

INVENTORY OF BREEDING BIRDS AT PEA RIDGE NATIONAL MILITARY PARK, ARKANSAS, 1999

by

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June 2000

Report to:

National Park Service, Midwest Regional Office
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INTRODUCTION

Pea Ridge National Military Park (PERI) in Benton County, Arkansas, commemorates the Civil War Battle of Pea Ridge that occurred in 1862. The site was authorized as a National Park Service (NPS) unit in 1956; most of the open area was in pasture and crops when it was acquired. Of the 1,740 hectares currently managed by NPS, 254 ha are in open fields of which 243 ha are leased to farmers for red fescue (*Festuca rubra*) hay, and 1,395 ha are forested. The remaining area is developed (visitor center, etc.) Currently there are 2.4 ha of restored prairie, with plans for 16-20 ha more (Zack Holden, personal communication). Long-term management plans for the park include the reestablishment of native prairie based on historical information from the time of the battle.

Two previous studies were conducted on the avian community at PERI in 1967 and 1972; however, neither study provided a comprehensive inventory of bird species (Shugart and James 1973, Posey 1974). The availability of habitats and surrounding landscape at PERI has changed since 1967, thus little is known about the current status of bird species that use PERI, particularly threatened and endangered (T&E) species. Grassland birds have shown greater declines than any other guild of North American bird species (Sauer et al. 1999). Species richness of grassland-associated birds at PERI is expected to be low, due to the management of grasslands as non-native grasses and the small areas of grassland within the park. However, the grassland bird species that could potentially use the park need to be evaluated. Like grassland birds, many species of neotropical migratory birds have declined in this region over the past 30 years (Sauer et al 1999). The forested areas of the park likely provide important habitat for neotropical migrants.

The information collected by this avian inventory at PERI will form the baseline data for comparison of breeding birds associated with future habitat changes, and enable resource managers to evaluate whether their projects result in increased avian diversity and abundance. In

addition, recommendations for improving habitat for selected T&E species and species of special concern can be made to resource managers based on the findings of this baseline inventory.

Finally, an inventory of species within declining guilds such as grassland birds and neotropical migrants will assist in the assessment of avian habitat quality at PERI.

