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Natural Resource Program Center

Bird Monitoring at Pea Ridge National Military Park, Arkansas
2008 Status Report

Natural Resource Technical Report NPS/HTLN/NRTR—2009/194

ON THE COVER
Bird habitat at Pea Ridge National Military Park
Photo from Heartland Network Files

Bird Monitoring at Pea Ridge National Military Park, Arkansas
2008 Status Report

Natural Resource Technical Report NPS/HTLN/NRTR—2009/194

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National Park Service
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Executive Summary

During 2008, the Heartland I&M Network and Prairie Cluster Prototype Monitoring Program (HTLN) initiated breeding bird surveys on Pea Ridge National Military Park, Arkansas (PERI) to address two objectives. The first is to monitor changes in bird community composition and abundance. The second is to monitor the responses of bird communities to changes in habitat structure and other habitat variables related to management activities. This report provides plot-specific, habitat-specific, and park-wide baseline data on populations and breeding habitat of birds at PERI. Sixty-three species of birds were recorded during site visits in May. The Yellow-throated vireo (*Vireo flavifrons*) was the most commonly occurring species during the breeding season based on both the mean number of individuals per plot and the proportion of plots they occupied. The Indigo bunting (*Passerina cyanea*) and Northern cardinal (*Cardinalis cardinalis*) had slightly more individuals per plot visited. But, the Yellow-throated vireo occupied more plots across the park. The Summer tanager (*Piranga rubra*), Eastern wood-pewee (*Contopus virens*), (Eastern) Tufted titmouse (*Parus bicolor*), Northern parula (*Parula americana*), Field sparrow (*Spizella pusilla*), and Blue-gray gnatcatcher (*Polioptila caerulea*) were moderately abundant. Partners in Flight, a coalition of agencies and individuals whose mission it is to conserve North America's declining bird populations, classify sixteen species found at PERI as species of continental importance. Species richness for birds in the grassland habitat of the monument is similar to those reported elsewhere. Three grassland obligate species were recorded, the Eastern meadowlark (*Sturnella magna*), Grasshopper sparrow (*Ammodramus savannarum*), and Henslow's sparrow (*Ammodramus henslowii*). Species richness in the woodland habitat, however, was lower than values reported elsewhere. No interior woodland obligates were recorded. Deciduous woodlands (1279.7 ha) dominate the bird habitat at PERI, with 76% of the plots located in this habitat type; 24% of the plots are located in habitat dominated by various grassland types and old fields (414.9 ha combined).

Plot-specific population information and habitat conditions during the breeding season of 2008 will aid natural resource staff in planning management actions that may affect various bird populations. With this report, park staff will be able to better plan management objectives, and future monitoring will aid in assessing their effectiveness. Monitoring data also provides park staff with additional information useful for interpreting natural resources.

Acknowledgements

We would like to thank the staff of Pea Ridge National Military Park, Arkansas for allowing us access to the memorial during our site visits.

Introduction

Birds are an important component of park ecosystems, as their high body temperature, rapid metabolism, and high ecological position in most food webs make them good indicators of the effects of local and regional changes in ecosystems. It has been suggested that management activities aimed at preserving habitat for bird populations, such as neotropical migrants, can have the added benefit of preserving entire ecosystems and their attendant ecosystem services (Karr 1991, Maurer 1993). Moreover, birds have a tremendous following among the public and many parks provide information on the status and trends of birds through their interpretive programs.

Topography of the Ozark/Ouachita physiographic area in northwestern Arkansas is dissected, with local relief over 100 meters common (Fitzgerald and Pashley 2000). However, broad flat ridges can be found throughout. The landscape historically contained a habitat of oak-hickory forest with a prairie grass understory in ravines and grass savanna habitat on ridges. Today the landscape has been altered through road construction, housing, and infrastructure development to accommodate the burgeoning population of the area. Over 115 bird species nest in the Ozark/Ouachita physiographic area (Fitzgerald and Pashley 2000). Widespread habitat loss to urban and industrial development threatens the integrity of this physiographic area for birds, especially in northwestern Arkansas.

Data collected during the U.S. Geological Survey's annual North American Breeding Bird Surveys (BBS) between 1966 and 2007 indicate that a number of bird species in the Ozark/Ouachita physiographic area show evidence of population declines (Sauer et al. 2008). Species such as the American redstart (*Setophaga ruticilla*), Bell's vireo (*Vireo bellii*), Common nighthawk (*Chordeilis minor*), Loggerhead shrike (*Lanius ludovicianus*), Prairie warbler (*Dendroica discolor*), Rose-breasted grosbeak (*Pheucticus ludovicianus*), and Yellow warbler (*Dendroica petechia*) have declined at alarming rates. Partners in Flight (PIF) have designated 33 species as species of conservation priority for the physiographic area because of declining numbers and habitat loss.

We will use trends in the composition and abundance of bird populations as long-term indicators of ecosystem integrity in the grassland and woodland habitats of Pea Ridge National Military Park, Arkansas (PERI). Ecosystem integrity is defined as the system's capability to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitat of the region (Karr and Dudley 1981). Research has demonstrated that birds serve as good indicators of changes in ecosystems (Cairns et al. 2004, Mallory et al. 2006, Wood et al. 2006). Therefore, changes in the numbers and composition of bird communities in the grasslands and woodlands may reflect the effectiveness of management in restoring and maintaining these communities at PERI. Bird monitoring, initiated in 2008, will aid in assessing the success of management efforts. Long-term trends in community composition and abundance of breeding bird populations provide one measure for assessing the ecological integrity and sustainability of this system.

Objectives

There are two primary objectives for monitoring breeding birds at Pea Ridge National military Park:

- Identify significant temporal changes in the species composition and abundance of bird communities that occur at PERI during the breeding season.
- Improve our understanding of breeding bird – habitat relationships and the effects of management actions such as stand thinning or prescribed fire on bird populations, by correlating changes in bird community composition and abundance with changes in specific habitat variables (e.g., vegetation structure, ground cover).

This report summarizes survey results for the first year of monitoring.

Methods

Site Selection

Permanent monitoring locations or 'plots' were selected by overlaying a systematic grid of 400 x 400 meter cells (originating from a random start point). The orientation of the grid was rotated 45 degrees to prevent monitoring sites from being influenced by man-made features (roads, fences, etc.) located along cardinal directions. We established 99 permanent plots: 24 grassland plots, 75 woodland plots (Fig. 1).

During bird surveys, monitoring plots were located using navigation waypoints (Table 1) in a GPS unit and temporarily marked with 36-inch pin flags to aid in re-locating the plots for habitat assessment, eliminating the need for permanent plot markers. We collected pin flags from each plot once the habitat work was completed. Monitoring plots will be re-located each year we conduct a bird survey.

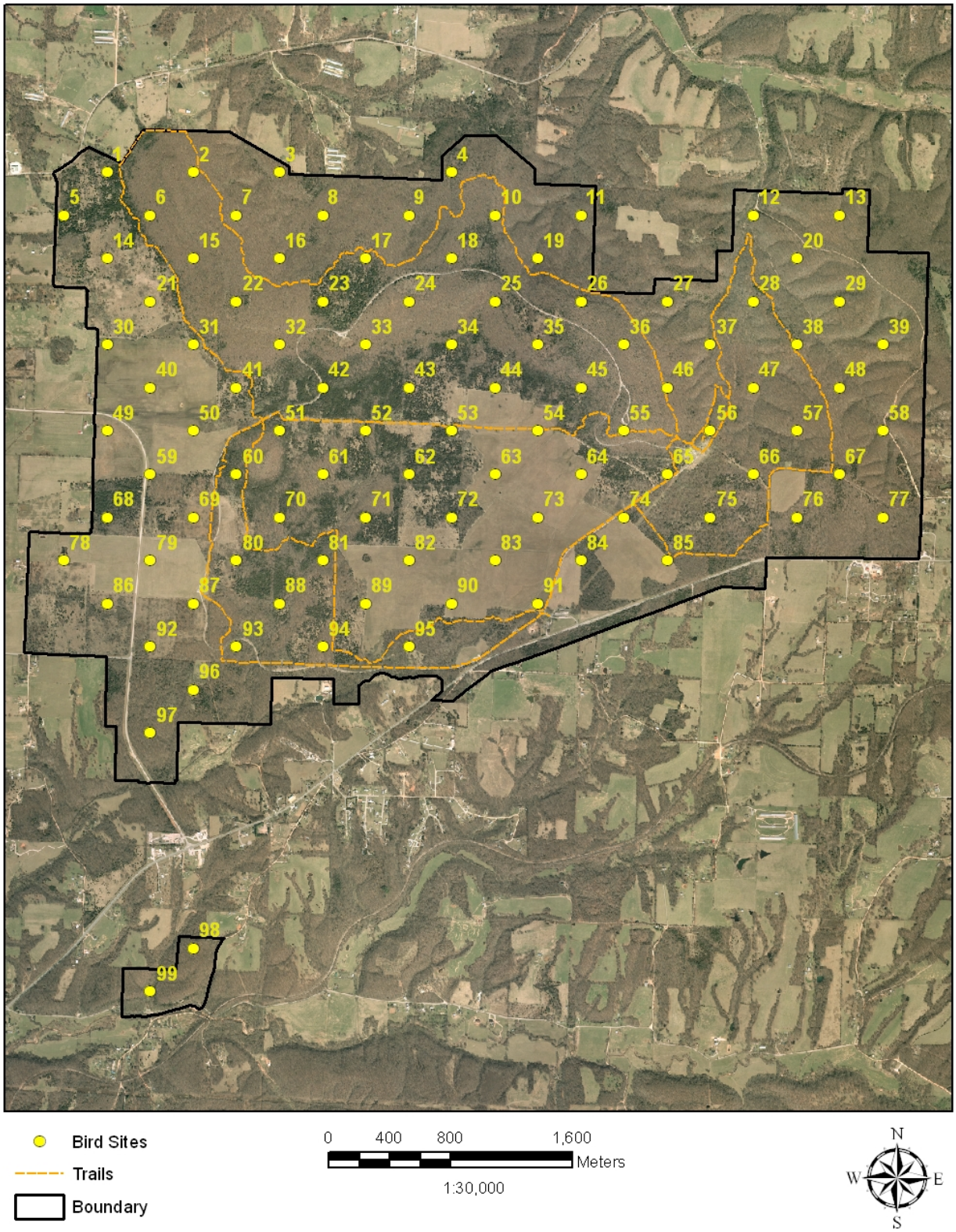

Figure 1. Bird plot locations on Pea Ridge National Military Park, Arkansas.

