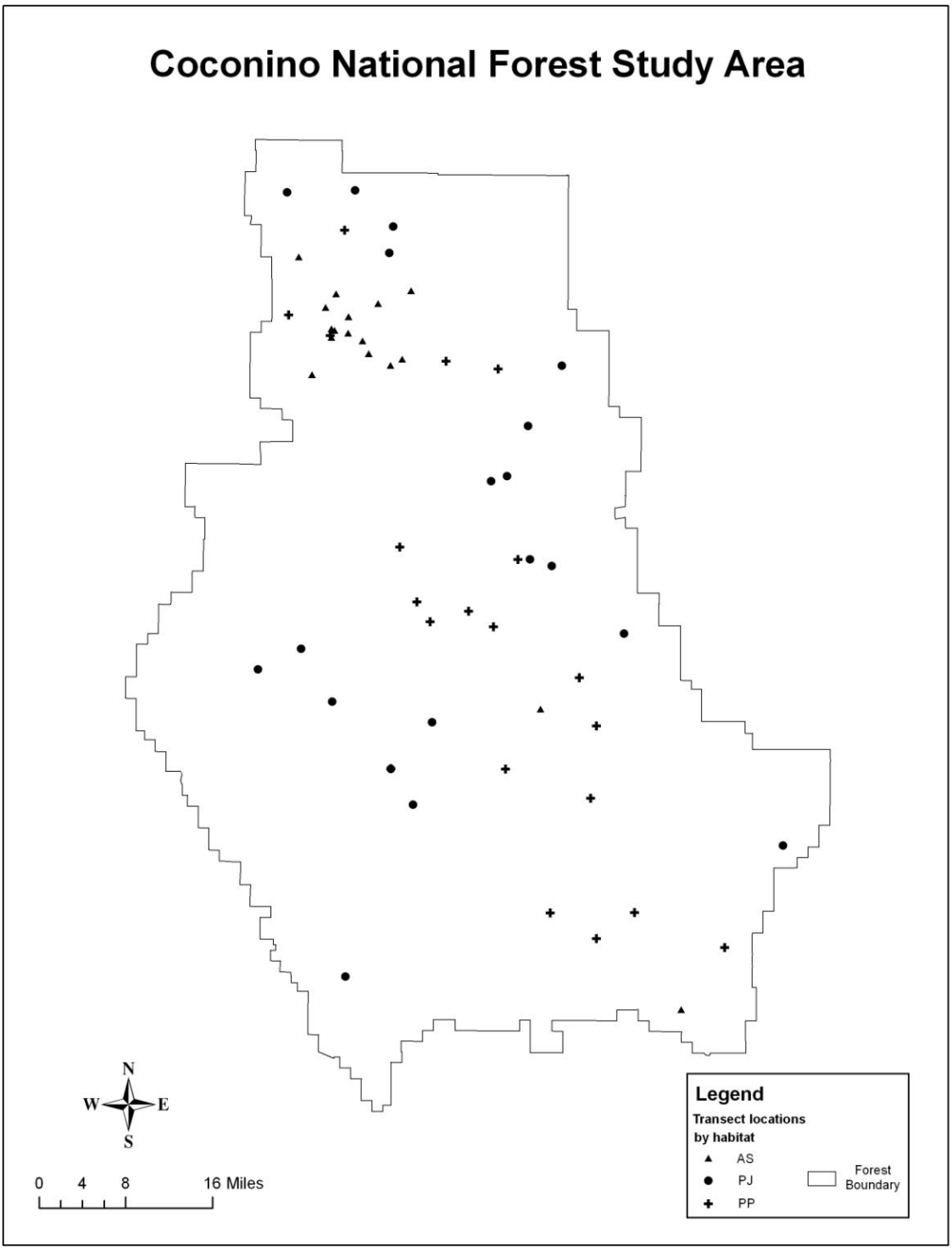

Figure 1. CNF Transect locations.