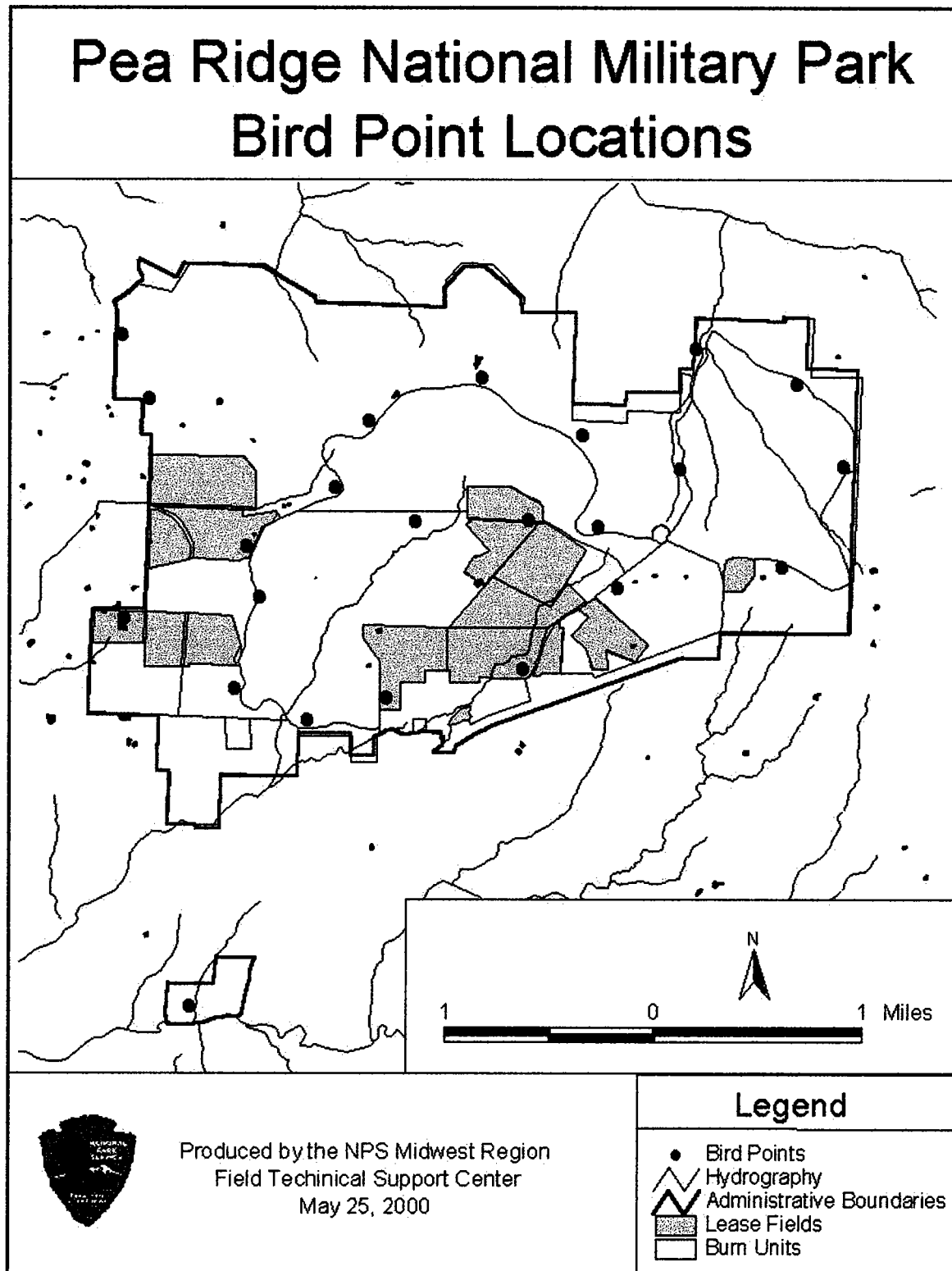
Objectives

1. Collect baseline data on breeding birds that use PERI.
2. Establish permanent sampling points and procedures at PERI that can be used for future monitoring.
3. Determine the relative abundance of breeding birds at PERI.
4. Determine the presence of rare bird species (listed as Threatened or Endangered (T&E) by the federal government or State of Arkansas) at PERI.

METHODS

Breeding birds were censused using the point count method described in Ralph et al. (1993, 1995). Point counts are a standard method used to monitor populations of breeding birds by the U.S. Forest Service and U.S. Fish and Wildlife Service (Ralph et al. 1993, Peterjohn 1994). We established 23 point-count locations along existing park roads and trails at PERI (Fig. 1). Points along the roads were a minimum of 0.5 mile apart. We recorded all birds seen or heard within a five-minute period. Each point was censused twice, once during 17-18 May and once during 4-6 June, 1999. We estimated the distance to each stationary bird and recorded birds flying overhead. In addition, we indicated whether birds were identified within 0-3 or 3-5 minutes from initiation of the count. Only trained observers proficient at bird identification by sight and sound performed counts. We started counts within one-half hour of local sunrise and ended no later than 0930. Counts were not conducted in rain, high wind, or other inclement weather that could affect our detection of birds. Raptors, swallows, nightjars, and waterbirds were noted but

Figure 1. Locations of bird points at Pea Ridge National Military Park, Arkansas, 1999.



not included in quantitative data because our methods were not appropriate to census these species (Ralph et al. 1995). Herein, we calculate relative abundance as the total number of individuals per species within a 100-m radius divided by the grand total of all individuals of all species. We also conducted informal censuses by slowly walking through the habitats within the park listening and watching for rare and T&E species. Any evidence of breeding observed within the park (e.g. nest building, food gathering, and presence of fledglings) was documented.

