Final Report
Apache-Sitgreaves National Forests and White Mountain Stewardship Project

Forest Bird Population Monitoring Project

As a component of the Arizona Bird Conservation Initiative

submitted by Cathy A. Taylor

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Introduction

The Apache-Sitgreaves National Forest has established a 10 year stewardship contract for reducing fuels, thinning the forest, reducing risk of wildfire in the mountain communities, and restoring a more natural fire regime. This is an ambitious project that will reduce fuels and tree densities on a large portion of the forest. There is a need to determine the effects of this large-scale project on wildlife, so that we may change the prescriptions if effects are greater than anticipated. The White Mountain Stewardship Project Community Monitoring Board requested help from scientists and resource managers to determine what monitoring is needed to answer this question. They reached a consensus that monitoring bird populations would indicate many of those effects. The White Mountain Stewardship Project (WMSP) has completed its third year, with several areas being treated across the Forest. It is important to obtain data across the Forest, prior to treatments taking place. These areas will also be monitored post-treatment and there will be control plots that will not be treated.

The data and information gathered from this project will help the Forest Service to understand the effects of the WMSP on forest birds across the landscape. This knowledge will allow the agency to change the project parameters of the contract, if the effects are outside of the anticipated or acceptable limits. This project will also allow the Forest Service to better gauge the impacts of their management actions throughout northern Arizona, and to access population trends in birds in the ponderosa pine and pinyon-juniper ecosystems.

The Forest Service identified Management Indicator Species (MIS) for Management Areas of the National Forest during development of the Apache-Sitgreaves National Forests Land Management Resource Plan in 1987. The National Forest Management Act requires that the Forest Service determine population trends for these species on the Forests, and document habitat trends for the indicator habitats that these species represent, in order to assess changes that may be due to Forest management. Some of these species are monitored by the Forests, others are monitored by the Arizona Game and Fish Department (game species), and some have had sporadic monitoring or surveys at best. Many of the MIS in the later category are birds and squirrels. If continued over many years, this monitoring project would provide information for the Forests on the population trends of some of these MIS species.

In addition, the Arizona Game and Fish Department is undertaking an effort to ensure statewide monitoring of bird populations (Coordinated Bird Monitoring). They are coordinating with state, federal, and tribal agencies, as well as with non-profit groups that are conducting bird monitoring in the state. This bird monitoring effort will make a large contribution to the State effort, and when combined with similar monitoring on the Coconino and Kaibab National Forests, will monitor birds across the forests of northern Arizona.

Training

The Apache-Sitgreaves National Forests contracted with Bryce Marshall of Biome, Ecological and Wildlife Research, for training in bird identification by song and call, and in the Point/Transect Bird Monitoring Protocol. Bryce provided this training between April 30, 2007 and May 20, 2007, for four Forest Service biologists and technicians and four volunteers. He also provided a CD to each participant, with bird calls and songs. Bryce also conducted a few of the point-transect surveys. The participants found the training invaluable to increasing their bird identification skills and understanding of the protocol.

Project Design and Methods

The WMSP occurs predominately in ponderosa pine and pine-oak habitats. During the planning process, some treatments are identified for pinyon-juniper habitats. In most studies, ponderosa pine and pine-oak habitats are lumped into one category. We chose to look at these habitats separately, to determine if there are differences that may be detected in the bird communities and the effects of the WMSP on those communities.

Survey stands were selected within the designated habitat stratifications, with half in treatment units and half outside of treatment units. We paired treatment and non-treatment areas within each WMS project, as much as possible. A 250 m buffer along habitat boundaries was excluded during the selection process to avoid areas influenced by neighboring habitats. Maintenance level 1 and 2 roads (closed roads and roads open for use for high-clearance vehicles) are ubiquitous on the Forest and were considered part of the available habitat. Maintenance level 3-5 roads were buffered 250 m along either side to avoid potential road influences.

Forest Service biologists established 24 point-transect routes, and produced GIS maps with coordinates for the points. These routes were located on the Alpine, Black Mesa, Lakeside, and Springerville Ranger Districts in the three forest types: ponderosa pine, pine- Gambel's oak, and pinyon-juniper habitats. Half of the routes are in units that will be treated under the White Mountain Stewardship Project (treatment plots), and half of the routes are in units that will not be treated (control plots). Surveys will occur in all plots prior to the treatments, and surveys will be repeated after treatments in both treatment plots and control plots (Table 1).

Table 1: Point-Transect survey routes by Habitat and Treatment.

