ARIZONA BIRD CONSERVATION INITIATIVE
GRANTS PROGRAM

PROJECT FINAL REPORT

AZGFD Region (1-6): 1	Date Report Submitted: 5 January 2009	Project # (For AZGFD use):

Project Title: **Apache-Sitgreaves National Forest Bird Monitoring, season 2**

Report Abstract (*200 words or less*):
ASNF conducted a second season of monitoring bird populations using Variable Distance Point Counts and Transects on 24 routes, 9 routes in ponderosa pine (PP), 7 routes in pine-oak (PO), and 8 routes in pinyon-juniper (PJ). 15 routes were in treatment units and 9 were in non-treatment units. A total of 1466 individuals of 71 bird species and 2 mammal species were detected, with 38 species located in PP and PO (25 species in common), and 54 species in PJ. 23 species were found in all three habitat types. A minimum of 35 detections are needed to calculate detection probabilities, and 16 species met this criteria. Twenty-six species have coefficients of variation $\leq$ 0.5 (p=0.5, power=0.8) and a 3% decline in population should be detectable within 12 years. Approximately 1/3 of the species have CV > 0.5 $\leq$ 1.0, and 3% decline in populations would be detectable within 30 years. The final 1/3 of species have CV > 1.0 and a decline in population could potentially be inferred, but would not be statistically significant. A third year of surveys is planned for 2009, with 3 additional routes.

APIF Plan (or other initiatives') Priority Bird Species or Habitats (including *number of acres*) benefited:

Black-throated gray warbler	Juniper titmouse	MIS SPECIES	
Cordilleran flycatcher	Gray vireo	Pygmy nuthatch	Abert's and Red squirrels
Gray flycatcher	Pinyon jay	Hairy woodpecker	
Olive-sided flycatcher	Purple Martin	Juniper titmouse	

Determine distribution and bird habitat associations, and evaluate the effects of land management actions on the above priority species.

Cooperating Agencies And/Or Conservation Groups, Landowners, Etc.:
The White Mountain Stewardship Community Monitoring Board
The Nature Conservancy

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Please complete the Final Report and submit to the Arizona Bird Conservation Initiative Coordinator following the reporting schedule outlined in the Collection Agreement.

FINAL REPORT 2008
ABCI/WMS/ASNF
APACHE-SITGREAVES NATIONAL FOREST BIRD POPULATION MONITORING PROJECT, SEASON 2

Survey Implementation

Survey Period: May 5, 2008 through July 6, 2008

Surveyors: 3 Forest Service technicians (Deb Brewster, Cathy Taylor, Linda WhiteTrifaro), and 2 volunteers (Sue Sitko, Bob Vahle)

Method: Point-Transect Surveys using distance sampling, (Buckland et al. 1993, Leukering et al. 2000). Effective for monitoring multiple species in the point counts while emphasizing focal species, e.g., management indicator species (MIS) and Arizona Pargtners in Flight priority species (APIF), on the transects; and for obtaining species density estimates in a variety of habitat types (Rosenstock et al 2001). Transect surveys targeted the following MIS: pygmy nuthatch, hairy woodpeckers, juniper titmice, and Abert's squirrel, and the following APIF species: Cordilleran flycatcher, olive-sided flycatcher, gray flycatcher, pinyon jay, gray vireo, black-throated gray warbler, and purple martin.

Results

Point Transect Routes: Completed 24 of the 27 planned routes: 9 routes in ponderosa pine (PP), 7 routes in pine-oak (PO), and 8 routes in pinyon-juniper (PJ). 15 routes were in treatment units and 9 were in non-treatment units (Table 1). Two of the treatment routes were treated between the 2007 and 2008 surveys. Two routes surveyed in 2007 were dropped due to having been treated with seed-cuts in the past. Three other routes were not surveyed due to time restrictions.

Points: 250 points in 24 plots. PP: 97 points, PO: 72 points, and PJ: 81 points.
Transects: about PP: 22,000 meters, PO: 19,100 meters, and PJ: 19,100 meters.

Table 1: Point-Transect routes by District, WMS Project, and Treatment.

