INVENTORY AND MONITORING of AVIAN MANAGEMENT INDICATOR SPECIES for the MEDICINE BOW NATIONAL FOREST, WYOMING

YEAR ONE PROGRESS REPORT

Prepared by:

Doug Keinath, Senior Zoologist
Hamilton Smith, Project Biologist
Dr. Gary P. Beauvais, Director

Wyoming Natural Diversity Database
University of Wyoming
1000 E. University Ave., Department 3381
Laramie, Wyoming 82071

Prepared for:

Ms. Jena Hickey
Forest Wildlife Biologist
Medicine Bow-Routt NF's &
Thunder Basin NG
2468 Jackson Street
Laramie, WY 82070

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INTRODUCTION

This report provides first-year results of a songbird inventory and monitoring study designed for a 5-year sampling period. The Wyoming Natural Diversity Database (WYNDD) conducted a stratified random sample of two target habitats and a control group on portions of the Medicine Bow National Forest (MBNF) in the Sierra Madre Mountains, Medicine Bow Mountains, and Laramie Mountains. Target habitats were medium to high elevation conifer forests dominated by spruce and fir and riparian zones with a high percentage of Willow (*Salix* spp.), while control sites were randomly selected from across the forest. The goal of the 5-year study is to provide distribution and density estimates of four avian management indicator species (MIS); Golden-crowned Kinglet (*Regulus satrapa*), Wilson's Warbler (*Wilsonia pusilla*), Lincoln's Sparrow (*Melospiza lincolnii*), and American Three-toed Woodpecker (*Picoides dorsalis*). For regional consistency the design and methods of this study are based on the Rocky Mountain Bird Observatory (RMBO) Point Transect Protocol (Leukering et al. 2005).

METHODS

Study area

Avian surveys were conducted in June and early July of 2005 on the Medicine Bow National Forest of southeastern Wyoming (Figure 1). The majority of the study took place on the Brush Creek-Hayden and Laramie ranger districts. One control transect was located on the Laramie Peak unit of the Douglas ranger district.

Point Counts

Transect selection and point count methods generally follow those described in the RMBO Point Transect Protocol, which was last revised in March, 2005 (Leukering et al. 2005). This document is included on the CD attached to this report (see Appendix). The following is a brief summary of WYNDD's application of the RMBO methodology for this study.

Transect Selection – An initial list of transect starting points was provided to WYNDD at the outset of the study. The three transect categories include two habitat types; spruce-fir and riparian willow, and a randomly selected control group. A total of 61 starting points were created by MBNF biologists and GIS staff, about half of which were primary points from the three habitat categories; the remainder being back-up points in case primary locations were not accessible. If a first priority starting point was inaccessible, observers would choose a back-up point from the given category in the same region of the forest. Stratified point selection ensured that effort was weighted equally across the forest.

There were subtle differences in the protocol for establishing transects of the three general categories.

1. Starting points for control transects followed a randomly selected compass bearing from the starting point. Each subsequent point was located on that bearing at a distance of approximately 250 meters from the previous point. Impassable terrain along the designated bearing resulted in a randomly selected 90 degree change of the transect's direction.

2. Medium and high elevation spruce/fir forest in this region is somewhat patchy in distribution, which necessitated a more complex delineation of transects from their designated starting points. As with the control transects, a random compass bearing was selected from the starting point and point counts were spaced approximately 250 meters apart along this bearing. However, the random bearing was regenerated if it did not fall mostly within spruce/fir habitat as delineated on aerial photos provided by MBNF. Further, once a bearing was selected, if the transect eventually departed from spruce/fir habitat, turns of 90 degrees were made as appropriate to stay within the target habitat type. This resulted in several non-linear transects, but no transect crossed back over previously-covered ground.
3. Suitable riparian habitat was highlighted by MBNF staff on digital orthophotos of the study area. Riparian transects were placed within these polygons of suspected suitable habitat. From designated starting points within these polygons, transects followed the riparian corridor rather than a predetermined bearing. Starting points were positioned to ensure that a complete transect of 15 listening points, spaced approximately 250 meters apart, could fit within the available habitat.

Conducting counts – Each transect was composed of 15 listening points spaced approximately 250 meters apart. When observers reached a point on a given line transect, several minutes were taken to recorded species that flushed upon arrival, log UTM coordinates with a hand-held GPS unit, and document general habitat composition at the point. During this period, observers also took note of species within the detection radius (100 meters). Each point count was five minutes in duration, during which time all avian species detected within 100 meters were recorded. For each detection, the observer made estimated the linear distance to each individual and recorded the method of detection (e.g., visual, singing, calling, drumming, or other aural detection). An underlying assumption of the distance-based sampling methodology is that each detection is independent of all other detections. Therefore, any bird that was observed because attention was drawn to it by another individual was recorded as part of a cluster, rather than a unique detection. Each bird within a cluster was recorded for species diversity information, but non-unique observations will not factor into density equations during our final analyses.