	Ponderosa Pine	**Pine – Oak**	**Pinyon - Juniper**
Treatment	PPTT (4 routes)	POTT (4 routes)	PJTT (4 routes)
Non-Treatment	PPNT (4 routes)	PONT (4 routes)	PJNT (4 routes)

The White Mountain Stewardship Contract (WMSC) is a ten-year contract that guarantees at least 5,000 acres of treatments a year, and 50,000 acres of treatments over the ten-year period. The bird surveys are designed to start after NEPA has been completed on the White Mountain stewardship projects so that routes can be placed in treatment units, and in control units prior to treatment. The bird monitoring project is looking specifically at the mechanical treatments, which will generate greater changes to the environment than the prescribed burning only treatments. It is likely that some areas will be surveyed more than once prior to treatment, while others may be treated shortly after the first survey.

White Mountain Stewardship projects that have been chosen as representative of the WMSC and that had bird survey plots established within them in 2007 are shown in Table 2. Maps of the survey routes are included in this report (Appendix B).

Table 2: White Mountain Stewardship projects by District.

Alpine RD	**Black Mesa RD**	**Lakeside RS**	**Springerville RD**
Nutrioso WUI	Hilltop	Los Burros	Eagar South
Alpine WUI	Nagle	Carlisle	

Survey Implementation

The technicians and volunteers began surveying for birds on May 29, 2007, and field work was completed by July 3, 2007. Seven people participated in the surveys, including two Forest Service technicians, four volunteers, and Bryce Marshall (trainer). Many of the routes were run by teams of 2 persons.

We conducted point-transect surveys using distance sampling, following Buckland et al. (1993) and Leukering et al. (2000). The point-transect method is an effective survey method for monitoring multiple species in the point counts while emphasizing focal species, e.g., MIS, on the transects. This method is also effective for obtaining species density estimates in a variety of habitat types (Rosenstock et al 2001). Transect surveys targeted the following MIS: pygmy nuthatches, hairy woodpeckers, juniper titmice, and Abert's squirrel.

Results

We completed 22 of the 24 routes, with 8 routes in ponderosa pine (PP), 7 routes in pine-oak (PO), and 7 routes in pinyon-juniper (PJ). Twelve of the routes were in treatment units and ten routes were in non-treatment units (Table 3).

A total of 224 points were surveyed within the 22 plots. There were 81 points in ponderosa pine, 72 points in ponderosa pine-Gambel's oak, and 71 points in pinyon-juniper. Transect length was 17,600 meters in ponderosa pine, 15,900 meters in pine-oak, and 15,650 meters in pinyon-juniper.

Table 3: Point-Transect routes by District, WMS Project, and Treatment.

District	Project	PPTT	PPNT	POTT	PONT	PJTT	PJNT
Lakeside	Los Burros	1	1	1	1		
	Carlisle Range Allt					1	1
	Blue Ridge 2B				1		
Springerville	Eagar South	1	1			1	1
Black Mesa	Nagel	2		1	1		
	Hill Top					1	1
Alpine	Alpine WUI	1	1	1			
	Nutrioso WUI			1			1
TOTAL		5	3	4	3	3	4

We surveyed a total of 1390 individuals of 66 bird species and 2 mammalian species, 5 of which are Forest Management Indicator Species (Appendix A). A total of 39 species were recorded in PP, and 40 species each were recorded in PO and PJ. PP and PO had 32 species in common, PP and PJ had 21 species in common, and PO and PJ had 19 species in common. The three habitat types had 18 species in common.

By habitat, we counted 60+ individuals of 2 species: dark-eyed junco and pigmy nuthatch. When PP and PO are lumped, yellow-rumped warbler (Audubon type) and mountain chickadee also had over 60 individuals. There were no species in PJ with 60 or more individuals, which is the number of individuals needed to calculate density.

A minimum of 35 detections are needed to be able to calculate detection probabilities. Twelve species meet this criteria: American robin, dark-eyed junco, Grace's warbler, mountain chickadee, northern flicker, plumbeous vireo, pygmy nuthatch, Steller's jay, violet-green swallow, white-breasted nuthatch, western tanager, and yellow-rumped warbler. We will complete the analysis for detection probabilities prior to the new survey season in May 2008.

Data analysis is not complete. We will analyze transect data using program DISTANCE, following model selection guidelines from Buckland et al. (1993). All juvenile birds will be omitted from the analysis. To calculate reliable density estimates for each species, a sample size, n0 , of 60-80 individual detections per habitat is recommended (Buckland et al. 1993), however we will report detection probabilities and density estimates for MIS species. For all other songbird species with sample sizes = 60, we will calculate the minimum total line length (L0) or points needed to meet the recommended target coefficients of variation based on the upper limit for "monitoring" described by Leukering et al. (2000), using sample size calculations for line transects and point counts provided by Buckland et al. (1993).