We recorded the location of each point using a Global Positioning System (GPS). GPS will allow others to relocate and use our points in future monitoring. In addition, GPS locations will allow analysis using spatial databases. Data on point locations and their attributes will be submitted to the NPS data manager and appended to this report.

RESULTS

Breeding Birds

We found 70 species of birds at PERI from May through August 1999. These included 32 neotropical migrants and 7 grassland-associated species (Table 1). Most of the species were probable breeders at PERI, except American Coot, Cedar Waxwing, Hermit Thrush, Rose-breasted Grosbeak, American Tree Sparrow, and Song Sparrow. Data from the USGS Breeding Bird Survey (BBS) indicate that some of the species we found at PERI have shown significant declines within the Ozark-Ouachita Plateau over the past 18 years (Table 1; Sauer et al. 1999). These include Yellow-billed Cuckoo, Eastern Kingbird, Eastern Towhee, Eastern Meadowlark, Red-winged Blackbird, Brown-headed Cowbird, and Common Grackle.

We recorded 497 individual birds of 46 species during point counts at PERI in May and June 1999 (Table 2, Appendix B). Most of the species we recorded at point counts were probable breeders at PERI except the Rose-breasted Grosbeak, which was probably a transient

Table 1. Species list and population trends for birds found at Pea Ridge National Military Park, Arkansas, 1999. Population trends are for the Ozark-Ouachita Plateau physiographic region of the Breeding Bird Survey (BBS), 1980-1999 (Sauer et al. 1999). Neotropical migrants are in bold and grassland-associated species are shaded. * = $P < 0.05$, ** = $P < 0.01$.

Common Name	Alpha	Scientific Name	Trend
Great Blue Heron	GBHE	<i>Ardea herodias</i>	2.3
American Coot	AMCO	<i>Fulica americana</i>	N/A
Turkey Vulture	TUVU	<i>Cathartes aura</i>	4.8**
Northern Harrier	NOHA	<i>Circus cyaneus</i>	N/A
Broad-winged Hawk	BWHA	<i>Buteo platypterus</i>	5.5
Great-horned Owl	GHOW	<i>Bubo virginianus</i>	-5.2
Wild Turkey	WITU	<i>Meleagris gallopavo</i>	-3.4
Mourning Dove	MODO	<i>Zenaida macroura</i>	1.4
Yellow-billed Cuckoo	YBCU	<i>Coccyzus americanus</i>	-2.6**
Ruby-throated Hummingbird	RTHU	<i>Archilochus colubris</i>	3.9*
Downy Woodpecker	DOWO	<i>Picoides pubescens</i>	1.0
Pileated Woodpecker	PIWO	<i>Dryocopus pileatus</i>	0.4
Red-bellied Woodpecker	RBWO	<i>Melanerpes carolinus</i>	0.2
Scissor-tailed Flycatcher	STFL	<i>Tyrannus forficatus</i>	0.3
Eastern Kingbird	EAKI	<i>Tyrannus tyrannus</i>	-2.3**
Great Crested Flycatcher	GCFL	<i>Myiarchus crinitus</i>	-0.7
Eastern Phoebe	EAPH	<i>Sayornis phoebe</i>	2.1
Eastern Wood-Pewee	EAWP	<i>Contopus virens</i>	1.4
Acadian Flycatcher	ACFL	<i>Empidonax virescens</i>	2.2
Barn Swallow	BARS	<i>Hirundo rustica</i>	-2.2
Northern Rough-winged Swallow	NRWS	<i>Stelgidopteryx serripennis</i>	-1.2
Blue Jay	BLJA	<i>Cyanocitta cristata</i>	-1.3
American Crow	AMCR	<i>Corvus brachyrhynchos</i>	1.6**
Eastern Tufted Titmouse	ETTI	<i>Baeolophus bicolor</i>	0.7
Carolina Chickadee	CACH	<i>Poecile carolinensis</i>	-1.2
White-breasted Nuthatch	WBNU	<i>Sitta carolinensis</i>	2.4
Carolina Wren	CAWR	<i>Thryothorus ludovicianus</i>	6.2**
Blue-gray Gnatcatcher	BGGN	<i>Poliophtila caerulea</i>	0.6
Eastern Bluebird	EABL	<i>Sialia sialis</i>	1.4
Wood Thrush	WOTH	<i>Hylocichla mustelina</i>	2.8**
Hermit Thrush	HETH	<i>Catharus guttatus</i>	N/A
American Robin	AMRO	<i>Turdus migratorius</i>	-1.0
Brown Thrasher	BRTH	<i>Toxostoma rufum</i>	-4.7**