At the start and end of transects, observers recorded time and atmospheric data (i.e., temperature in degrees Fahrenheit, cloud cover, precipitation, and wind in the Beaufort scale). They recorded locations of count stations using hand-held Garmin® E-trex™ Global Positioning System (GPS) units. Observers logged all GPS data in Universal Transverse Mercator (UTM) North American Datum 1927. Before beginning a point count, observers recorded vegetation data within a 50-m radius of the point, including structural stage, forest canopy closure, mean canopy height, types and relative proportions of overstory trees, sub-canopy tree species composition, percent coverage and types of shrubs, and types and relative proportions of ground cover. They recorded vegetation data quietly; allowing birds, disturbed by our approach, time to return to their normal habits prior to beginning the point count.

Data Analysis

We used the analysis program Distance 5.0© to generate density estimates (*D*) from our point count data (Thomas et al. 2006). Buckland et al. (2001) developed the concepts and methods of distance analysis. Distance analysis relies on three assumptions:

1. observers detect all birds at the point (i.e. distance to detection is 0);
2. observers measure distances of birds close to the point accurately; and
3. birds do not move in response to the observer's presence.

Distance 5.0© fits a unique detection function to the distribution of species in a sampled habitat. Because the detection function is unique to each species in each sampled habitat, Distance 5.0© is more suitable than other analytical programs for highly varied sampling landscapes.

The number of detections used in analyses (*n*) may be fewer than the number of birds observed (*N*) because:

1. we recorded a cluster of birds as a single detection;
2. we excluded birds detected far from the observer; and
3. we removed birds detected flying over but not using the habitat.

The difference between (*n*) and (*N*) can be large for species that we often observed in groups (e.g., swifts, swallows, and crossbills), at great distance (e.g. raptors and corvids), or flying over (e.g. Pine Siskin and Evening Grosbeak).

We generated density estimates for species that had at least 60 utilizable detections (*n*) in a sampled habitat. We excluded flyover and line transect detections from analyses when calculating density estimates.

RESULTS

RMBO staff conducted 690 point counts along 58 point transects in three habitats (Figure 1) between 18 May and 9 July, 2008 on the MBCNF project.

Observers recorded 4,407 birds of 90 species on MBCNF point-count transects (Appendix A). The number of species detected in sampled habitats ranged from 51 in Aspen to 66 in Pinyon-Juniper. Staff detected some species that are peripheral to the habitat in which they were found. We provide habitat-based density estimates for 20 species in three habitats.

Aspen (AS)

Observers conducted 158 point counts along 19 AS transects in 2008 for an average of 8 points per transect. Observers recorded 1,274 birds from 51 species. Observers detected an average of 67 birds and 18 species per transect in AS.

Table 1. Estimated densities of breeding birds in AS in CNF, summer 2008[1]

Species	*D*	*LCL*	*UCL*	*%CV*	*n*
House Wren	50.47	34.43	73.97	23.06	108
Yellow-rumped Warbler	43.50	29.67	63.79	22.82	74
Dark-eyed Junco	69.27	39.92	120.20	34.11	79
Cordilleran Flycatcher	24.52	18.00	33.39	18.32	80
Hermit Thrush	11.24	7.77	16.26	22.01	64
Mountain Chickadee	46.59	34.39	63.13	18.33	87
Western Wood-Pewee	12.26	8.01	18.76	25.64	62
Warbling Vireo	26.16	18.53	36.91	20.79	89

[1] *D* = estimated density (birds/km2); *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)

Observers conducted 246 point counts along 19 PJ transects in 2008 for an average of 13 points per transect. Observers recorded 1,411 birds from 66 species. Observers detected an average of 74 birds and 19 species per transect in PJ.

Table 2. Estimated densities of breeding birds in PJ in CNF, summer 2008[1]

Species	*D*	*LCL*	*UCL*	*%CV*	*n*
Ash-throated Flycatcher	14.76	10.75	20.26	18.96	87
Spotted Towhee	19.09	11.65	31.26	29.46	71
Chipping Sparrow	22.48	14.42	35.04	26.45	58
Juniper Titmouse	10.22	7.04	14.83	22.46	63

[1] *D* = estimated density (birds/km2); *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*.