Project	**PPTT**	**PPNT**	**POTT**	**PONT**	**PJTT**	**PJNT**
Los Burros (LS)	1		1			
Timber Mesa (LS)						1
Blue Ridge 2B (LS)			1			
CT		1		1		
Eagar South (SP)	2				1	1
Grapevine (SP)					1	1
Nagel (BM)	2	1	1			
Hill Top (BM)					1	1
EN			1			
Alpine WUI (AL)	1	1	1			
Nutrioso WUI (AL)			1			1
	6	**3**	**6**	**1**	**3**	**5**

Table 2 summarizes the data collected during the 2008 bird surveys.
Number of Individuals Detected: 1466 individuals
Number of species detected: 71 bird species, 2 mammalian species
Number of MIS: 5 species Number of APIF: 7 species
Number of Species: PP: 38 species; PO: 38 species; PJ: 54 species; Total: 71 species.
Number of species in common: PP and PO: 25, PP and PJ: 25 species, PO and PJ: 30 species
The three habitat types had 23 species in common.

By habitat, we counted 60+ individuals of only one species: dark-eyed junco in ponderosa pine. Pigmy nuthatch was detected 59 times in PP. When PP and PO are lumped, the yellow-rumped warbler (Audubon type) and the Steller's jay 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. Sixteen species meet this criterion: American robin, black-throated gray warbler, chipping sparrow, bushtit, dark-eyed junco, Grace's warbler, mountain chickadee, western bluebird, northern flicker, plumbeous vireo, pygmy nuthatch, Steller's jay, violet-green swallow, white-breasted nuthatch, western tanager, and yellow-rumped warbler.

A minimum sample size of $n \geq 35$ is recommended by Buckland et al. (2004) for a statistically rigorous analysis of detection probabilities, which allows for an evaluation of sampling effectiveness by species. Statistical significance of p = 0.1 and power of 0.8 apply to trend estimates assuming current survey efforts and methods are continued annually (Leukering et. al 2000). Table 3 indicates species for which changes in populations may be detected over 12 or 30 years, and is based on the coefficient of variation calculated for each species.

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).

2009 Plans: We would like to conduct a third year of surveys. More areas will have been treated by May 2009. In addition, we would like to get surveys completed on 27 routes. We plan to add 2 non-treatment pine-oak routes, and 1 treatment pinyon-juniper route, if possible.

Table 2: Bird Species Recorded on Points during Point-Transect Surveys and the Number of Individuals Recorded by Habitat Type (using alpha species codes).

	Individuals by Habitat					Species in 2+ Habitats			
Species	**PJ Total**	**PO Total**	**PP Total**	**ALL TOTAL**		**PJ PO PP**	**PJ PO**	**PO PP**	**PJ PP**
Acorn Woodpecker		11	10	21				1	
American Crow	1	1		2			1		
American Kestral			1	1					
American Robin	6	13	35	54		1	1	1	1
Ash-throated Flycatcher	19			19					
Bald Eagle			1	1					
Bewick's Wren	13			13					
Blue-gray gnatcatcher	3			3					
Brown-headed cowbird	3	1		4			1		
Black-headed grosbeak	6	2	2	10		1	1	1	1
Brown creeper			10	10					
Broad-tailed hummingbird	8	13	5	26		1	1	1	1
Band-tailed pigeon			1	1					
Black-throated gray warbler	38			38					
Bushtit	51			51					
Cassin's finch	2			2					
Cassin's kingbird	1			1					
Chipping sparrow	38	2		40			1		
Clark's nutcracker	10		6	16					1
Cordilleran flycatcher	2	10	15	27		1	1	1	1
Common nighthawk		2		2					
COPO			1	1					
Common raven	15	2	8	25		1	1	1	1
Dark-eyed junco	20	38	60	118		1	1	1	1
Downy woodpecker	2	1	2	5		1	1	1	1
Gray flycatcher	14	3		17			1		
Gray vireo	5			5					
Grace's warbler	3	13	25	41		1	1	1	1
Hairy woodpecker	4	6	11	21		1	1	1	1
Hepatic tanager	9			9					
Hermit thrush		9	14	23				1	
House wren	1			1					