In addition to point count surveys, low density target species were documented while walking between points on each transect. A complete list of low density target species for all habitats is available in Leukering et al. (2005). For the purposes of this study, the critical low density species monitored via line transect was the American Three-toed Woodpecker, so all between-point detections of American Three-toed Woodpeckers were documented. For these detections, observers also estimated the linear distance to the individual and the angle (in degrees) that the detection occurred from the linear transect line. Bearing and linear distance will be used to determine the density coefficient for three-toed woodpeckers at the conclusion of the initial 5–year phase of this study.

Environmental conditions –During this study all counts were conducted between 5:30 am and 11:00 am. Both rain and wind speed can hinder bird detection, and often result in subdued avian behavior. Under no circumstances were transects conducted if wind exceeded 18 mph, or a 4 on the Beaufort wind scale (wind raises dust, leaves, loose paper; small branches in motion). Point counts were suspended if precipitation exceeded a drizzle, or if snowfall noticeably subdued bird behavior.

RESULTS AND DISCUSSION

As stated in the introduction, the primary goal of this 5-year study is to develop density estimates for four management indicator species. This analysis requires the full dataset, and therefore not be performed until the final year. Thus, this progress report presents a simple accounting of the data collected to date.

Summary of Data

Figure 2 and Table 1 show how many MIS were detected during the point count transects conducted during the spring of 2005. Lincoln's Sparrow was the most frequent MIS detected (164 observations), followed by Wilson's Warbler (134 observations). Golden-crowned Kinglet and Three-toed Woodpecker were far less common, being detected only 30 and 15 times respectively. Based on these numbers, it is our initial guess that this study will generate sufficient information to accurately estimate densities for Lincoln's Sparrow and Wilson's Warbler, but that sample size will be marginal for

Golden-crowned Kinglet and Three-toed Woodpecker. This will be clarified in subsequent years of the project.

Each species showed clear preference at the scale of transects. Golden-crowned kinglets were found predominantly on spruce-fir transects (76.7% of observations) and cursory investigation of the data suggest that those found in riparian and control transects were in pockets of spruce-fir forest. Similarly, all observations of Three-toed Woodpeckers were on spruce-fir transects. Given that Wilson's Warbler prefers dense willow habitat, it is not surprising that over 99% of observations were on riparian transects and the one observation that fell on a control transect was in a riparian area. Moreover, cursory examination of the data suggest that these observations were concentrated on those transects with the tallest and most extensive willow habitat. Lincoln's Sparrow occurred on all transect types, but still showed a bias, as 91.5% of observations occurred on riparian transects.

An initial summary of all observations are presented in Table 2. Nearly 2,300 observations were made during formal point-counts transects, which represented 89 different species. The most commonly encountered species was Ruby-crowned Kinglet (254 observations covering all transects), followed by Yellow-rumped Warbler (193 observations), Lincoln's Sparrow (164 observations) and Wilson's Warbler (134 observations). On the opposite end of the spectrum, twenty species were represented by only one observation (see Table 2).

A Note on Surveys and Personnel

The management indicator species selected for this project make the selection of field personnel critical, as they are not easy to audibly distinguish by in-experienced birders. For instance:

1. The distinctive, high-pitched song of the Golden-crowned Kinglet cannot be detected by people who have difficultly hearing high-frequency sounds. Conversely, portions of the song of the very common Ruby-crowned Kinglet are similar to the Golden-crowned Kinglet and can be confused by someone without experience. Given the apparently low abundance of Golden-crowned Kinglets on the selected transects, potentially significant biases could occur

unless field personnel have a) appropriate auditory capabilities and b) a precise ability to filter out calls of similar species.

2. The majority of Three-toed Woodpeckers in this study were identified by their drumming, which is distinctive, but which many biologist cannot distinguish from that of the Hairy Woodpecker. Hairy Woodpeckers are more common on the forest, so making this mistake could severely bias estimates of Three-toed Woodpecker occurrence.
3. In dense riparian habitat, visibility is limited and the person conducting point counts must rely largely on audible cues (i.e., songs and calls). However, these areas generally contain abundant and dense avifauna, resulting in many, intermixed vocalizations that can be difficult to distinguish even by good birders. Wilson's Warbler falls squarely in the middle of this fray and has a song similar to several other warblers occurring in the area. Thus, it is important that technicians be thoroughly aware of the subtleties that distinguish Wilson's Warbler songs and calls from others in Table 2.

Since MIS were not selected for their ease of identification and detection, it is critical that personnel be thoroughly screened for their abilities to detect and distinguish each of these four species. Further, to minimize variability in detection, continuity of training should be maintained throughout the course of the 5 year study.

REFERENCES

Leukering, T., M.F. Carter, A. Panjabi, D. Faulkner, and R. Levad. 2005. Rocky Mountain Bird Observatory Point Transect Protocol: Revised March 2005. Rocky Mountain Bird Observatory, Brighton, Colorado.