Table 1. Plot I.D. and habitat type for each breeding bird survey plot at Pea Ridge National Military Park, Arkansas. Also given are x and y UTM coordinates for each plot. UTM Zone 15 North, Datum 1983 (Conus).

Plot I.D.	Habitat Type	X Coordinate (Easting)	Y Coordinate (Northing)
PERITweety1	Grassland	405072.520	4036536.798
PERITweety2	Woodland	405638.205	4036536.798
PERITweety3	Woodland	406203.891	4036536.798
PERITweety4	Woodland	407335.262	4036536.798
PERITweety5	Woodland	404789.677	4036253.955
PERITweety6	Woodland	405355.363	4036253.955
PERITweety7	Woodland	405921.048	4036253.955
PERITweety8	Woodland	406486.733	4036253.955
PERITweety9	Woodland	407052.419	4036253.955
PERITweety10	Woodland	407618.104	4036253.955
PERITweety11	Woodland	408183.790	4036253.955
PERITweety12	Woodland	409315.161	4036253.955
PERITweety13	Woodland	409880.846	4036253.955
PERITweety14	Grassland	405072.520	4035971.112
PERITweety15	Woodland	405638.205	4035971.112
PERITweety16	Woodland	406203.891	4035971.112
PERITweety17	Woodland	406769.576	4035971.112
PERITweety18	Woodland	407335.262	4035971.112
PERITweety19	Woodland	407900.947	4035971.112
PERITweety20	Woodland	409598.003	4035971.112
PERITweety21	Grassland	405355.363	4035688.269
PERITweety22	Woodland	405921.048	4035688.269
PERITweety23	Woodland	406486.733	4035688.269
PERITweety24	Woodland	407052.419	4035688.269
PERITweety25	Woodland	407618.104	4035688.269
PERITweety26	Woodland	408183.790	4035688.269
PERITweety27	Woodland	408749.475	4035688.269
PERITweety28	Woodland	409315.161	4035688.269
PERITweety29	Woodland	409880.846	4035688.269
PERITweety30	Grassland	405072.520	4035405.427
PERITweety31	Grassland	405638.205	4035405.427
PERITweety32	Woodland	406203.891	4035405.427
PERITweety33	Woodland	406769.576	4035405.427
PERITweety34	Woodland	407335.262	4035405.427
PERITweety35	Woodland	407900.947	4035405.427
PERITweety36	Woodland	408466.632	4035405.427
PERITweety37	Woodland	409032.318	4035405.427
PERITweety38	Woodland	409598.003	4035405.427
PERITweety39	Woodland	410163.689	4035405.427
PERITweety40	Grassland	405355.363	4035122.584
PERITweety41	Grassland	405921.048	4035122.584
PERITweety42	Woodland	406486.733	4035122.584
PERITweety43	Woodland	407052.419	4035122.584
PERITweety44	Woodland	407618.104	4035122.584
PERITweety45	Woodland	408183.790	4035122.584
PERITweety46	Woodland	408749.475	4035122.584
PERITweety47	Woodland	409315.161	4035122.584
PERITweety48	Woodland	409880.846	4035122.584
PERITweety49	Grassland	405072.520	4034839.741
PERITweety50	Grassland	405638.205	4034839.741
PERITweety51	Woodland	406203.891	4034839.741

Table 1. Plot I.D. and habitat type for each breeding bird survey plot at Pea Ridge National Military Park, Arkansas. Also given are x and y UTM coordinates for each plot. UTM Zone 15 North, Datum 1983 (Conus) (continued).

Plot I.D.	Habitat Type	X Coordinate (Easting)	Y Coordinate (Northing)
PERITweety52	Woodland	406769.576	4034839.741
PERITweety53	Woodland	407335.262	4034839.741
PERITweety54	Grassland	407900.947	4034839.741
PERITweety55	Woodland	408466.632	4034839.741
PERITweety56	Woodland	409032.318	4034839.741
PERITweety57	Woodland	409598.003	4034839.741
PERITweety58	Woodland	410163.689	4034839.741
PERITweety59	Grassland	405355.363	4034556.899
PERITweety60	Woodland	405921.048	4034556.899
PERITweety61	Woodland	406486.733	4034556.899
PERITweety62	Woodland	407052.419	4034556.899
PERITweety63	Grassland	407618.104	4034556.899
PERITweety64	Grassland	408183.790	4034556.899
PERITweety65	Woodland	408749.475	4034556.899
PERITweety66	Woodland	409315.161	4034556.899
PERITweety67	Woodland	409880.846	4034556.899
PERITweety68	Woodland	405072.520	4034274.056
PERITweety69	Grassland	405638.205	4034274.056
PERITweety70	Woodland	406203.891	4034274.056
PERITweety71	Woodland	406769.576	4034274.056
PERITweety72	Woodland	407335.262	4034274.056
PERITweety73	Grassland	407900.947	4034274.056
PERITweety74	Grassland	408466.632	4034274.056
PERITweety75	Woodland	409032.318	4034274.056
PERITweety76	Woodland	409598.003	4034274.056
PERITweety77	Woodland	410163.689	4034274.056
PERITweety78	Grassland	404789.677	4033991.213
PERITweety79	Grassland	405355.363	4033991.213
PERITweety80	Woodland	405921.048	4033991.213
PERITweety81	Woodland	406486.733	4033991.213
PERITweety82	Grassland	407052.419	4033991.213
PERITweety83	Grassland	407618.104	4033991.213
PERITweety84	Woodland	408183.790	4033991.213
PERITweety85	Grassland	408749.475	4033991.213
PERITweety86	Woodland	405072.520	4033708.370
PERITweety87	Woodland	405638.205	4033708.370
PERITweety88	Woodland	406203.891	4033708.370
PERITweety89	Grassland	406769.576	4033708.370
PERITweety90	Grassland	407335.262	4033708.370
PERITweety91	Grassland	407900.947	4033708.370
PERITweety92	Woodland	405355.363	4033425.528
PERITweety93	Woodland	405921.048	4033425.528
PERITweety94	Woodland	406486.733	4033425.528
PERITweety95	Woodland	407052.419	4033425.528
PERITweety96	Woodland	405638.205	4033142.685
PERITweety97	Woodland	405355.363	4032859.842
PERITweety98	Woodland	405638.205	4031445.629
PERITweety99	Woodland	405355.363	4031162.786

Bird Surveys

Bird surveys followed methods outlined in the bird monitoring protocol by Peitz et al. (2008) and summarized below. Variable circular plot counts, a point count methodology that incorporates a measure of detectability into population estimates, were used to survey birds present (Fancy 1997). All birds seen or heard at plots during 5-min sampling periods were recorded along with their corresponding distance from observer. Bird observations were separated into two time segments: those detected during the first three minutes of the count (to allow future comparisons with the national Breeding Bird Survey data), and any new birds detected during the final two minutes of the count. For most species, we recorded each individual bird as a separate observation. For species that usually occur in clusters or flocks, the units recorded were cluster or flock size, and not the individual bird. During analysis, each individual in a cluster or flock will be treated as a separate observation. After completing a count at a plot and filling out the data sheet, the observer navigated to the next plot using a GPS unit. While traveling between plots, the observer was vigilant for the presence of species not recorded during timed surveys. These species help formulate a more complete species list for the park by identifying species missed during timed surveys. We sampled all 99 plots between May 12 and May 18, 2008. We sampled birds during a period when it was light enough to observe birds to four hours after sunrise, approximately 30 hours over the seven days of surveys.

Variable circular plot counts were conducted in an attempt to get an "instantaneous count" of all birds present. The observer recorded birds flushed from a plot when approached and the counts were started as soon as the observer reached plot center. Our method took into account the fact that birds close to the observer have a higher probability of being detected (if they were not flushed) than birds far from the observer and that different species have different detection functions (i.e., the probability of detecting a bird at different distances from the observer). An important assumption of the method is that birds exactly at the center of the plot have a 100% probability of being detected, and that there is a high probability of detecting birds within the first 5-10 meters of the plot center. The most important birds to detect are those very close to the observer (within the first 5-10 meters), and it is highly desirable that estimated distances, or those taken with a rangefinder, be within 1-2 meters of actual distances for any bird within 20 meters of the observer. However, we recorded all birds seen or heard, including flyovers, along with distance from the observer when possible. For this report, all birds seen or heard during the full 5-min are included.