Common Name	Alpha	Scientific Name	Trend
Northern Mockingbird	NOMO	<i>Mimus polyglottos</i>	-0.1
Cedar Waxwing	CEWA	<i>Bombycilla cedrorum</i>	15.5
Red-eyed Vireo	REVI	<i>Vireo olivaceus</i>	4.5**
White-eyed Vireo	WEVI	<i>Vireo griseus</i>	0.4
Warbling Vireo	WAVI	<i>Vireo gilvus</i>	1.0
Black-and-White Warbler	BAWW	<i>Catharopeza varia</i>	-0.9
Blue-winged Warbler	BWWA	<i>Vermivora pinus</i>	1.9
Northern Parula	NOPA	<i>Parula americana</i>	4.5**
Pine Warbler	PIWA	<i>Dendroica pinus</i>	1.6
Ovenbird	OVEN	<i>Limnothlypis aurocapillus</i>	0.0
Kentucky Warbler	KEWA	<i>Seiurus formosus</i>	-1.1
Louisiana Waterthrush	LOWA	<i>Seiurus motacilla</i>	-2.3
Common Yellowthroat	COYE	<i>Geothlypis trichas</i>	-1.8
Yellow-breasted Chat	YBCH	<i>Zeledonia virens</i>	-0.8
Rose-breasted Grosbeak	RBGR	<i>Pheucticus ludovicianus</i>	N/A
Northern Cardinal	NOCA	<i>Cardinalis cardinalis</i>	0.7
Blue Grosbeak	BLGR	<i>Guiraca caerulea</i>	-1.2
Indigo Bunting	INBU	<i>Passerina cyanea</i>	0.1
Eastern Towhee	EATO	<i>Pipilo erythrophthalmus</i>	-3.6**
Grasshopper Sparrow	GRSP	<i>Ammodramus savannarum</i>	-3.2
American Tree Sparrow	ATSP	<i>Spizella arborea</i>	N/A
Chipping Sparrow	CHSP	<i>Spizella passerina</i>	1.8
Field Sparrow	FISP	<i>Spizella pusilla</i>	-0.7
Dickcissel	DICK	<i>Spiza americana</i>	-1.6
Eastern Meadowlark	EAME	<i>Sturnella magna</i>	-3.2**
European Starling	EUST	<i>Sturnus vulgaris</i>	-1.7
Red-winged Blackbird	RWBL	<i>Agelaius phoeniceus</i>	-3.6**
Brown-headed Cowbird	BHCO	<i>Molothrus ater</i>	-2.5**
Common Grackle	COGR	<i>Quiscalus quiscula</i>	-3.8**
Scarlet Tanager	SCTA	<i>Piranga olivacea</i>	1.6
Summer Tanager	SUTA	<i>Piranga rubra</i>	0.4
Baltimore Oriole	BAOR	<i>Icterus galbula</i>	3.5
American Goldfinch	AMGO	<i>Carduelis tristis</i>	1.3

Table 2. Total birds and species relative abundance (percent of total) found within 23 point-count locations at Pea Ridge National Military Park, Arkansas, 1999, and population trends for each species (Ozark-Ouachita Plateau, Breeding Bird Survey). * = $P < 0.05$, ** = $P < 0.01$.