FIGURES AND TABLES

Figure 1: Approximate location of songbird transects to monitor avian management indicator species within the Medicine Bow National Forest of southern Wyoming.

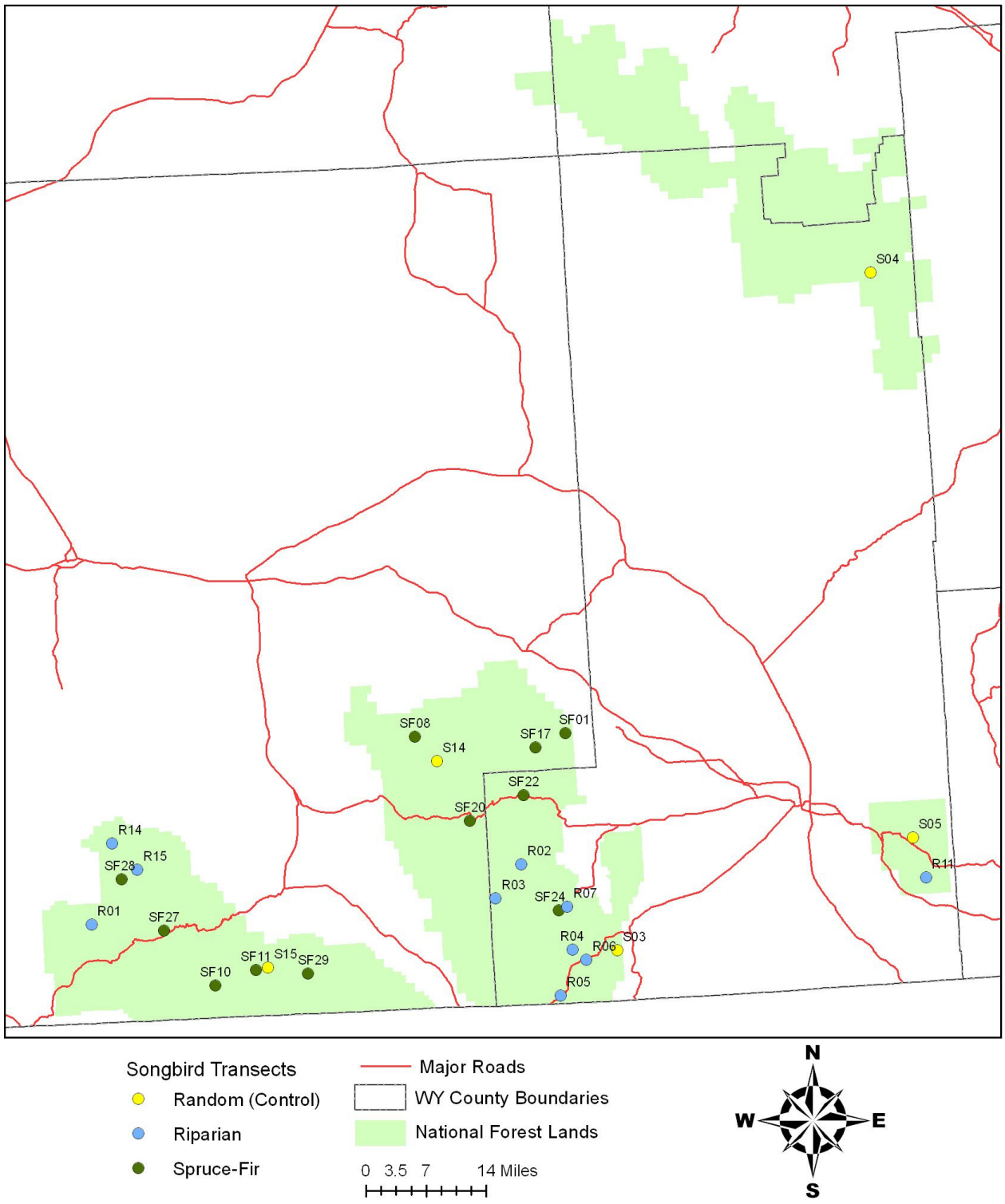
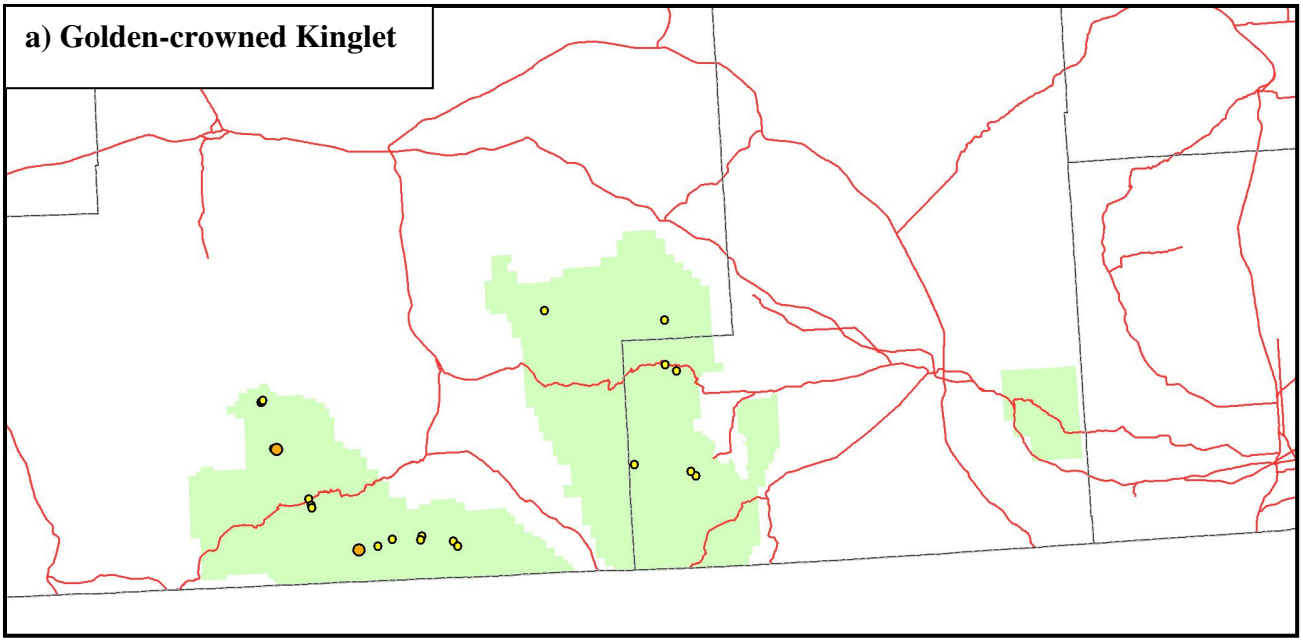