Bird Habitat

The collection of habitat data followed methods outlined in the bird monitoring protocol by Peitz et al. (2008). A summary of the sampling method's follows: Habitat data collection started each morning after the first variable circular plot count was completed. Observers visited plots for habitat measures in the same order they were surveyed for birds to avoid disturbing birds on a plot prior to the survey. Once the habitat crew arrived at a plot, they set up the center subplot and completed all habitat measures for this subplot and the 50-m radius plot.

We characterized habitat available for each bird species on a number of different scales. Slope, slope variability, aspect, aspect variability, and topographic position of each 50-m radius plot were determined and recorded first. Measurements were recorded during the first year of monitoring, and will not be re-measured in subsequent years. The amount of various vegetation

types and the amount of road and water cover on each plot were recorded. As plots were sampled, horizontal vegetation cover was estimated in 0.25-m intervals from 0.0 to 2.0 meters above ground surface using a 15-cm wide cover board. Area of the cover board obscured by vegetation was estimated at a 15-m distances from plot center. Using a graduated measuring rod, vertical vegetation structure was measured in 1-m increments up to 7.5 meters in height at four locations around the perimeter of the subplot. Locations were in the four cardinal directions. Vertical structure was recorded for deciduous, coniferous, and herbaceous vegetation. Trees were tallied by species and size class (<1.0 cm, 1.1 – 2.5 cm, 2.6 – 8.0 cm, 8.1 – 15.0 cm, 15.1 – 23.0 cm, 23.1 – 38.0 or >38.0 cm) on the subplot. Lastly, at the subplot, ground and foliar cover were recorded in a 1.78-m radius nested sample plot. Ground cover included deciduous and grass litter, bare soil, rock, woody debris (>2.5 cm diameter), and unvegetated. Foliar cover was estimated for six plant guilds, including warm- and cool-season grasses, forbs, moss and lichens, shrubs and vines, tree seedlings, and total foliar cover (<1.5 m tall). Average parameter values were reported for grassland and woodland habitats. Heads-up digitizing of habitat types in a geographic information system (GIS) was used to determine the amounts of these habitats present on the park. Bird plots were not sampled in the developed (31.9 ha), mowed (4.3 ha), or pond (0.5 ha) areas.

Data Analysis

Prior to summary analysis, the residency status (permanent resident, summer resident, migrant) of each bird species recorded was determined. Identifying the residency of each species helps to exclude migrants from analysis of breeding birds within PERI. The frequency and abundance of bird species were reported in four ways. 1) For each species, the number of individuals encountered per plot visit (individuals / plot visit) was averaged over all plots. 2) The proportion of plots occupied by each species was determined (total number of plots occupied by a species / 99). 3) Restricting the area of inference to a 100-m radius (3.14 ha) around each plot center, we determined each species density (individuals / 3.14 ha) and averaged these values across all plots (average density $\pm$ std dev). 4) To examine local density, density was calculated as in (3) above, but only from plots where a species was encountered. Distance software, which accounts for un-detected individuals, will be used in future species density estimates once there are enough observations (~60) to do so accurately (Buckland et al. 1993, Buckland et al. 2001). A map was created showing species richness and the richness of species of continental importance, as determined by Partners in Flight (Rich et al. 2004), by plot.

Annual bird diversity, richness, and distribution evenness were calculated for permanent and summer resident males, by plot, and habitat-wide averages ($\pm$ std dev) were determined. Flyover males where included in each calculation. Bird diversity values for each plot were calculated using the Shannon Diversity Index:

$$H' = -\Sigma(n_1/N)\ln(n_1/N)$$

where n_1/N is the proportion of the total number of individuals in a population consisting of the ith species (Shannon, 1949). Species richness is the total number of bird taxa recorded per plot. Species distribution evenness is calculated for each plot using Pielou (J):

$$J' = H' / Hmax$$

where H' is the Shannon Diversity Index and Hmax is the maximum possible diversity for a given number of species if all species are present in equal numbers ((ln(species richness)). J' is a measure of how evenly individuals are distributed within a community when compared to the equal distribution and maximum diversity a community can have (Pielou, 1969).

Location and permanent abiotic measures on each plot and habitat subplot were reported. Annual averages (± std dev) for semi-permanent plot data, including road and water cover were calculated from plot estimates. Using plot values, averages (± std dev) for horizontal vegetation cover between 0 – 0.25, 0.25-0.5, 0.5 – 0.75, 0.75-1.0, 1.0 – 1.25, 1.25-1.5, 1.5 – 1.75, and 1.75 – 2.0 meters and read at a 15-m distance were calculated. Average (± std dev) annual vertical structure diversity was estimated and reported. Vertical structure diversity values were determined for each plot by summing the percents of possible touches (12) from vegetation within each 1-m height increment actually touched; dividing this value by the number of height increments measured (8); adding the resulting value to the percent of increments occupied; multiplying this value by 100; and than dividing it by two. Vertical structure diversity values are weighted equally to represent both the vertical height of vegetation and how dense the vegetation is within each height increment.

Within each plot, ground cover, including deciduous and grass litter, bare soil, rock, woody debris (>2.5 cm DBH), and unvegetated, were averaged (± std dev) across plots. Foliar cover, by guild of warm- and cool-season grasses, forbs, mosses and lichens, shrubs and vines, tree seedlings, and total foliar cover (<1.5 m tall) were averaged across plots (± std dev). Appendix 2 lists habitat parameter values recorded for each plot.

Results

Bird Surveys

Sixty-three bird species were recorded during the breeding bird surveys at PERI in 2008 (Table 2). Twenty-six of the 63 species recorded are classified as permanent residents (Stokes and Stokes 1996). Of the remaining species, 32 are classified as summer residents, two as winter residents, and three as migrants. Two species, the Barred owl (*Strix varia*) and Northern oriole (*Icterus galbula*), were only observed outside the 5-min survey periods. Sixteen species—the Acadian flycatcher (*Empidonax virescens*), Blue-winged warbler (*Vermivora pinus*), Brown thrasher (*Toxostoma rufum*), Carolina wren (*Thryothorus ludovicianus*), Eastern towhee (*Pipilo erythrophthalmus*), Grasshopper sparrow (*Ammodramus savannarum*), Henslow's sparrow (*Ammodramus henslowii*), Indigo bunting (*Passerina cyanea*), Kentucky warbler (*Oporornis formosus*), Louisiana waterthrush (*Seiurus motacilla*), Prairie warbler (*Dendrocia discolor*), Red-bellied woodpecker (*Melanerpes carolinus*), White-eyed vireo (*Vireo griseus*), Wood thrush (*Hylocichla mustelina*), Worm-eating warbler (*Helmitheros vermivorus*), and Yellow-throated vireo (*Vireo flavifrons*)—are considered species of continental importance (Rich et al. 2004). Three species—Eastern meadowlark (*Sturnella magna*), Grasshopper sparrow, and Henslow's sparrow—are grassland obligates. No woodland obligate species were recorded.

The Yellow-throated vireo was the most commonly occurring species during the breeding season based on both the mean number of individuals per plot and the proportion of plots they occupied on the park (Tables 3 and 4, also see Appendix 1). The Indigo bunting and Northern cardinal (*Cardinalis cardinalis*) had slightly more individuals per plots visited. But, the Yellow-throated vireo occupied more plots across the park. The Summer tanager (*Piranga rubra*), Eastern wood-pewee (*Contopus virens*), (Eastern) Tufted titmouse (*Parus bicolor*), Northern parula (*Parula americana*), Field sparrow (*Spizella pusilla*), and Blue-gray gnatcatcher (*Polioptila caerulea*) were moderately abundant. Eight species—the Eastern kingbird (*Tyrannus tyrannus*), Hairy woodpecker (*Picoides villosus*), Louisiana waterthrush, Mourning dove (*Zenaida macroura*), Northern bobwhite (*Colinus virginianus*), Northern mockingbird (*Minus polyglottos*), Ovenbird (*Seirus aurocapillus*), and Ruby-throated humingbird (*Archilochus colubris*)—were represented by observation(s) on single plots. Average park-wide density of each bird species during the breeding season of 2008 is listed in Table 5. Average density of each species for plots occupied is listed in Table 6. The Indigo bunting had the highest park-wide density of any species. However, the Red-winged blackbird (*Agelaius phoeniceus*) had the highest density for plots occupied. Species richness and the richness of species of continental importance by plot are illustrated in Figure 2. Average ($\pm$ std dev) species richness, diversity, and species distribution evenness values for the bird communities in grassland and woodland habitats are given in Figure 3.

Table 2. Bird species recorded during breeding bird surveys at Pea Ridge National Military Park, Arkansas in 2008. The American Ornithologists' Union Code (AOU code) and residency status of each species is given.