Ponderosa Pine (PP)

We conducted 286 point counts along 20 PP transects in 2008 for an average of 14 points per transect. We recorded 1,722 birds from 60 species. Observers detected an average of 86 birds and 21 species per transect in PP.

Table 3. Estimated densities of breeding birds in PP in CNF, summer 2008[1]

Species	*D*	*LCL*	*UCL*	*%CV*	*n*
Pygmy Nuthatch	17.60	12.73	24.33	19.41	98
Mountain Chickadee	21.06	16.25	27.29	15.38	82
Grace's Warbler	24.60	16.88	35.85	22.04	145
Dark-eyed Junco	31.22	16.32	59.74	40.66	92
White-breasted Nuthatch	11.66	8.65	15.71	18.00	80
Western Bluebird	36.71	26.97	49.95	18.63	97
Yellow-rumped Warbler	9.43	6.11	14.55	25.86	58
American Robin	9.64	6.60	14.09	22.57	64

[1] *D* = estimated density (birds/km2); *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

Analysis of the habitat-stratified point transects produced good estimates with low coefficients of variation (CV<50%) for two Management Indicator Species (MIS) (Pygmy Nuthatch in Aspen and Juniper Titmouse in Pinyon-Juniper). We detected Hairy Woodpecker, another MIS, over 20 times in every habitat surveyed. Therefore, within the next few years, we should have the minimum 60 observations per habitat needed to estimate Hairy Woodpecker densities in each habitat .

Although we did not sample riparian or wetland habitats in 2008, we detected a few MIS associated with these habitats (Cinnamon Teal, Lincoln's Sparrow, and Yellow-breasted Chat). We would need to establish riparian transects in CNF to have enough detections to monitor these species adequately. We detected Red-naped Sapsucker and Lucy's Warbler fewer than five times. These species are present in low densities in the habitats surveyed. Wild Turkey may be present in sufficient numbers, but are difficult to detect because of their secretive and wary behavior.

The RMBO habitat-based land monitoring protocol does not adequately detect other MIS. CNF monitors many of these (Northern Goshawk, Mexican Spotted Owl) in separate efforts. One way to monitor the health of bird populations, especially small ones, is to monitor reproductive output at nests.

LITERATURE CITED

Adamus, P. R, T. J. Danielson, and A. Gonyaw. 2001. Indicators for Monitoring Biological Integrity of Inland, Freshwater Wetlands: A survey of North American technical literature (1990-2000). U.S. Environmental Protection Agency, Office of Water, Wetlands Division. Washington, D.C. EPA 843-R-01.

Birdlife International. 2003. Biodiversity Indicator for Europe: Population Trends of Wild Birds. http://www.birdlife.org/action/science/indicators/pdfs/eur_biodiversity_indicators

Buckland, S. T., D. R. Anderson, K. P. Burnham, J. L. Laake, D. L. Borchers, and L. Thomas. 2001. Introduction to Distance Sampling. Oxford University Press, London, UK.

Bureau of Land Management. 1998. Birds as Indicators of Riparian Vegetation Condition in the Western U.S. Bureau of Land Management, Partners in Flight, Boise, Idaho. BLM/ID/PT-98/004+6635. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/birds/ripveg/index.htm (Version 15DEC98).

Hutto, R. L. 1998. Using Landbirds as an Indicator Species Group. Pp. 75-92 in Marzluff, J. M., and R. Sallabanks (eds.), Avian conservation: Research and Management. Island Press, Washington, DC.

Leukering, T. 2000. Point Transect Protocol for *Monitoring Colorado's Birds*. Unpublished document, Rocky Mountain Bird Observatory, Brighton, CO. 16 pp.

Manley, P.N., W.M. Block, F.R. Thompson, G.S. Butcher, C. Paige, L.H. Suring, D.S. Winn, D. Roth, C.J. Ralph, E. Morris, C.H. Flather, and K. Byford. 1993. Guidelines for Monitoring Populations of Neotropical Migratory Birds on National Forest System Lands. USDA Forest Service, Washington. 35 pp.

Morrison, M. 1986. Bird populations as indicators of environmental change. Current Ornithology 3:429-451.