Common Name	Total Birds	Relative Abundance (%)	Percent Change 1966-1998
Wild Turkey	1	0.20	9.2
Yellow-billed Cuckoo	2	0.40	-0.2
Ruby-throated Hummingbird	1	0.20	1.6
Downy Woodpecker	3	0.60	0.8
Pileated Woodpecker	1	0.20	-2.2**
Red-bellied Woodpecker	6	1.21	-0.5
Eastern Kingbird	3	0.60	-0.9
Great Crested Flycatcher	10	2.01	-1.4
Eastern Phoebe	1	0.20	1.9*
Eastern Wood-Pewee	14	2.81	-0.8
Acadian Flycatcher	5	1.00	-0.4
Blue Jay	10	2.01	-1.2*
American Crow	15	3.01	1.6**
Eastern Tufted Titmouse	24	4.82	-0.7
Carolina Chickadee	9	1.81	-1.2
White-breasted Nuthatch	4	0.80	1.2
Blue-gray Gnatcatcher	48	9.64	-0.3
Carolina Wren	12	2.41	1.3
Eastern Bluebird	5	1.00	0.6
American Robin	4	0.80	1.1
Northern Mockingbird	1	0.20	-1.1
Red-eyed Vireo	35	7.03	1.4
White-eyed Vireo	9	1.81	-0.6
Black-and-white Warbler	4	0.80	-0.7
Blue-winged Warbler	5	1.00	2.9
Northern Parula	16	3.21	0.2
Pine Warbler	1	0.20	0.3
Ovenbird	4	0.80	-3.1**
Kentucky Warbler	2	0.40	-1.5
Common Yellowthroat	3	0.60	-0.9
Yellow-breasted Chat	22	4.42	-0.7

Common Name	Total Birds	Relative Abundance (%)	Percent Change 1966-1998
Rose-breasted Grosbeak	2	0.40	--
Northern Cardinal	26	5.22	0
Blue Grosbeak	1	0.20	0.7
Indigo Bunting	35	7.03	0.1
Eastern Towhee	16	3.21	-2.3**
Grasshopper Sparrow	1	0.20	0.7
Field Sparrow	20	4.02	-2.8**
Dickcissel	27	5.42	-1.6
Eastern Meadowlark	16	3.21	-1.4
Red-winged Blackbird	13	2.61	-0.5
Brown-headed Cowbird	34	6.83	-1.4**
Common Grackle	4	0.80	0
Scarlet Tanager	1	0.20	0
Summer Tanager	9	1.81	0
American Goldfinch	10	2.01	0.4
GRAND TOTAL	497		

(James and Neal 1986). Blue-gray Gnatcatcher was the most abundant species at PERI (Table 2, Figure 2). Of the most abundant breeding birds at PERI, Blue-gray Gnatcatcher, Indigo Bunting, Northern Cardinal, Eastern Tufted Titmouse, Yellow-breasted Chat, and Field Sparrow are all species associated with forest edges and are common in Arkansas. Three grassland-associated species; Dickcissel, Field Sparrow, and Eastern Meadowlark were among the ten most abundant species (Figure 2). Field Sparrow populations have experienced significant declines in the Ozark-Ouachita Plateau since 1966 (Table 2).