Common name	Species name	AOU code	Residency[1]
Acadian flycatcher	***Empidonax virescens***	**ACFL**	**SR**
American crow	*Corvus brachyrhynchos*	AMCR	R
American goldfinch	*Carduelis tristis*	AMGO	R
American redstart	*Setophaga ruticilla*	AMRE	SR
American robin	*Turdus migratorius*	AMRO	R
Barn swallow	*Hirundo rustica*	BARS	SR
Barred owl*	*Strix varia*	BDOW	R
Bewick's wren	*Thryomanes bewickii*	BEWR	R
Black-and-white warbler	*Myniotilta varia*	BAWW	SR
Blue jay	*Cyanocitta cristata*	BLJA	R
Blue-gray gnatcatcher	*Polioptila caerulea*	BGGN	SR
Blue-winged warbler	***Vermivora pinus***	**BWWA**	**SR**
Brown thrasher	***Toxostoma rufum***	**BRTH**	**R**
Brown-headed cowbird	*Molothrus ater*	BHCO	R
Carolina chickadee	*Parus carolinensis*	CACH	R
Carolina wren	***Thryothorus ludovicianus***	**CARW**	**R**
Chipping sparrow	*Spizella passerine*	CHSP	SR
Common yellowthroat	*Geothlypis trichas*	COYE	SR
Eastern (Rufous-side) towhee	***Pipilo erythrophthalmus***	**EATO**	**WR**
Eastern bluebird	*Sialia sialis*	EABL	R
Eastern kingbird	*Tyrannus tyrannus*	EAKI	SR
Eastern meadowlark	*Sturnella magna*	EAME	R
Eastern phoebe	*Sayornis phoebe*	EAPH	R
Eastern wood-pewee	*Contopus virens*	EAWP	SR
Field sparrow	*Spizella pusilla*	FISP	R
Grasshopper sparrow	***Ammodramus savannarum***	**GRSP**	**SR**
Gray catbird	*Dumetella carolinensis*	GRCA	SR
Great crested flycatcher	*Myiarchus crinitus*	GCFL	SR
Hairy woodpecker	*Picoides villosus*	HAWO	R
Henslow's sparrow	***Ammodramus henslowii***	**HESP**	**M**
Indigo bunting	***Passerina cyanea***	**INBU**	**SR**
Kentucky warbler	***Oporornis formosus***	**KEWA**	**SR**
Louisiana waterthrush	***Seiurus motacilla***	**LOWA**	**SR**
Mourning dove	*Zenaida macroura*	MODO	R
Northern (Baltimore) oriole*	*Icterus galbula*	BAOR	SR
Northern bobwhite	*Colinus virginianus*	NOBO	R
Northern cardinal	*Cardinalis cardinalis*	NOCA	R
Northern mockingbird	*Minus polyglottos*	NOMO	R
Northern parula	*Parula Americana*	NOPA	SR
Ovenbird	*Seirus aurocapillus*	OVEN	SR
Pileated woodpecker	*Dryocopus pileatus*	PIWO	R

Table 2. Bird species recorded during breeding bird surveys at Pea Ridge National Military Park, Arkansas in 2008. The American Ornithologists' Union Code (AOU code) and residency status of each species is given (continued).

Common name	Species name	AOU code	Residency[1]
Prairie warbler	***Dendrocia discolor***	**PRAW**	**SR**
Red-bellied woodpecker	***Melanerpes carolinus***	**RBWO**	**R**
Red-eyed vireo	*Vireo olivaceus*	REVI	SR
Red-tailed hawk	*Buteo jamaicensis*	RTHA	R
Red-winged blackbird	*Agelaius phoeniceus*	RWBL	R
Ruby-throated hummingbird	*Archilochus colubris*	RTHU	SR
Scarlet tanager	*Piranga olivacea*	SCTA	SR
Song sparrow	*Melospiza melodia*	SOSP	WR
Summer tanager	*Piranga rubra*	SUTA	SR
Swainson's thrush	*Catharus ustulatus*	SWTH	M
Turkey vulture	*Cathartes aura*	TUVU	R
(Eastern) Tufted titmouse	*Baeolophus bicolor*	ETTI	R
Veery	*Catharus fuscescens*	VEER	M
Whip-poor-will	*Caprimulgus vociferous*	WPWI	SR
White-breasted nuthatch	*Sitta carolinensis*	WBNU	R
White-eyed vireo	***Vireo griseus***	**WEVI**	**SR**
Wood thrush	***Hylocichla mustelina***	**WOTH**	**SR**
Worm-eating warbler	***Helmitheros vermivorus***	**WEWA**	**SR**
Yellow warbler	*Dendroica petechia*	YWAR	SR
Yellow-billed cuckoo	*Coccyzus americanus*	YBCU	SR
Yellow-breasted chat	*Icteria virens*	YBCH	SR
Yellow-throated vireo	***Vireo flavifrons***	**YTVI**	**SR**

[*] Species recorded only while traveling between point transects or at other times outside of 5-min survey periods.

[1] Residency: M = migrant; SR = summer resident; R = year around resident; WR = winter resident; According to Stokes and Stokes (1996).

Species names are valid and verified names taken from ITIS (Integrated Taxonomic Information System). http://www.itis.usda.gov/.

Bolded species names are those species considered of continental importance (Rich et al. 2004).

Table 3. Number of individuals encountered per plot visit, over all 99 plots, for bird species recorded at Pea Ridge National Military Park, Arkansas during the 2008 breeding bird surveys. Number of individuals per plot includes all individuals recorded on plots during a 5-min survey, including flyovers.

Common name	Species name	AOU code	Individual / plot visit
Acadian flycatcher	***Empidonax virescens***	**ACFL**	**0.20**
American crow	*Corvus brachyrhynchos*	AMCR	0.14
American goldfinch	*Carduelis tristis*	AMGO	0.04
American redstart	*Setophaga ruticilla*	AMRE	0.06
American robin	*Turdus migratorius*	AMRO	0.02
Barn swallow	*Hirundo rustica*	BARS	0.03
Bewick's wren	*Thryomanes bewickii*	BEWR	0.03
Black-and-white warbler	*Myniotilta varia*	BAWW	0.08
Blue jay	*Cyanocitta cristata*	BLJA	0.10
Blue-gray gnatcatcher	*Polioptila caerulea*	BGGN	0.23
Blue-winged warbler	***Vermivora pinus***	**BWWA**	**0.02**
Brown thrasher	***Toxostoma rufum***	**BRTH**	**0.03**
Brown-headed cowbird	*Molothrus ater*	BHCO	0.07
Carolina chickadee	*Parus carolinensis*	CACH	0.02
Carolina wren	***Thryothorus ludovicianus***	**CARW**	**0.21**
Chipping sparrow	*Spizella passerine*	CHSP	0.02
Common yellowthroat	*Geothlypis trichas*	COYE	0.04
Eastern (Rufous-side) towhee	***Pipilo erythrophthalmus***	**EATO**	**0.21**
Eastern bluebird	*Sialia sialis*	EABL	0.04
Eastern kingbird	*Tyrannus tyrannus*	EAKI	0.02
Eastern meadowlark	*Sturnella magna*	EAME	0.18
Eastern phoebe	*Sayornis phoebe*	EAPH	0.02
Eastern wood-pewee	*Contopus virens*	EAWP	0.31
Field sparrow	*Spizella pusilla*	FISP	0.25
Grasshopper sparrow	***Ammodramus savannarum***	**GRSP**	**0.07**
Gray catbird	*Dumetella carolinensis*	GRCA	0.02
Great crested flycatcher	*Myiarchus crinitus*	GCFL	0.02
Hairy woodpecker	*Picoides villosus*	HAWO	0.01
Henslow's sparrow	***Ammodramus henslowii***	**HESP**	**0.03**
Indigo bunting	***Passerina cyanea***	**INBU**	**0.49**
Kentucky warbler	***Oporornis formosus***	**KEWA**	**0.05**
Louisiana waterthrush	***Seiurus motacilla***	**LOWA**	**0.01**
Mourning dove	*Zenaida macroura*	MODO	0.01
Northern bobwhite	*Colinus virginianus*	NOBO	0.01
Northern cardinal	*Cardinalis cardinalis*	NOCA	0.43
Northern mockingbird	*Minus polyglottos*	NOMO	0.01
Northern parula	*Parula Americana*	NOPA	0.27
Ovenbird	*Seirus aurocapillus*	OVEN	0.01
Pileated woodpecker	*Dryocopus pileatus*	PIWO	0.10
Prairie warbler	***Dendroica discolor***	**PRAW**	**0.03**

Table 3. Number of individuals encountered per plot visit, over all 99 plots, for bird species recorded at Pea Ridge National Military Park, Arkansas during the 2008 breeding bird surveys. Number of individuals per plot includes all individuals recorded on plots during a 5-min survey, including flyovers (continued).

Common name	Species name	AOU code	Individual / plot visit
Red-bellied woodpecker	***Melanerpes carolinus***	**RBWO**	**0.17**
Red-eyed vireo	*Vireo olivaceus*	REVI	0.08
Red-tailed hawk	*Buteo jamaicensis*	RTHA	0.03
Red-winged blackbird	*Agelaius phoeniceus*	RWBL	0.05
Ruby-throated hummingbird	*Archilochus colubris*	RTHU	0.01
Scarlet tanager	*Piranga olivacea*	SCTA	0.04
Song sparrow	*Melospiza melodia*	SOSP	0.02
Summer tanager	*Piranga rubra*	SUTA	0.37
Swainson's thrush	*Catharus ustulatus*	SWTH	0.07
Turkey vulture	*Cathartes aura*	TUVU	0.02
(Eastern) Tufted titmouse	*Baeolophus bicolor*	ETTI	0.28
Veery	*Catharus fuscescens*	VEER	0.07
Whip-poor-will	*Caprimulgus vociferous*	WPWI	0.02
White-breasted nuthatch	*Sitta carolinensis*	WBNU	0.08
White-eyed vireo	***Vireo griseus***	**WEVI**	**0.05**
Wood thrush	***Hylocichla mustelina***	**WOTH**	**0.07**
Worm-eating warbler	***Helmitheros vermivorus***	**WEWA**	**0.07**
Yellow warbler	*Dendroica petechia*	YWAR	0.02
Yellow-billed cuckoo	*Coccyzus americanus*	YBCU	0.02
Yellow-breasted chat	*Icteria virens*	YBCH	0.07
Yellow-throated vireo	***Vireo flavifrons***	**YTVI**	**0.42**

Bolded species names are those species considered of continental importance (Rich et al. 2004).