O'Connell, T.J., L.E. Jackson, and R.P. Brooks. 2000. Bird Guilds as Indictors of Ecological Condition in the Central Appalachians. Ecological Applications 10:1706-1721.

Panjabi, A. 2006. Point Transect Protocol for *Monitoring the Birds of the Black Hills,* Revised March 2006. Unpublished document. Rocky Mountain Bird Observatory. Brighton, Colorado. 28 pp.

Rich, T. 2002. Using Breeding Land Birds in the Assessment of Western Riparian Systems. Wildlife Society Bulletin. 30(4):1128-1139.

Sauer, J.R. 1993. Monitoring Goals and Programs of the U.S. Fish and Wildlife Service. In Finch, D.M. and P.W. Stangel (eds.) Status and Management of Neotropical Migratory Birds; 1992 Set. 21-25; Estes Park, Co. Gen. Tech. Rep. RM-229. Fort

Collins, CO. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 422 pp.

Thomas, L., Laake, J.L., Strindberg, S., Marques, F.F.C., Buckland, S.T., Borchers, D.L., Anderson, D.R., Burnham, K.P., Hedley, S.L., Pollard, J.H., Bishop, J.R.B. and Marques, T.A. 2006. Distance 5.0. Release "2". Research Unit for Wildlife Population Assessment, University of St. Andrews, UK.

U.S. Environmental Protection Agency. 2002. Methods for evaluating wetland condition: biological assessment methods for birds. Office of Water, U.S. Environmental Protection Agency, Washington, D.C. EPA-822-R-02-023.

USGS National Gap Analysis Program. 2007. Digital Animal-Habitat Models for the Southwestern United States. Version 1.0. Center for Applied Spatial Ecology, New Mexico Cooperative Fish and Wildlife Research Unit, New Mexico State University.

APPENDIX

List of all bird species observed during point transects in Coconino National Forest in 2008, with species totals by habitat and management designation.

Common Name[1]	Total # of individuals observed per habitat, 2008[2]				Species Management Designation			
					AZGFD[3]	USFS[4]		PIF[5]
	AS	PJ	PP	Total		CNF	Region 3	BCR34
Wild Turkey	--	--	4	4	SGCN	MIS		
Gambel's Quail	--	24	--	24				CS,RS
Turkey Vulture	1	9	1	11				
Cooper's Hawk	2	2	--	4				RS
Northern Goshawk	1	--	--	1	SGCN	MIS	R3SS	RC
Red-tailed Hawk	1	5	3	9				
Golden Eagle	--	2	--	2				
American Kestrel	--	5	4	9				
Band-tailed Pigeon	16	--	2	18				CC
White-winged Dove	--	1	--	1				
Mourning Dove	1	52	17	70				
Northern Pygmy-Owl	--	1	--	1				
Common Nighthawk	--	1	3	4				
White-throated Swift	--	18	--	18				CC,RS
Anna's Hummingbird	--	1	--	1				
Broad-tailed Hummingbird	19	16	22	57				
Acorn Woodpecker	3	--	11	14				
Williamson's Sapsucker	5	--	1	6				
Red-naped Sapsucker	3	--	--	3	SGCN	MIS		
Downy Woodpecker	4	1	3	8	SGCN			
Hairy Woodpecker	28	26	23	77		MIS		
Northern Flicker	43	7	44	94				
Olive-sided Flycatcher	3	--	1	4	SGCN			CC
Western Wood-Pewee	65	7	40	112				
Gray Flycatcher	--	49	19	68				
Cordilleran Flycatcher	84	--	17	101				RS
Ash-throated Flycatcher	--	98	10	108				RS
Cassin's Kingbird	--	--	2	2				RC,RS
Western Kingbird	--	5	--	5				
Plumbeous Vireo	10	28	96	134				RS
Warbling Vireo	92	1	9	102				
Steller's Jay	41	6	57	104				
Western Scrub-Jay	--	37	3	40				
Pinyon Jay	--	49	14	63				CC,RC
Clark's Nutcracker	9	2	--	11	SGCN			
American Crow	--	--	8	8				
Common Raven	11	63	27	101				
Purple Martin	--	--	3	3	SGCN			