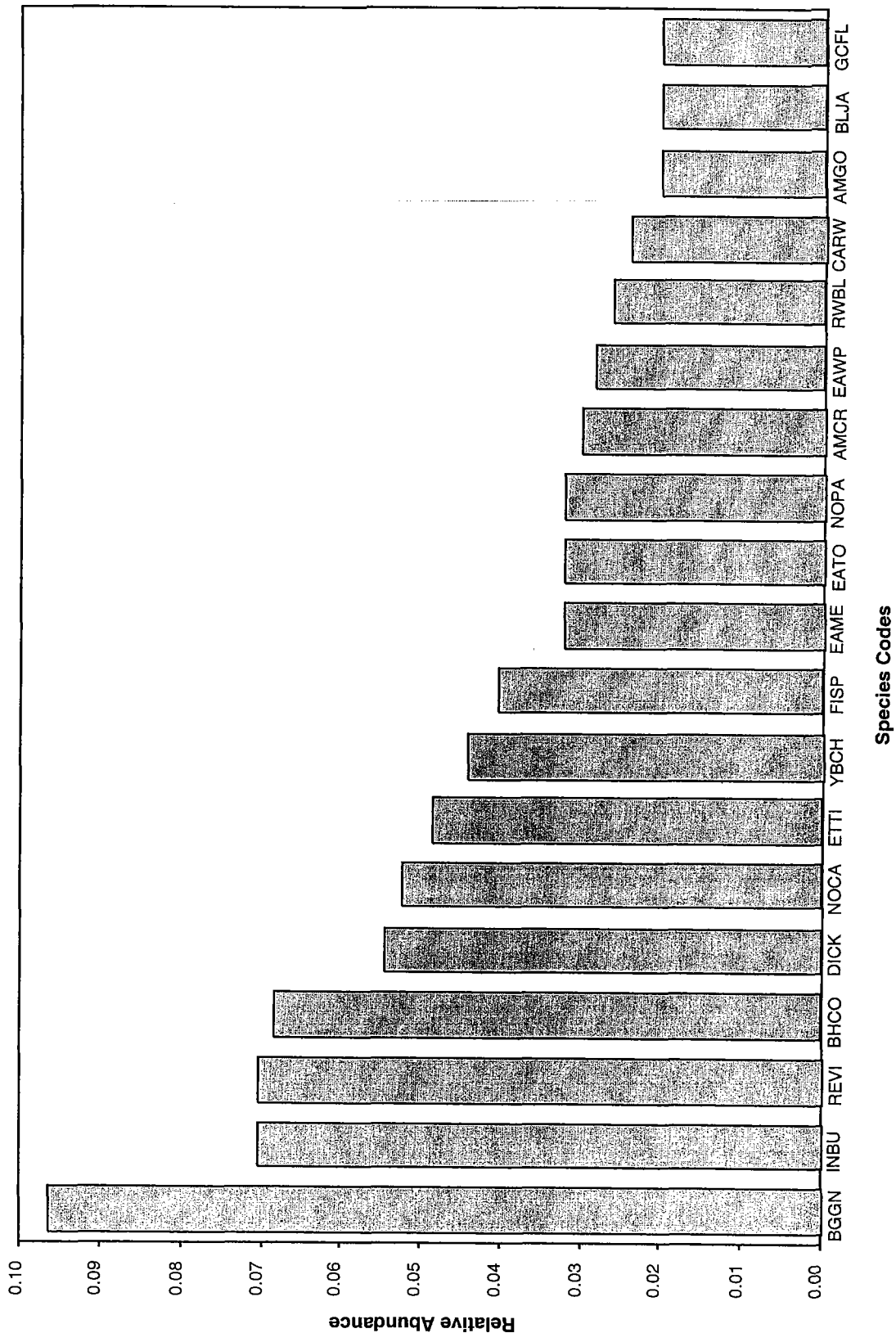
Species of Special Concern

We did not find any state or federal T&E species at PERI during our inventory. Although Bald Eagles (*Haliaeetus leucocephalus*) are frequently seen in northwest Arkansas in the winter, our study was conducted during spring months. Most spring sightings of eagles in Arkansas are associated with nesting birds in southern portions of the state (James and Neal 1986).

DISCUSSION

The species we found at PERI were all typical of northwestern Arkansas (Howell 1911, Wheeler 1924, James and Neal 1986). We found a similar number of species at PERI as those found in 1967 (Shugart and James 1973). Differences in species composition between our inventory and their research may be due to differences in methodology. We used point counts distributed throughout the park, while they used variable-sized sample plots (spot mapping) distributed among different habitat types. In addition, the availability of habitats and surrounding landscape at PERI has changed since 1967. For example, thirty years ago there were broom sedge (*Andropogon virginicus*) and blue grass (*Poa* spp.) fields and early successional areas dominated by persimmon (*Diospyros virginiana*) (Shugart and James 1973).

Figure 2. Relative abundance (percent of total) of the 19 most common bird species found at Pea Ridge National Military Park, Arkansas, 1999. See Table 1 for species codes.