Table 4. Proportion of plots (out of 99) occupied by bird species (including flyovers) at Pea Ridge National Military Park, Arkansas during the 2008 breeding bird surveys.

Common name	Species name	AOU code	Proportion of plots occupied
Acadian flycatcher	***Empidonax virescens***	**ACFL**	**0.18**
American crow	*Corvus brachyrhynchos*	AMCR	0.12
American goldfinch	*Carduelis tristis*	AMGO	0.02
American redstart	*Setophaga ruticilla*	AMRE	0.04
American robin	*Turdus migratorius*	AMRO	0.02
Barn swallow	*Hirundo rustica*	BARS	0.03
Bewick's wren	*Thryomanes bewickii*	BEWR	0.03
Black-and-white warbler	*Myniotilta varia*	BAWW	0.08
Blue jay	*Cyanocitta cristata*	BLJA	0.09
Blue-gray gnatcatcher	*Polioptila caerulea*	BGGN	0.20
Blue-winged warbler	***Vermivora pinus***	**BWWA**	**0.02**
Brown thrasher	***Toxostoma rufum***	**BRTH**	**0.02**
Brown-headed cowbird	*Molothrus ater*	BHCO	0.07
Carolina chickadee	*Parus carolinensis*	CACH	0.02
Carolina wren	***Thryothorus ludovicianus***	**CARW**	**0.18**
Chipping sparrow	*Spizella passerine*	CHSP	0.02
Common yellowthroat	*Geothlypis trichas*	COYE	0.03
Eastern (Rufous-side) towhee	***Pipilo erythrophthalmus***	**EATO**	**0.20**
Eastern bluebird	*Sialia sialis*	EABL	0.02
Eastern kingbird	*Tyrannus tyrannus*	EAKI	0.01
Eastern meadowlark	*Sturnella magna*	EAME	0.10
Eastern phoebe	*Sayornis phoebe*	EAPH	0.02
Eastern wood-pewee	*Contopus virens*	EAWP	0.29
Field sparrow	*Spizella pusilla*	FISP	0.17
Grasshopper sparrow	***Ammodramus savannarum***	**GRSP**	**0.06**
Gray catbird	*Dumetella carolinensis*	GRCA	0.02
Great crested flycatcher	*Myiarchus crinitus*	GCFL	0.02
Hairy woodpecker	*Picoides villosus*	HAWO	0.01
Henslow's sparrow	***Ammodramus henslowii***	**HESP**	**0.02**
Indigo bunting	***Passerina cyanea***	**INBU**	**0.29**
Kentucky warbler	***Oporornis formosus***	**KEWA**	**0.05**
Louisiana waterthrush	***Seiurus motacilla***	**LOWA**	**0.01**
Mourning dove	*Zenaida macroura*	MODO	0.01
Northern bobwhite	*Colinus virginianus*	NOBO	0.01
Northern cardinal	*Cardinalis cardinalis*	NOCA	0.31
Northern mockingbird	*Minus polyglottos*	NOMO	0.01
Northern parula	*Parula Americana*	NOPA	0.24
Ovenbird	*Seirus aurocapillus*	OVEN	0.01
Pileated woodpecker	*Dryocopus pileatus*	PIWO	0.09
Prairie warbler	***Dendroica discolor***	**PRAW**	**0.03**
Red-bellied woodpecker	***Melanerpes carolinus***	**RBWO**	**0.17**
Red-eyed vireo	*Vireo olivaceus*	REVI	0.08

Table 4. Proportion of plots (out of 99) occupied by bird species (including flyovers) at Pea Ridge National Military Park, Arkansas during the 2008 breeding bird surveys (continued).

Common name	Species name	AOU code	Proportion of plots occupied
Red-tailed hawk	*Buteo jamaicensis*	RTHA	0.03
Red-winged blackbird	*Agelaius phoeniceus*	RWBL	0.02
Ruby-throated hummingbird	*Archilochus colubris*	RTHU	0.01
Scarlet tanager	*Piranga olivacea*	SCTA	0.04
Song sparrow	*Melospiza melodia*	SOSP	0.02
Summer tanager	*Piranga rubra*	SUTA	0.29
Swainson's thrush	*Catharus ustulatus*	SWTH	0.05
Turkey vulture	*Cathartes aura*	TUVU	0.02
(Eastern) Tufted titmouse	*Baeolophus bicolor*	ETTI	0.26
Veery	*Catharus fuscescens*	VEER	0.07
Whip-poor-will	*Caprimulgus vociferous*	WPWI	0.02
White-breasted nuthatch	*Sitta carolinensis*	WBNU	0.07
White-eyed vireo	***Vireo griseus***	**WEVI**	**0.05**
Wood thrush	***Hylocichla mustelina***	**WOTH**	**0.04**
Worm-eating warbler	***Helmitheros vermivorus***	**WEWA**	**0.05**
Yellow warbler	*Dendroica petechia*	YWAR	0.02
Yellow-billed cuckoo	*Coccyzus americanus*	YBCU	0.02
Yellow-breasted chat	*Icteria virens*	YBCH	0.07
Yellow-throated vireo	***Vireo flavifrons***	**YTVI**	**0.36**

Bolded species names are those species considered of continental importance (Rich et al. 2004).

Table 5. Average density (± std. dev.) of bird species at Pea Ridge National Military Park, Arkansas during the 2008 breeding bird surveys. Species densities are for individuals recorded within 100-m of plot center during a 5-min survey, excluding flyovers.

Common name	Species name	AOU code	2008 Individuals / ha
Acadian flycatcher	***Empidonax virescens***	**ACFL**	**0.06 (0.14)**
American crow	*Corvus brachyrhynchos*	AMCR	0.00 (0.03)
American goldfinch	*Carduelis tristis*	AMGO	0.01 (0.09)
American redstart	*Setophaga ruticilla*	AMRE	0.02 (0.10)
American robin	*Turdus migratorius*	AMRO	0.00 (0.03)
Bewick's wren	*Thryomanes bewickii*	BEWR	0.01 (0.05)
Black-and-white warbler	*Myniotilta varia*	BAWW	0.03 (0.09)
Blue jay	*Cyanocitta cristata*	BLJA	0.01 (0.06)
Blue-gray gnatcatcher	*Polioptila caerulea*	BGGN	0.07 (0.16)
Blue-winged warbler	***Vermivora pinus***	**BWWA**	**0.01 (0.05)**
Brown thrasher	***Toxostoma rufum***	**BRTH**	**0.01 (0.06)**
Brown-headed cowbird	*Molothrus ater*	BHCO	0.02 (0.08)
Carolina chickadee	*Parus carolinensis*	CACH	0.01 (0.05)
Carolina wren	***Thryothorus ludovicianus***	**CARW**	**0.06 (0.15)**
Chipping sparrow	*Spizella passerine*	CHSP	0.01 (0.05)
Common yellowthroat	*Geothlypis trichas*	COYE	0.01 (0.06)
Eastern (Rufous-side) towhee	***Pipilo erythrophthalmus***	**EATO**	**0.05 (0.11)**
Eastern bluebird	*Sialia sialis*	EABL	0.01 (0.09)
Eastern kingbird	*Tyrannus tyrannus*	EAKI	0.01 (0.06)
Eastern meadowlark	*Sturnella magna*	EAME	0.03 (0.12)
Eastern phoebe	*Sayornis phoebe*	EAPH	0.01 (0.05)
Eastern wood-pewee	*Contopus virens*	EAWP	0.08 (0.15)
Field sparrow	*Spizella pusilla*	FISP	0.05 (0.15)
Grasshopper sparrow	***Ammodramus savannarum***	**GRSP**	**0.02 (0.09)**
Gray catbird	*Dumetella carolinensis*	GRCA	0.01 (0.05)
Great crested flycatcher	*Myiarchus crinitus*	GCFL	0.01 (0.05)
Hairy woodpecker	*Picoides villosus*	HAWO	0.00 (0.03)
Henslow's sparrow	***Ammodramus henslowii***	**HESP**	**0.01 (0.07)**
Indigo bunting	***Passerina cyanea***	**INBU**	**0.14 (0.27)**
Kentucky warbler	***Oporornis formosus***	**KEWA**	**0.01 (0.06)**
Louisiana waterthrush	***Seiurus motacilla***	**LOWA**	**0.00 (0.03)**
Northern bobwhite	*Colinus virginianus*	NOBO	0.00 (0.03)
Northern cardinal	*Cardinalis cardinalis*	NOCA	0.11 (0.22)
Northern mockingbird	*Minus polyglottos*	NOMO	0.00 (0.03)
Northern parula	*Parula Americana*	NOPA	0.08 (0.16)
Ovenbird	*Seirus aurocapillus*	OVEN	0.00 (0.03)
Pileated woodpecker	*Dryocopus pileatus*	PIWO	0.02 (0.08)
Prairie warbler	***Dendroica discolor***	**PRAW**	**0.01 (0.05)**
Red-bellied woodpecker	***Melanerpes carolinus***	**RBWO**	**0.04 (0.11)**
Red-eyed vireo	*Vireo olivaceus*	REVI	0.03 (0.09)

Table 5. Average density (± std. dev.) of bird species at Pea Ridge National Military Park, Arkansas during the 2008 breeding bird surveys. Species densities are for individuals recorded within 100-m of plot center during a 5-min survey, excluding flyovers (continued).