Common Name[1]	Total # of individuals observed per habitat, 2008[2]				Species Management Designation			
					AZGFD[3]	USFS[4]		PIF[5]
	AS	PJ	PP	Total		CNF	Region 3	BCR34
Violet-green Swallow	67	38	50	155				
Barn Swallow	--	1	--	1				
Mountain Chickadee	91	15	91	197				
Juniper Titmouse	--	100	--	100		MIS		RC,RS
Bushtit	--	7	--	7				
Red-breasted Nuthatch	31	--	1	32				
White-breasted Nuthatch	37	20	89	146				
Pygmy Nuthatch	55	4	154	213		MIS		RS
Brown Creeper	12	--	5	17				
Rock Wren	--	4	7	11				
Canyon Wren	--	5	--	5				RS
Bewick's Wren	--	24	1	25				
House Wren	115	--	17	132				
Ruby-crowned Kinglet	4	--	--	4	SGCN			
Blue-gray Gnatcatcher	--	2	--	2				
Western Bluebird	23	17	119	159				RS
Mountain Bluebird	--	4	--	4				
Townsend's Solitaire	3	--	2	5				
Swainson's Thrush	1	--	--	1	SGCN			
Hermit Thrush	71	3	14	88				
American Robin	38	1	67	106				
Northern Mockingbird	--	53	--	53				
Phainopepla	--	4	--	4				RC,CS,RS
Olive Warbler	2	--	1	3				RS
Virginia's Warbler	1	--	8	9				CC,RS
Lucy's Warbler	--	4	--	4		MIS		CC,RC,CS,RS
Yellow-rumped Warbler	78	5	61	144				
Black-throated Gray Warbler	--	39	--	39				RC
Grace's Warbler	4	7	170	181				CC,RS
Wilson's Warbler	--	1	--	1				
Red-faced Warbler	9	--	15	24				CC,CS,RS
Hepatic Tanager	1	7	6	14				RS
Western Tanager	17	18	56	91				
Green-tailed Towhee	4	5	1	10	SGCN			
Spotted Towhee	--	79	1	80				RC,RS
Canyon Towhee	--	1	--	1				RC,CS,RS
Chipping Sparrow	2	64	44	110				
Black-chinned Sparrow	--	16	--	16				CC,RS
Lark Sparrow	1	13	12	26				
Black-throated Sparrow	--	9	--	9				RS
Dark-eyed Junco	92	--	105	197				
Northern Cardinal	--	1	--	1				
Black-headed Grosbeak	6	47	13	66				
Western Meadowlark	1	19	2	22				

Common Name[1]	Total # of individuals observed per habitat, 2008[2]				Species Management Designation			
					AZGFD[3]	USFS[4]		PIF[5]
	AS	PJ	PP	Total		CNF	Region 3	BCR34
Brewer's Blackbird	--	--	5	5				
Brown-headed Cowbird	2	22	27	51				
Scott's Oriole	--	11	--	11				CS,RS
House Finch	--	16	3	19				
Red Crossbill	26	--	--	26				
Pine Siskin	3	7	6	16				
Lesser Goldfinch	2	14	19	35				

[1] Common Names are from the A.O.U. Check-list of North American Birds, Seventh Edition (2003).
[2] Habitats: AS=Aspen; PJ=Pinyon-Juniper; PP=Ponderosa Pine.
[3] AZGFD=Arizona Game and Fish Department, SGCN=Species of Greatest Conservation Need (Arizona's Comprehensive Wildlife Conservation Strategy: 2005-2015 (2006)).
[4] USFS=United States Forest Service, CNF=Coconino National Forest, MIS=Management Indicator Species; Region3=USFS Region 3, R3SS=USFS Region 3 Sensitive Species.
[5] PIF=Partners in Flight, BCR=Bird Conservation Region, CC=Continental Concern Species, RC=Regional Concern Species, CS=Continental Stewardship Species, RS = Regional Stewardship Species.