Plans for 2008 Surveys

We plan to conduct a second year of point-transect surveys in 2008. Adjustments may be made in a few routes by dropping points on a route that are not consistent with the rest of that route, and adding additional routes. We plan to survey a minimum of 27 routes with a minimum of 250 points, in the three habitat types and 2 treatments.

Final Itemized Use Of Funds

The Arizona Bird Conservation Initiative contributed $12,000 in grant monies for this project. The White Mountain Stewardship Monitoring Board provided another $11,500 (which are federal appropriated dollars). The Apache-Sitgreaves National Forests Wildlife Program contributed $1,000, and volunteers put in about $3,400 worth of labor.

Project Cost Analysis Worksheet

Item	*Column A* **Fed. Agency Appropriated Contribution**	*Column B* **Requested ABCI Contribution**	*Column C* **Total Costs**	*Column D* **Total Estimated Funds**
a. Salaries	$ 3,120	$10,800	$13,920	$13,500
b. Materials & Supplies	$ 3,420	$ 150	$ 3,570	$ 3,000
c. Vehicles	$ 1,500		$ 1,500	$ 2,500
d. Travel	$ 260	$ 50	$ 310	$ 500
e. Contract for Training	$ 4,200	$ 1,000	$ 5,200	$ 5,000
o. Total Cost Estimate	$12,500	$12,000	$24,500	$24,500

In addition, we had four volunteers who underwent training and conducted bird surveys.
The volunteers included: Sue Sitko, Richard Inman, Bob Vahle, and Justin Schofer.
The combined value of their volunteer time is estimated at $3,400, for a total project cost of $27,900.

In Appreciation

We want to thank the Arizona Game and Fish Department and the Arizona Bird Conservation Initiative for providing $12,000 for the project in 2007, and the White Mountain Stewardship Monitoring Board for providing $11,500.

We especially want to thank the following volunteers: Sue Sitko, Bob Vahle, Richard Inman, and Justin Schofer. Deb Brewster did a great job as the crew leader, managing the day to day surveys.

APPENDIX B

MAPS OF THE POINT-TRANSECT ROUTES

(the maps will be sent hardcopy, as they are too large to email)

Appendix A

Bird Species Recorded on Points during Point-Transect Surveys and the Number of Individuals Recorded by Habitat Type (using alpha species codes).

SPECIES	PP	PO	PJ	TOTAL		SPECIES	PP	PO	PJ	TOTAL
ABSQ	1	2		3		PISI	1	0		1
ACWO	5	5		10		PLVI	23	16	9	48
AMKE			2	2		PUMA	1	2		3
AMRO	19	29	3	51		PYNU	55	68	2	125
ATFL			16	16		RBNU	2	3		5
BAEG	1	0		1		RECR	3	0	1	4
BEWR			16	16		RESQ	0	3		3
BHCO	2	0	2	4		RFWA	0	3		3
BHGR	1	3	7	11		RTHA	0	2	1	3
BRCR	0	1		1		RWBL	0	1		1
BTHU	4	3	2	9		SPTO			3	3
BTPI	3	0		3		SSHA	0	1		1
BTYW			9	9		STJA	21	20		41
BUSH			17	17		TOSO	8	11	1	20
CAKI			2	2		TTWO	0	2		2
CHSP	4	2	27	33		TUTI			1	1
COFL	12	9		21		TUVU	1	1	1	3
COHA	1	0		1		VGSW	16	17	5	38
CORA	8	7	7	22		VIWA	1	9		10
DEJU	70	36	10	116		WAVI	0	6		6
DOWO	1	0	1	2		WBNU	15	22		37
GRFL			17	17		WEBL	10	7	8	25
GRWA	36	16		52		WEKI			2	2
HAWO	3	9	2	14		WETA	23	19	14	56
HETH	4	5		9		WEWP	6	9	2	17
HOLA			1	1		WISA	0	1		1
JUTI			9	9		WSJA			5	5
LASP			14	14		YRWA	44	26		70
LEGO			3	3						
MOBL	3	2		5		TOTALS	467	432	491	1390
MOCH	29	31	22	82						
MODO	8	5	2	15						
NIHA	0	0	1	1						
NOFL	18	17	2	37						
NOMO			14	14						
OLWA	3	1		4						
OSFL	1	0		1						
PIJA			16	16						