Common name	Species name	AOU code	2008 Individuals / ha
Red-winged blackbird	*Agelaius phoeniceus*	RWBL	0.02 (0.11)
Scarlet tanager	*Piranga olivacea*	SCTA	0.01 (0.06)
Song sparrow	*Melospiza melodia*	SOSP	0.01 (0.05)
Summer tanager	*Piranga rubra*	SUTA	0.12 (0.21)
Swainson's thrush	*Catharus ustulatus*	SWTH	0.02 (0.10)
Turkey vulture	*Cathartes aura*	TUVU	0.00 (0.03)
(Eastern) Tufted titmouse	*Baeolophus bicolor*	ETTI	0.07 (0.15)
Veery	*Catharus fuscescens*	VEER	0.02 (0.08)
Whip-poor-will	*Caprimulgus vociferous*	WPWI	0.01 (0.05)
White-breasted nuthatch	*Sitta carolinensis*	WBNU	0.03 (0.10)
White-eyed vireo	***Vireo griseus***	**WEVI**	**0.01 (0.06)**
Wood thrush	***Hylocichla mustelina***	**WOTH**	**0.02 (0.12)**
Worm-eating warbler	***Helmitheros vermivorus***	**WEWA**	**0.02 (0.11)**
Yellow warbler	*Dendroica petechia*	YWAR	0.01 (0.05)
Yellow-billed cuckoo	*Coccyzus americanus*	YBCU	0.01 (0.05)
Yellow-breasted chat	*Icteria virens*	YBCH	0.02 (0.08)
Yellow-throated vireo	***Vireo flavifrons***	**YTVI**	**0.12 (0.19)**

Bolded species names are those species considered of continental importance (Rich et al. 2004).

Table 6. Average bird density (± std. dev.) for plots occupied by species at Pea Ridge National Military Park, Arkansas during the 2008 breeding bird surveys. Species densities are for individuals recorded within 100-m of plot center during a 5-min survey, excluding flyovers. A standard deviation of 0.00 indicates the species occurred on two or more plots with equal density. When a species occurred on only one plot, the standard deviation could not be calculated.

Common name	Species name	AOU code	Individuals / ha
Acadian flycatcher	***Empidonax virescens***	**ACFL**	**0.36 (0.11)**
American crow	*Corvus brachyrhynchos*	AMCR	0.32
American goldfinch	*Carduelis tristis*	AMGO	0.64 (0.00)
American redstart	*Setophaga ruticilla*	AMRE	0.48 (0.18)
American robin	*Turdus migratorius*	AMRO	0.32
Bewick's wren	*Thryomanes bewickii*	BEWR	0.32 (0.00)
Black-and-white warbler	*Myniotilta varia*	BAWW	0.32 (0.00)
Blue jay	*Cyanocitta cristata*	BLJA	0.32 (0.00)
Blue-gray gnatcatcher	*Polioptila caerulea*	BGGN	0.37 (0.00)
Blue-winged warbler	***Vermivora pinus***	**BWWA**	**0.32 (0.00)**
Brown thrasher	***Toxostoma rufum***	**BRTH**	**0.63**
Brown-headed cowbird	*Molothrus ater*	BHCO	0.32 (0.00)
Carolina chickadee	*Parus carolinensis*	CACH	0.32 (0.00)
Carolina wren	***Thryothorus ludovicianus***	**CARW**	**0.38 (0.13)**
Chipping sparrow	*Spizella passerine*	CHSP	0.32 (0.00)
Common yellowthroat	*Geothlypis trichas*	COYE	0.64
Eastern (Rufous-side) towhee	***Pipilo erythrophthalmus***	**EATO**	**0.32 (0.00)**
Eastern bluebird	*Sialia sialis*	EABL	0.64 (0.00)
Eastern kingbird	*Tyrannus tyrannus*	EAKI	0.64
Eastern meadowlark	*Sturnella magna*	EAME	0.40 (0.23)
Eastern phoebe	*Sayornis phoebe*	EAPH	0.32 (0.00)
Eastern wood-pewee	*Contopus virens*	EAWP	0.35 (0.09)
Field sparrow	*Spizella pusilla*	FISP	0.45 (0.22)
Grasshopper sparrow	***Ammodramus savannarum***	**GRSP**	**0.37 (0.13)**
Gray catbird	*Dumetella carolinensis*	GRCA	0.32 (0.00)
Great crested flycatcher	*Myiarchus crinitus*	GCFL	0.32 (0.00)
Hairy woodpecker	*Picoides villosus*	HAWO	0.32
Henslow's sparrow	***Ammodramus henslowii***	**HESP**	**0.48 (0.23)**
Indigo bunting	***Passerina cyanea***	**INBU**	**0.55 (0.25)**
Kentucky warbler	***Oporornis formosus***	**KEWA**	**0.32 (0.00)**
Louisiana waterthrush	***Seiurus motacilla***	**LOWA**	**0.32**
Northern bobwhite	*Colinus virginianus*	NOBO	0.32
Northern cardinal	*Cardinalis cardinalis*	NOCA	0.45 (0.21)
Northern mockingbird	*Minus polyglottos*	NOMO	0.32
Northern parula	*Parula Americana*	NOPA	0.36 (0.11)
Ovenbird	*Seirus aurocapillus*	OVEN	0.32
Pileated woodpecker	*Dryocopus pileatus*	PIWO	0.40 (0.16)
Prairie warbler	***Dendroica discolor***	**PRAW**	**0.32 (0.00)**

Table 6. Average bird density (± std. dev.) for plots occupied by species at Pea Ridge National Military Park, Arkansas during the 2008 breeding bird surveys. Species densities are for individuals recorded within 100-m of plot center during a 5-min survey, excluding flyovers. A standard deviation of 0.00 indicates the species occurred on two or more plots with equal density. When a species occurred on only one plot, the standard deviation could not be calculated (continued)

Common name	Species name	AOU code	Individuals / ha
Red-bellied woodpecker	***Melanerpes carolinus***	**RBWO**	**0.32 (0.00)**
Red-eyed vireo	*Vireo olivaceus*	REVI	0.32 (0.00)
Red-winged blackbird	*Agelaius phoeniceus*	RWBL	0.80 (0.23)
Scarlet tanager	*Piranga olivacea*	SCTA	0.32 (0.00)
Song sparrow	*Melospiza melodia*	SOSP	0.32 (0.00)
Summer tanager	*Piranga rubra*	SUTA	0.41 (0.17)
Swainson's thrush	*Catharus ustulatus*	SWTH	0.45 (0.17)
Turkey vulture	*Cathartes aura*	TUVU	0.32
(Eastern) Tufted titmouse	*Baeolophus bicolor*	ETTI	0.35 (0.10)
Veery	*Catharus fuscescens*	VEER	0.32 (0.00)
Whip-poor-will	*Caprimulgus vociferous*	WPWI	0.32 (0.00)
White-breasted nuthatch	*Sitta carolinensis*	WBNU	0.36 (0.12)
White-eyed vireo	***Vireo griseus***	**WEVI**	**0.32 (0.00)**
Wood thrush	***Hylocichla mustelina***	**WOTH**	**0.56 (0.30)**
Worm-eating warbler	***Helmitheros vermivorus***	**WEWA**	**0.45 (0.28)**
Yellow warbler	*Dendroica petechia*	YWAR	0.32 (0.00)
Yellow-billed cuckoo	*Coccyzus americanus*	YBCU	0.32 (0.00)
Yellow-breasted chat	*Icteria virens*	YBCH	0.32 (0.00)
Yellow-throated vireo	***Vireo flavifrons***	**YTVI**	**0.37 (0.12)**

Bolded species names are those species considered of continental importance (Rich et al. 2004).