Figure 2: Observation maps of avian management indicator species in the Medicine Bow National Forest. a) Golden-crowned Kinglet, b) Three-toed Woodpecker, c) Lincoln's Sparrow, and d) Wilson's Warbler. Symbols represent the number of individuals observed during point count transects and are coded as follows:

○ = 1 or 2 individuals, ● = 3 or 4 individuals, ■ = 5 or 6 individuals.



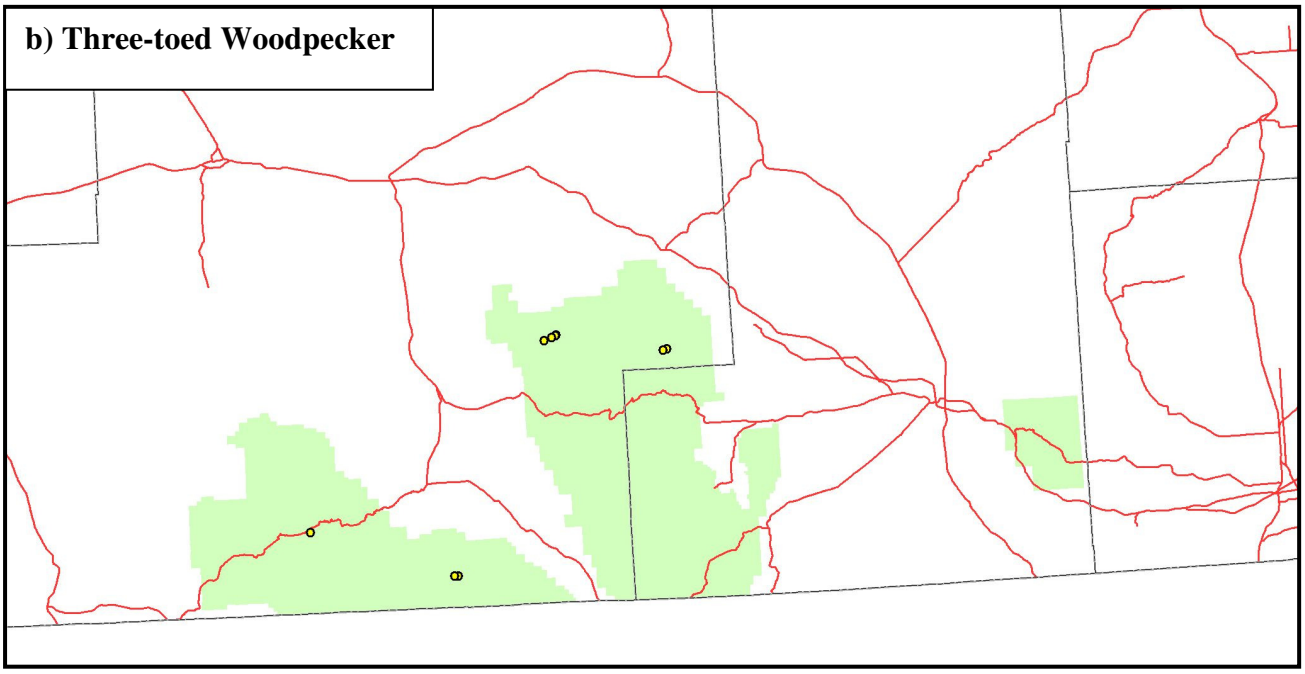
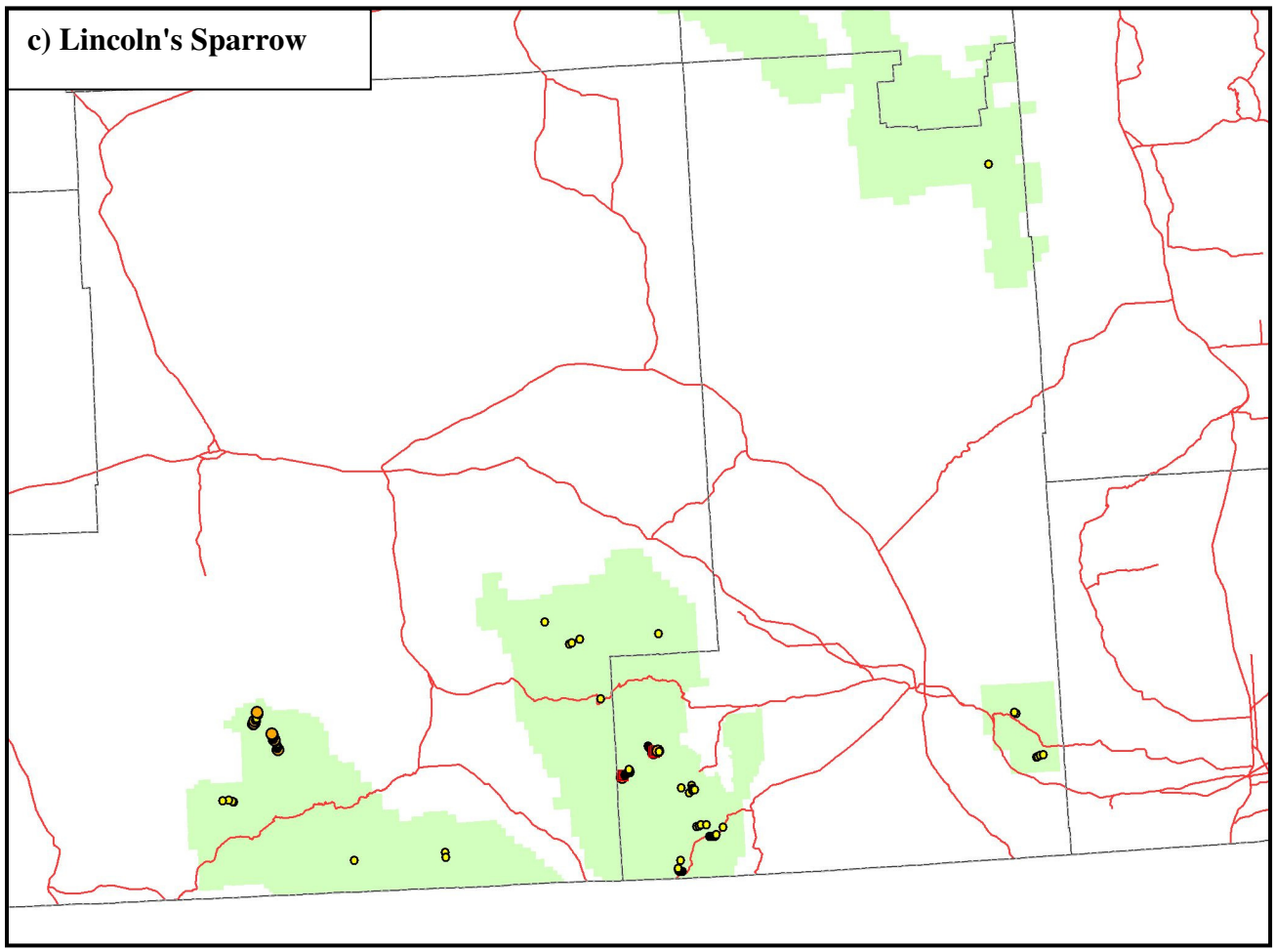


Figure 2: continued.

○ = 1 or 2 individuals, ● = 3 or 4 individuals, ■ = 5 or 6 individuals.