The greatest change in habitat over the thirty-year period has been in old field habitats, most of which have been converted to fescue grass (*Festuca* sp.). In addition, the land surrounding PERI was primarily agricultural in 1967, but now is bordered by residential areas to the north. Much of the Oak-Hickory forest, however, remains in late successional stages.

Two of the most abundant species (ranked 6 and 7) found in 1967, Northern Bobwhite (*Colinus virginianus*) and Prairie Warbler (*Dendroica discolor*), were not found at PERI in 1999. Both species were found in 1972, but we do not know what their relative abundance within all of PERI was at that time, other than they were abundant within old field habitats (Posey 1974). Other species found in 1967 but not found in this study were Loggerhead Shrike (*Lanius ludovicianus*), Hairy Woodpecker (*Dendrocopus villosus*), Bells' Vireo (*Vireo bellii*), Painted Bunting (*Passerina caerulea*), Greater Roadrunner (*Geococcyx californicus*), Gray Catbird (*Dumetella carolinensis*), Worm-eating Warbler (*Helmitheros vermivorus*), Cerulean Warbler (*Dendroica cerulea*), and American Redstart (*Setophaga ruticilla*). Northern Bobwhite populations have declined in northwest Arkansas during the past 30 years (Sauer et al. 1999) as hedge rows and old fields have disappeared (D. A. James, personal communication). Most of the species found in 1967 but not during this inventory were associated with brushy habitats, i.e., Northern Bobwhite, Bell's Vireo, Painted Bunting, Prairie Warbler, and Gray Catbird. Loggerhead Shrike, Greater Roadrunner, Worm-eating Warbler, and Cerulean Warbler are currently present in northwestern Arkansas but in low numbers. Of the species we did not find at PERI, Northern Bobwhite, Loggerhead Shrike, Bell's Vireo, Gray Catbird, and Prairie Warbler have all shown significant ($P < 0.05$) negative population trends in the Ozark-Ouachita Plateau BBS from 1980-1999 (Sauer et al. 1999).

In contrast, Blue-gray Gnatcatcher, Northern Cardinal, Eastern Tufted Titmouse, Yellow-breasted Chat, Field Sparrow, Eastern Meadowlark, and Eastern Towhee were among the 10 most abundant species in 1967 (Shugart and James 1973) and 1999 (present inventory). Indigo

Bunting, however, was the second most abundant species in 1999, but was not among the 10 most abundant species found in 1967. We found that Brown-headed Cowbirds were abundant in 1999 but none were found at PERI in 1967. Brown-headed Cowbirds were, however, present in 1972 (Posey 1974).

Species that are active primarily at night are not adequately sampled by point count methods. These include species in the nightjar family that are common in northwest Arkansas, i.e., Common Nighthawk (*Chordeiles minor*), Chuck-Will's Widow (*Caprimulgus carolinensis*), and Whip-poor-will (*Caprimulgus vociferus*). Likewise, owls are not adequately sampled with point counts. We suspect that owls and nightjars are present at PERI although we did not observe many during this study.

Not surprisingly, we did not find T&E species, or species that are rare in Arkansas at PERI. For example, PERI is not appropriate habitat for the endangered Red-cockaded Woodpeckers (*Picoides borealis*), whose range is in the southern portions of Arkansas where there are large stands of loblolly and shortleaf pines (James and Neal 1986). Cerulean Warbler is rare in this area and is usually associated with large tracts of mature bottomland forest, and Swainson's Warbler (*Limnothlypis swainsonii*) is usually associated with canebrake habitats. Likewise, Bachman's Sparrow (*Aimophila aestivalis*) is associated with young pine plantations in the Ouachitas and Coastal Plain regions of the state (James and Neal 1986).

ACKNOWLEDGMENTS

We thank Stephen Adams (former Superintendent, PERI), Robert Still, and Zack Holden of the NPS for making this study possible. We also thank Amy Hardwick for her assistance in the field and with data entry. Gary Willson, Dan Licht, and Doug James proved helpful comments on drafts of this report.

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Appendix A. GPS locations of bird points at PERI, 1999.