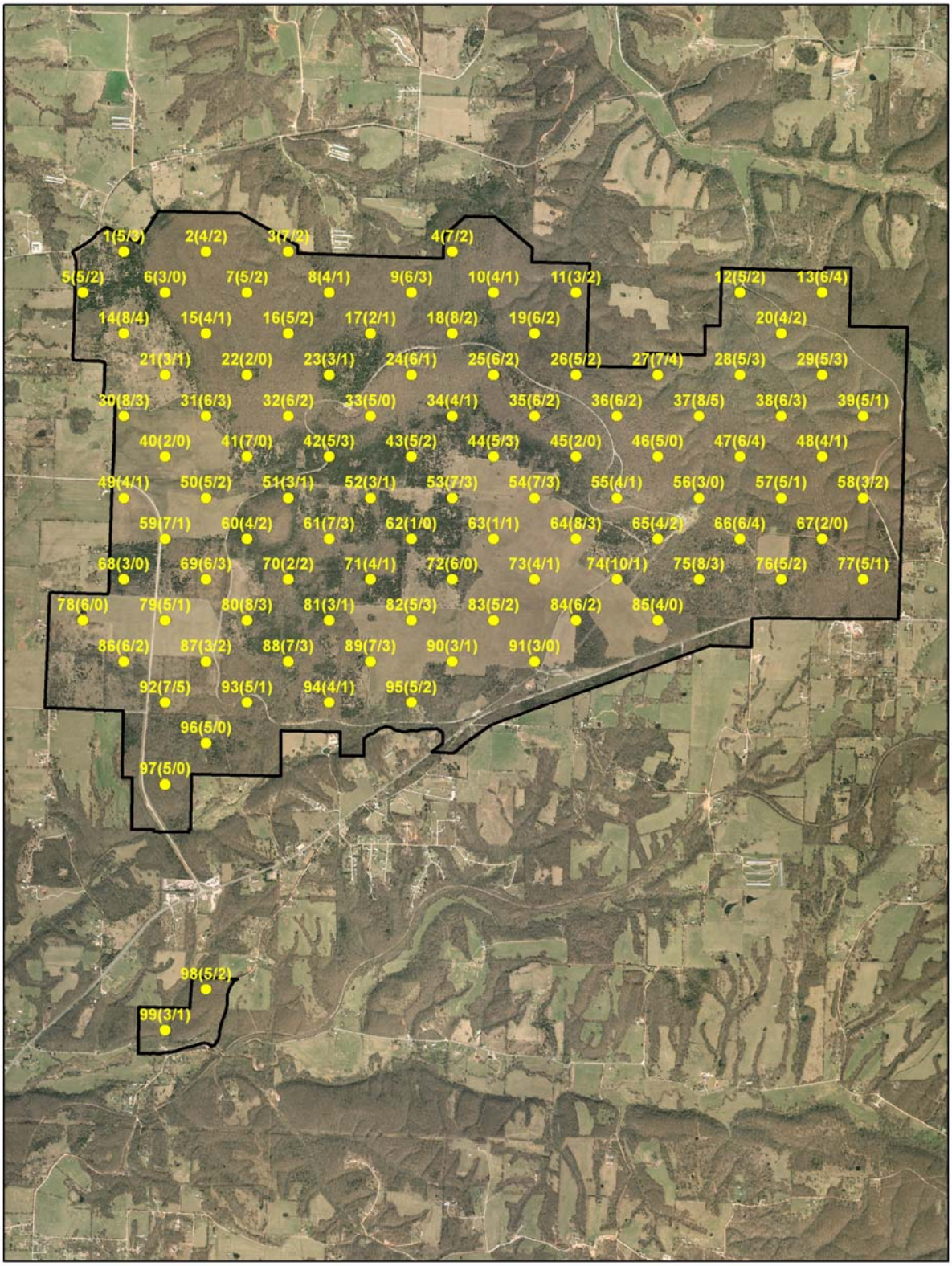

Figure 2. Bird species richness and the richness of species of continental importance for each plot on Pea Ridge National Military Park, Arkansas, in 2008

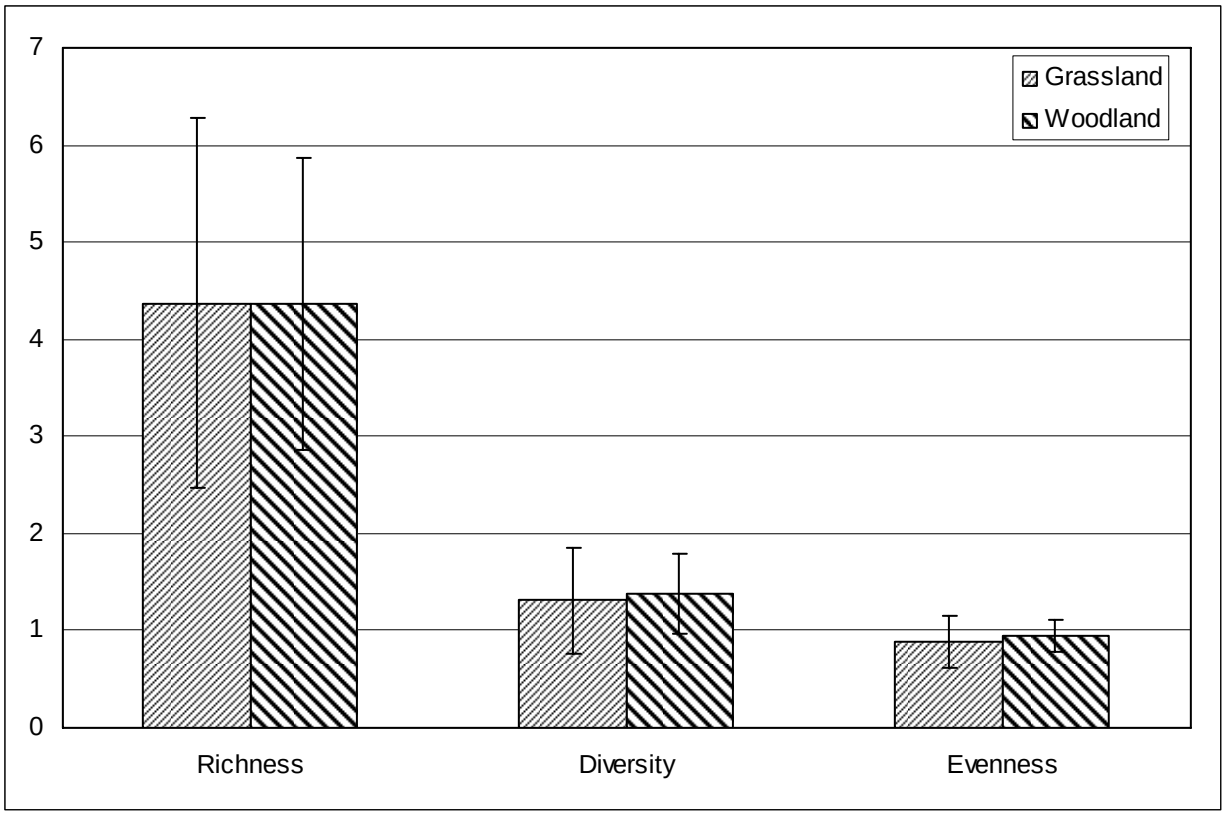

Figure 3. Average (± std dev) species richness, diversity, and species distribution evenness values for the grassland (24 plots) and woodland (75 plots) bird communities at Pea Ridge National Military Park, Arkansas during the breeding season of 2008.

Bird Habitat

Abiotic features of plots sampled for breeding birds and habitat composition are given in Table 7. Slope and aspect variability ranged from low to high, as plots are located at a variety of topographic positions. Slope across survey plots ranged from 1° to 22°.

Bird habitat sampled consisted primarily of the grassland (414.9 ha) and woodland (1279.9 ha) types. Bird survey plots in the grassland habitat average over 53% of the fescue/orchard grass type and 25% of the field/prairie type, with smaller amounts of other habitat types present (Table 8). Survey plots in the woodland habitat average over 82% deciduous woodlands, with smaller amounts of other habitat types present. Canopy cover averaged 88% in the woodland habitat, but only 12% in the grassland habitat. Canopy cover was mostly from hardwood trees. However, some conifer canopy cover was present. Basal area from hardwood trees averaged 6.7 m^2/ha in the woodland habitat, and 0.5 m^2/ha in the grassland habitat. Basal area from conifer trees averaged 1.1 m^2/ha in the woodland habitat, and 0.1 m^2/ha in the grassland habitat. Hardwood tree species from twelve different families contributed to the canopy cover and basal area (Table 9). Tree species from the *Cupressaceae* families accounted for the limited amount of conifer canopy cover observed.

In the grassland habitat, the highest horizontal vegetation covers observed occurred in profile classes below 0.50 meter when read from a 15-m distance (Table 8, also see Appendix 2). In the

woodland habitat, the highest horizontal vegetation covers observed occurred in profile classes below 0.50 meter as well. However, for both habitat types, vegetation cover was recorded for all height classes. In spite of good horizontal vegetation cover, the average vertical structure diversity estimate in grassland habitat, 13%, appears to be low. In the woodland habitat the vertical structure diversity estimate is 30%.

Deciduous litter was the most prominent litter type recorded in the woodland habitat with lesser amounts of conifer and grass litters present (Table 8). Grass litter dominated the litter type recorded in the grassland habitat. Grassland plots averaged 48% bare soil, while woodland plots averaged 16%. Ground cover was mostly unvegetated, averaging 77% and 87%, respectively for the grassland and woodland habitats. Cool season grasses and forbs contributed the greatest amounts to live foliar cover in the grassland habitat. Woody shrubs and vines, moss and lichens, and forbs contributed the greatest amounts to live foliar cover in the woodland habitat. Total foliar coverage averaged 44% across plots in the grassland habitat, and 21% in the woodland habitat.

Table 7. Abiotic features of 50-m radius plots sampled for breeding birds at Pea Ridge National Military Park, Arkansas.

Plot number	Slope (^{O})	Slope variability	Aspect (^{O})	Aspect variability	Topographic position	Habitat type
PERITweety1	2	Low	257	low	level	Grassland
PERITweety2	7	Low	63	low	upper-slope	Woodland
PERITweety3	5	Low	226	low	upper-slope	Woodland
PERITweety4	17	High	280	low	escarpment/face	Woodland
PERITweety5	2	Low	300	low	level	Woodland
PERITweety6	7	Low	263	low	mid-slope	Woodland
PERITweety7	6	Low	54	low	mid-slope	Woodland
PERITweety8	7	Low	297	low	mid-slope	Woodland
PERITweety9	7	medium	69	low	mid-slope	Woodland
PERITweety10	14	High	97	low	upper-slope	Woodland
PERITweety11	16	Low	229	medium	mid-slope	Woodland
PERITweety12	14	Low	306	low	mid-slope	Woodland
PERITweety13	10	High	3	high	draw	Woodland
PERITweety14	1	Low	259	low	level	Grassland
PERITweety15	4	Low	223	low	mid-slope	Woodland
PERITweety16	11	medium	62	medium	mid-slope	Woodland
PERITweety17	2	Low	349	medium	crest	Woodland
PERITweety18	3	Low	243	low	upper-slope	Woodland
PERITweety19	9	High	329	medium	mid-slope	Woodland
PERITweety20	8	High	258	high	draw	Woodland
PERITweety21	1	Low	261	low	level	Grassland
PERITweety22	6	Low	292	low	upper-slope	Woodland
PERITweety23	1	Low	180	low	crest	Woodland
PERITweety24	6	Low	178	low	upper-slope	Woodland
PERITweety25	7	medium	234	low	mid-slope	Woodland
PERITweety26	11	High	9	low	upper-slope	Woodland
PERITweety27	5	Low	94	medium	mid-slope	Woodland
PERITweety28	14	High	312	high	draw	Woodland
PERITweety29	7	High	256	high	upper-slope	Woodland
PERITweety30	1	Low	195	low	level	Grassland
PERITweety31	5	Low	224	low	lower-slope	Grassland
PERITweety32	6	Low	133	low	mid-slope	Woodland
PERITweety33	7	Low	148	low	mid-slope	Woodland
PERITweety34	5	Low	156	low	mid-slope	Woodland
PERITweety35	2	medium	217	low	crest	Woodland
PERITweety36	2	Low	35	low	crest	Woodland
PERITweety37	9	High	344	high	draw	Woodland
PERITweety38	2	Low	29	low	crest	Woodland
PERITweety39	22	medium	318	high	draw	Woodland
PERITweety40	1	Low	259	low	level	Grassland
PERITweety41	3	Low	238	low	lower-slope	Grassland
PERITweety42	1	Low	187	low	mid-slope	Woodland
PERITweety43	1	Low	159	low	lower-slope	Woodland
PERITweety44	4	Low	190	low	lower-slope	Woodland
PERITweety45	7	Low	198	low	mid-slope	Woodland
PERITweety46	10	medium	63	low	upper-slope	Woodland
PERITweety47	16	Low	70	medium	mid-slope	Woodland
PERITweety48	12	Low	19	medium	mid-slope	Woodland
PERITweety49	1	Low	27	low	level	Grassland
PERITweety50	1	Low	292	low	level	Grassland
PERITweety51	3	Low	357	low	mid-slope	Woodland