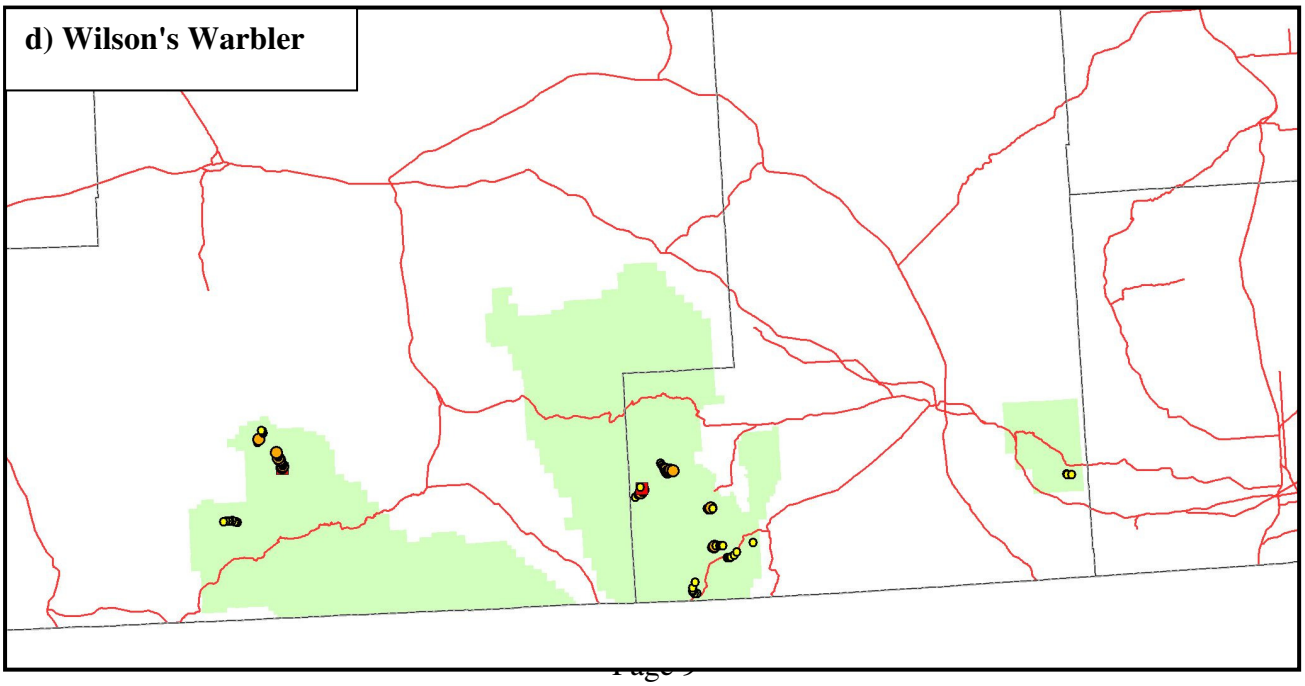


Table 1: Preliminary summary of management indicator species observed by transect, where GCKI = Golden-crowned Kinglet, LISP = Lincoln's Sparrow, TTWO = American Three-toed Woodpecker, and WIW = Wilson's Warbler.

Transect		Habitat*	GCKI	LISP	TTWO	WIWA
R01	(Sierra Madre, Big Sandstone Creek)	Riparian		5		9
R02	(Medicine Bow, Douglas Creek and Cinnibar Park)	Riparian		30		30
R03	(Medicine Bow, Horse Creek)	Riparian	2	22		18
R04	(Medicine Bow, Fox Creek and Tributary)	Riparian		5		14
R05	(Medicine Bow, Pelton Creek at WyColo)	Riparian		8		6
R06	(Medicine Bow, Woods Creek at Chimney Park)	Riparian		9		6
R07	(Medicine Bow, Lake Creek at Dry Park Road)	Riparian		8		9
R11	(Pole Mountain, Middle Crow Creek west of Granit Springs Res.)	Riparian		5		3
R14	(Sierra Madre, Savery Creek)	Riparian	3	28		9
R15	(Sierra Madre, Jack Creek)	Riparian		30		29
S03	(Medicine Bow, Porter and Woods Creeks)	Control				1
S04	(Laramie Range, Clark Draw off Murphy Canyon)	Control		1		
S05	(Pole Mountain, Bisbee Hill and Lodgepole Creek)	Control		2		
S14	(Medicine Bow, Brush Creek and Turpin Reservoir)	Control		4		
S15	(Sierra Madre, Soldier Creek and Encampment River)	Control	2			
SF08	(Medicine Bow, East Kenneday Peak and Purse Creek)	Spruce-Fir	1	1	5	
SF10	(Sierra Madre, Hog Park Northwest, Little Snake River)	Spruce-Fir	4	1		
SF11	(Sierra Madre, Hog Park Northeast, Robinson Creek)	Spruce-Fir	1			
SF17	(Medicine Bow, Trail Creek)	Spruce-Fir	1	1	5	
SF20	(Medicine Bow, Silver Lake and Sucker Lake)	Spruce-Fir		1	1	
SF22	(Medicine Bow, Snowy Range Natural Area)	Spruce-Fir	2			
SF24	(Medicine Bow, Muddy Mountain)	Spruce-Fir	3	1		
SF27	(Sierra Madre, Haskin's Creek Campground)	Spruce-Fir	4		1	
SF28	(Sierra Madre, East Fork Savery Creek and Contintental Divide)	Spruce-Fir	5			
SF29	(Sierra Madre, Billie Creek and Blackhall Mountain)	Spruce-Fir	2	2	3	
Species Total (all transects)			30	164	15	134