Hutton's vireo			1	1					
Juniper titmouse	21			21					
Lark sparrow	4			4					
Lesser goldfinch	4			4					
Lewis' woodpecker	1			1					
Merriam's turkey	1			1					
Mountain bluebird	1	2		3			1		
Mountain chickadee	30	26	31	87		1	1	1	1
Mourning dove	7	1	4	12		1	1	1	1
Northern flicker	10	13	19	42		1	1	1	1
Northern goshawk			1	1					
Northern pygmy owl		1		1					
Olive warbler			2	2					
Olive-sided flycatcher			1	1					
Pinyon jay	13			13					
Pine siskin	4	2	6	12		1	1	1	1
Plumbeous vireo	12	18	26	56		1	1	1	1
Purple martin		9		9					
Pygmy nuthatch	12	34	59	105		1	1	1	1
Red-breasted nuthatch			2	2					
Ruby-crowned kinglet	1			1					
Red crossbill	1		8	9					1
Red-faced warbler		1		1					
Red-tail hawk	1	2		3			1		
Spotted towhee	3			3					
Sharp-shinned hawk		1		1					
Steller's jay	13	24	53	90		1	1	1	1
Townsend solitaire	1	9	14	24		1	1	1	1
Turkey vulture	7	3		10			1		
Violet-green swallow	25	4	13	42		1	1	1	1
Virginia's warbler	1			1					
Warbling vireo		11		11					
White-breasted nuthatch	10	20	12	42		1	1	1	1
Western bluebird	23	20	21	64		1	1	1	1
Western tanager	13	9	39	61		1	1	1	1
Western scrub jay	6			6					
Western wood peewee	4	10	8	22		1	1	1	1
Yellow warbler			2	2					
Yellow-rumped warbler	1	29	54	84		1	1	1	1

	Individuals by Habitat					Species in 2+ Habitats			
Species	**PJ Total**	**PO Total**	**PP Total**	**ALL TOTAL**		**PJ PO PP**	**PJ PO**	**PO PP**	**PJ PP**
Total Detections	**504**	**376**	**583**	**1463**		**23**	**30**	**25**	**25**
# SPECIES	54	38	38	71					
35+ INDIV.	4	2	7	9					
60+			1	7					

	MIS APIF			35+			60+

Table 3: (following page): Depiction of data by species, with Coefficients of Variability (CV), and ability to detect a decline of 3% in population over a 12 to 30 year period.

Pinyon /Juniper	Detections
BUSH	51
BTYW	38
CHSP	38
MOCH	30
VGSW	25
WEBL	23
JUTI	21
DEJU	20
ATFL	19
CORA	15
GRFL	14
BEWR	13
PIJA	13
STJA	13
WETA	13
PLVI	12
PYNU	12
CLNU	10
NOFL	10
WBNU	10
HETA	9
BTHU	8
MODO	7
TUVU	7
AMRO	6
BHGR	6
WSJA	6
GRVI	5
HAWO	4
LASP	4
LEGO	4
PISI	4
WWPE	4
BGGN	3
BHCO	3
GRWA	3
SPTO	3
CAFI	2
COFL	2
DOWO	2
AMCR	1
CAKI	1
HOWR	1
LEWO	1
METU	1
MOBL	1
RCKI	1
RECR	1
RTHA	1
TOSO	1
VIWA	1
YRWA	1

Pine/Oak	Detections
DEJU	38
PYNU	34
YRWA	29
MOCH	26
STJA	24
WBNU	20
WEBL	20
PLVI	18
AMRO	13
BTHU	13
GRWA	13
NOFL	13
ACWO	11
WAVI	11
COFL	10
WWPE	10
HETH	9
PUMA	9
TOSO	9
WETA	9
HAWO	6
VGSW	4
GRFL	3
TUVU	3
BHGR	2
CHSP	2
CONI	2
CORA	2
MOBL	2
PISI	2
RTHA	2
AMCR	1
BHCO	1
DOWO	1
MODO	1
NPOW	1
RFWA	1
SSHA	1

PIPO	Detections
DEJU	60
PYNU	59
YRWA	54
STJA	53
WETA	39
AMRO	35
MOCH	31
PLVI	26
GRWA	25
WEBL	21
NOFL	19
COFL	15
HETH	14
TOSO	14
VGSW	13
WBNU	12
HAWO	11
ACWO	10
BRCR	10
CORA	8
RECR	8
WWPE	8
CLNU	6
PISI	6
BTHU	5
MODO	4
BHGR	2
DOWO	2
OLWA	2
RBNU	2
WREN	2
YEWA	2
AMKE	1
BAEA	1
BTPI	1
COPO	1
HUVI	1
NOGO	1
OSFL	1

With p=0.1 and power 0.8

CV<0.5, detects a 3%/year decline in 12 years

CV<1.0, detect a 3%/year decline in 30 years

CV>1.0, no detection of a 3%/year decline in 30 years