Point	Easting	Northing	Error (m)	Habitat Type
1	407899	4033509	4.6	Fescue
2	407579	4035735	5.4	Oak-Cedar
3	408479	4034593	11	Oak-Hickory
4	408355	4035302	6	Oak-Hickory
5	408621	4034130	7.3	Grass
6	406716	4035406	6.9	Grass
7	406451	4034897	8.2	Cedar
8	405768	4034444	7	Grass
9	407073	4034633	6	Burned Grass
10	407946	4034642	4.3	Fescue
11	406849	4033285	5.9	Fescue
12	406245	4033114	8	Hickory-Dogwood
13	405685	4033359	5.8	Burned Sumac
14	405873	4034057	6.9	Grass
15	405017	4035578	7.5	Grass
15	409103	4035039	6.3	Oak-Hickory
16	409895	4034285	8.3	Cedar-Oak
17	410367	4035054	8.5	Maple-Cedar
18	410005	4035691	5.8	Oak-Hickory
19	409221	4035956	7.7	Oak-Dogwood
20	405344	4030920	14	Walnut-Oak
21	404833	4033899	6.5	Fescue
23	404811	4036072	5.6	Maple-Cedar

Appendix B. Number of birds found within each point count at Pea Ridge National Military Park, Arkansas, 1999.

Species	Point																							Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Wild Turkey																					1			1
Yellow-billed Cuckoo															1					1				2
Ruby-throated Hummingbird																						1		1
Downy Woodpecker																		1	2					3
Pileated Woodpecker																			1					1
Red-bellied Woodpecker			1													2	1	1		1				6
Eastern Kingbird	3																							3
Great Crested Flycatcher						1	3	1								2			3					10
Eastern Phoebe							1																	1
Eastern Wood-pewee			4	2					1		3				1		1	1		1				14
Acadian Flycatcher																	2	1		2				5
Barn Swallow																					1			1
Northern Rough-winged Swallow																				1				1
Blue Jay			1							4	2				1	1		1						10
American Crow	1						4				2					1			2		1	4		15
Eastern Tufted Titmouse		2					1	1			2	1	1		2	3	3	3	5					24
Carolina Chickadee		1						1			3									3		1		9
White-breasted Nuthatch			1																1	2				4
Blue-gray Gnatcatcher		2		4			11	1			1	2			6		6	3	3	5			4	48
Carolina Wren	2											1		1					1	7				12
Eastern Bluebird										3			2											5
American Robin	2					1	1																	4
Northern Mockingbird																					1			1
Red-eyed Vireo	1					1	1	2	1		1	1	1	1	7	3	5	3	5	2				35
White-eyed Vireo		3					2		2										1				1	9
Black-and-white Warbler							2					1											1	4
Blue-winged Warbler											3			1						1				5
Northern Parula											1	1		2	4		2		5	1				16
Pine Warbler							1																	1

Species	Point																							Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Ovenbird															2				2					4
Kentucky Warbler																1			1					2
Common Yellowthroat																				1		2		3
Yellow-breasted Chat							1		4		1	3		2								9	2	22
Rose-breasted Grosbeak												1					1							2
Northern Cardinal	1	2			2	1	4	1	1			1	1	1	2	1				4			4	26
Blue Grosbeak		1																						1
Indigo Bunting		3			2	3	2		5		1	1	4	3		3			2	2		3	1	35
Eastern Towhee							3	1	4			1	1	1		1						3	1	16
Grasshopper Sparrow									1															1
Field Sparrow						1	3	3	1		1		4	2								2	3	20
Dickcissel	9							5		7	2										4			27
Eastern Meadowlark	7							1		6											2			16
Red-winged Blackbird																					13			13
Brown-headed Cowbird	2	1	1			1	1	1	2	8	2	2	3	6				2			2			34
Common Grackle																					4			4
Scarlet Tanager									1															1
Summer Tanager	1		1			1	1		1				2				1	1						9
American Goldfinch									7		2											1		10
Total per point	29	15	9	6	4	10	42	18	31	28	24	19	19	20	26	18	22	17	34	33	28	23	22	497