* This represents the primary habitat type targeted by the transect. Not all points within a given transect fall within the noted habitat. Control transects were randomly placed throughout the forest and generally contain a mixture of habitat types, which were often coniferous, dominated by lodgepole pine, and interested at least one riparian area.

Table 2: Preliminary summary of all species observed by transect.

Species	R01	R02	R03	R04	R05	R06	R07	R11	R14	R15	S03	S04	S05	S14	S15	SF01	SF08	SF10	SF11	SF17	SF20	SF22	SF24	SF27	SF28	SF29	Totals
American Crow (AMCR)																					1						1
American Goldfinch (AMGO)	3					4																					7
American Kestrel (AMKE)													1														1
American Pipit (AMPI)																					6						6
American Robin (AMRO)	12	5	1	3	5	4	1	7	6	9	2	3	8	3		4	1	4	4	1	3		1	2	1	2	92
Bald Eagle (BAEA)		3																									3
Barn Swallow (BARS)										1																	1
Black-capped Chickadee (BCCH)					2	2	1																				5
Belted Kingfisher (BEKI)	2									2																	4
Blue-gray Gnatcatcher (BGGN)	1									1							1										3
Brown-headed Cowbird (BHCO)	1	1		1	3	4	8	3		7	2	3	4														37
Black-headed Grosbeak (BHGR)																								1			1
Brown Creeper (BRCR)				1	2	2					3	1	1	3	2		4	1	4	2		2	6	4	5	4	47
Brewer's Sparrow (BRSP)											1																1
Broad-tailed Hummingbird (BTLH)	14			1	5		1	15	3	12	1		3						1			2			1		59
Black-throated Gray Warbler (BTYW)	5					1											1										7
Cassin's Finch (CAFI)									1							3	1				4	2					11
Cedar Waxwing (CEDW)					1												1										2
Chipping Sparrow (CHSP)				1	1				4		2	2	2	2	1					1						2	18
Clark's Nutcracker (CLNU)													2	2	1	3		2				3				3	16
Cordilleran Flycatcher (COFL)						2		7	4		2	3			3										1		22
Common Nighthawk (CONI)	1													1													2
Common Raven (CORA)								1	1			1							1								4
Common Snipe (COSN)	1	5	4		3	6	6		1	4																	30
Dark-eyed Junco (DEJU)		3	4	2	1	1	2		4	1	2	4		4	6	10	7	9	10	10	8	2	5	3	7	3	108
Downy Woodpecker (DOWO)	1																							1			2
Dusky Flycatcher (DUFL)	9				1	5	2	3	3	9	6	9	6						1								54
Evening Grosbeak (EVGR)																	1										1
Fox Sparrow (FOSP)										1																	1
Great Blue Heron (GBHE)	1							2		1																	4
Golden-crowned Kinglet (GCKI)			2						3						2		1	4	1	1		2	3	4	5	2	30
Great Horned Owl (GHOW)											1																1
Gray Jay (GRAJ)			7	4			2		2		1					1	1	2	2		8	2	3	3	1	3	42
Green-tailed Towhee (GTTO)	7				7			7	1	1	7		5	1				1									37
Hairy Woodpecker (HAWO)			1		1	1			1			2	1		4				1				3	2		2	19
Hermit Thrush (HETH)						1			1			1	1	4	2	8	5	6	1	9	1	1	3	5	2	4	55
Horned Lark (HOLA)													10														10
House Wren (HOWR)	6							1	1		11	13	8														40
Lark Sparrow (LASP)	1																										1
Lincoln's Sparrow (LISP)	5	30	22	5	8	9	8	5	28	30		1	2	4			1	1		1	1		1			2	164
Mallard (MALL)		1		2	1		5			2																	11
MacGillivray's Warbler (MGWA)						2		3	6	4	2		1							1							19
Mountain Bluebird (MOBL)	2	3	2					1			4	1	4		1	1		3								2	24
Mountain Chickadee (MOCH)			2	6	4	2	1	1	4		4	3		3	5	8	3	14	7	7	3	3	5	6	5	9	105
Mourning Dove (MODO)																1											1

Table 1 continued

Species	R01	R02	R03	R04	R05	R06	R07	R11	R14	R15	S03	S04	S05	S14	S15	SF01	SF08	SF10	SF11	SF17	SF20	SF22	SF24	SF27	SF28	SF29	Totals
Northern Flicker (NOFL)	2	1				2	3				3	1	3	2	4		1		2		1			2			27
Northern Goshawk (NOGO)						1																					1
Northern Rough-winged Swallow (NRWS)	2																										2
Orange-crowned Warbler (OCWA)									1		1																2
Olive-sided Flycatcher (OSFL)		1							2									1	2	5							11
Pine Grosbeak (PIGR)															2	1		4		2	1			1		1	12
Pine Siskin (PISI)	5		3	2	1			1	5	5	7	7	1		3	4	7	9	7	1	1		4	3	7	1	84
Plumbeous Vireo (PLVI)								1				2															3
Pygmy Nuthatch (PYNU)												6	1														7
Red-breasted Nuthatch (RBNU)	1		1	1				1	1		1	4	2		1		6	1	1	2	1	1	1	6	1	2	35
Ruby-crowned Kinglet (RCKI)	4	3	7	8	12	14	13	1	12	5	6	2	3	14	6	14	13	7	23	13	15	8	13	12	9	17	254
Red Crossbill (RECR)									1		1	6	1		3	4		2		3					5	1	27
Red-naped Sapsucker (RNSA)	1	2		4	2	4			1	2		1	1				5						1				24
Rock Wren (ROWR)	1										1																2
Red-tailed Hawk (RTHA)	2				2																						4
Red-winged Blackbird (RWBL)					1	1		1																			3
Sandhill Crane (SACR)	1																										1
Say's Phoebe (SAPH)																			1								1
Savannah Sparrow (SAVS)	1																										1
Sora (SORA)														1													1
Song Sparrow (SOSP)	9				1			27	1	1																	39
Spotted Sandpiper (SPSA)	4	9				1		4						3													21
Spotted Towhee (SPTO)	1																										1
Sharp-shinned Hawk (SSHA)																								1			1
Steller's Jay (STJA)				2							1																3
Swainson's Thrush (SWTH)	1														1			1		1							4
Townsend's Solitaire (TOSO)	1										1	4	1		3	1		6									17
Three-toed Woodpecker (TTWO)																	5			5	1			1		3	15
Turkey Vulture (TUVU)	1																										1
Veery (VEER)						1																		1			2
Vesper Sparrow (VESP)	2												2														4
Violet-green Swallow (VGSW)	1						1	1	3	4		2															12
Virginia's Warbler (VIWA)												1															1
Warbling Vireo (WAVI)	6			4		2			1	8	4	5	6		3		5		6		1	1	1	3		1	57
White-breasted Nuthatch (WBNU)											1					1		1						1	1		5
White-crowned Sparrow (WCSP)	2	14	8		3		4			7						1					2						41
Western Bluebird (WEBL)		3																									3
Western Kingbird (WEKI)	1																										1
Western Tanager (WETA)									2		2	10	1		7		2	3	15		1			6	2	1	52
Western Wood-Pewee (WEWP)	1			1	1	1			5		1	1		1	3									1			16
Williamson's Sapsucker (WISA)												1			1												2
Wilson's Warbler (WIWA)	9	30	18	14	6	6	9	3	9	29	1																134
Yellow Warbler (YEWA)	3							23		1	1		1														29
Yellow-rumped Warbler (YRWA)	2	4	8	6		5	1	4	4	1	5	18	12	10	10	20	10	11	8	20	7	11		4	6	6	193
Transect Totals	136	118	90	68	74	84	68	123	122	148	88	118	94	58	74	85	82	93	98	85	66	40	50	73	59	71	2265

APPENDIX: DIGITAL FILES

The CD-ROM on the inside, back cover of this report contains an electronic version of the Leukering et al. (2004) report describing the detailed methods recommended by the Rocky Mountain Bird Observatory for conducting avian point count transects. It also contains the data collected for this project. In the folder labeled "Shapefiles," there is one shapefile for each transect, which contains all the observations recorded on that transect. The attribute table of each shapefile contains the following fields:

1. Transect: The transect code and point number at which the observation was made (e.g., R01-3 represents the third point of riparian transect number 1).
2. X: The X-coordinate, or UTM Easting, of the point in question (Zone 13, NAD 1927)
3. Y: The Y-coordinate, or UTM Northing, of the point in question (Zone 13, NAD 1927)
4. Species: The four letter species code of the species observed.
5. Dist_M: Approximate distance, in meters, that the species was observed from the location of the point count.
6. How: The method used to make the observation, as described in Leukering et al. 2005. In general, F = flyover, S = song, C = call, V = visual, D = drumming, O = other.
7. Cluster: Whether the observation was part of a cluster of birds (yes or no).
8. Size: If the observation was part of a cluster, this size of the cluster in number of birds.
9. Betw_pts: If the observation was taken between point counts (yes) or at a point count (no).
10. Bearing: If the observation was made between point counts, the bearing from the transect line at which the observation was made, as discussed in Leukering et al. 2005.