Table 7. Abiotic features of 50-m radius plots sampled for breeding birds at Pea Ridge National Military Park, Arkansas (continued).

Plot number	Slope (^{O})	Slope variability	Aspect (^{O})	Aspect variability	Topographic position	Habitat type
PERITweety52	3	medium	136	medium	draw	Woodland
PERITweety53	1	Low	208	low	level	Woodland
PERITweety54	2	Low	249	high	lower-slope	Grassland
PERITweety55	14	High	180	low	upper-slope	Woodland
PERITweety56	7	High	304	low	upper-slope	Woodland
PERITweety57	13	High	194	low	mid-slope	Woodland
PERITweety58	14	medium	358	high	lower-slope	Woodland
PERITweety59	1	Low	138	low	level	Grassland
PERITweety60	2	Low	248	low	mid-slope	Woodland
PERITweety61	4	Low	165	low	mid-slope	Woodland
PERITweety62	3	Low	342	low	mid-slope	Woodland
PERITweety63	3	Low	352	low	upper-slope	Grassland
PERITweety64	2	Low	184	low	lower-slope	Grassland
PERITweety65	3	Low	254	low	level	Woodland
PERITweety66	3	medium	96	medium	mid-slope	Woodland
PERITweety67	2	Low	241	low	mid-slope	Woodland
PERITweety68	0	Low	196	low	level	Woodland
PERITweety69	1	Low	337	low	level	Grassland
PERITweety70	3	Low	219	low	mid-slope	Woodland
PERITweety71	2	Low	283	low	mid-slope	Woodland
PERITweety72	2	medium	9	low	crest	Woodland
PERITweety73	2	Low	108	low	lower-slope	Grassland
PERITweety74	1	medium	292	medium	level	Grassland
PERITweety75	1	Low	286	low	lower-slope	Woodland
PERITweety76	3	medium	166	low	lower-slope	Woodland
PERITweety77	2	Low	217	low	mid-slope	Woodland
PERITweety78	0	Low	304	low	level	Grassland
PERITweety79	2	Low	284	low	level	Grassland
PERITweety80	1	Low	228	low	level	Woodland
PERITweety81	5	High	333	high	mid-slope	Woodland
PERITweety82	2	Low	264	low	mid-slope	Grassland
PERITweety83	2	Low	117	low	mid-slope	Grassland
PERITweety84	1	Low	282	low	lower-slope	Woodland
PERITweety85	3	medium	208	high	draw	Grassland
PERITweety86	1	Low	248	low	level	Woodland
PERITweety87	1	Low	264	low	level	Woodland
PERITweety88	2	Low	140	low	lower-slope	Woodland
PERITweety89	1	Low	278	low	mid-slope	Grassland
PERITweety90	1	Low	142	low	upper-slope	Grassland
PERITweety91	2	Low	317	low	lower-slope	Grassland
PERITweety92	1	Low	337	low	level	Woodland
PERITweety93	6	medium	120	high	mid-slope	Woodland
PERITweety94	7	High	200	high	lower-slope	Woodland
PERITweety95	2	Low	209	low	upper-slope	Woodland
PERITweety96	1	medium	224	low	upper-slope	Woodland
PERITweety97	6	High	150	high	draw	Woodland
PERITweety98	1	medium	2	medium	crest	Woodland
PERITweety99	2	High	183	high	draw	Woodland

Table 8. Averages (± std dev) for habitat parameters at Pea Ridge National Military Park, Arkansas during the bird breeding season, 2008. Within the scale in which habitat parameters are collected, 50-m plot, 5-m subplot, and 1.78-m sample plot, percentages of coverage may not necessarily sum to 100% as values are averaged over mid-point values of cover classes (i.e. class 1 = 0.5%, class 2 = 3.0%, class 3 = 15.0%, class 4 = 37.5%, class 5 = 62.5%, class 6 = 85.0%, and class 7 = 97.5%).

	Grassland		Woodland	
Habitat Parameter	Mean	Std dev	Mean	Std dev
50 meter plot coverage				
Fescue/Orchard Grass (%)	53.44	(44.54)	0.44	(2.45)
Field / Prairie (%)	24.58	(39.72)	0.74	(4.65)
Highway Right of Way (%)	0.25	(0.85)	0.04	(0.35)
Lawn (%)	0.00	(0.00)	0.74	(4.65)
Old Field (%)	5.21	(17.65)	1.33	(8.37)
Open Woodland (%)	0.63	(3.06)	3.07	(11.84)
Parking Lot (%)	0.00	(0.00)	0.08	(0.49)
Pasture Road (%)	0.13	(0.61)	0.36	(1.84)
Paved Road (%)	0.27	(0.85)	0.24	(1.76)
Pond (%)	0.13	(0.61)	0.00	(0.00)
Riparian Woodland (%)	0.00	(0.00)	1.33	(8.37)
Shrub (%)	1.00	(3.15)	2.63	(9.79)
Stream (%)	0.00	(0.00)	0.33	(1.82)
Trail (%)	0.00	(0.00)	0.04	(0.35)
Tree Line (%)	0.00	(0.00)	0.50	(4.33)
Woodland (%)	4.81	(9.29)	81.97	(27.48)
5 meter subplot				
Canopy cover				
Hardwood (%)	8.14	(21.23)	76.30	(31.02)
Conifer (%)	3.73	(14.65)	12.44	(26.61)
Total cover (%)	11.91	(25.54)	87.84	(19.83)
Canopy Height				
Hardwood (m)	1.87	(4.41)	17.65	(7.62)
Conifer (m)	0.00	(0.00)	2.10	(4.29)
Basal Area				
Hardwood (m^2/ha)	0.50	(1.18)	6.67	(3.87)
Conifer (m^2/ha)	0.13	(0.45)	1.08	(2.58)
Total (m^2/ha)	0.63	(1.38)	7.75	(3.44)
Horizontal vegetation profile at 15-m				
0.00 – 0.25 m (%)	93.54	(10.19)	71.30	(32.65)
0.25 – 0.50 m (%)	71.94	(33.45)	52.50	(41.14)
0.50 – 0.75 m (%)	11.15	(21.39)	23.95	(36.02)
0.75 – 1.00 m (%)	3.73	(12.90)	18.66	(32.85)
1.00 – 1.25 m (%)	2.89	(12.72)	18.17	(31.11)
1.25 – 1.50 m (%)	5.88	(18.69)	20.07	(31.99)
1.50 – 1.75 m (%)	4.21	(19.88)	28.05	(38.46)
1.75 – 2.00 m (%)	4.71	(20.00)	25.25	(35.92)
Vertical structure diversity (%)	12.86	(10.03)	30.37	(14.42)
1.78 meter sample plot coverage				
Deciduous litter (%)	1.85	(7.62)	54.2	(34.95)
Conifer litter (%)	2.85	(12.73)	6.37	(18.56)
Grass litter (%)	34.75	(29.72)	4.04	(12.80)
Bare soil (%)	47.63	(29.16)	16.39	(22.41)

Tables 8. Averages (± std dev) for habitat parameters at Pea Ridge National Military Park, Arkansas during the bird breeding season, 2008. Within the scale in which habitat parameters are collected, 50-m plot, 5-m subplot, and 1.78-m sample plot, percentages of coverage may not necessarily sum to 100% as values are averaged over mid-point values of cover classes (i.e. class 1 = 0.5%, class 2 = 3.0%, class 3 = 15.0%, class 4 = 37.5%, class 5 = 62.5%, class 6 = 85.0%, and class 7 = 97.5%) (continued).

	Grassland		Woodland	
Habitat Parameter	Mean	Std dev	Mean	Std dev
Rock (%)	0.13	(0.61)	6.73	(13.01)
Woody debris (%)	2.02	(7.62)	5.91	(7.34)
Unvegetated (%)	76.67	(12.70)	86.93	(14.66)
Warm-season grass (%)	3.25	(5.46)	1.01	(3.02)
Cool-season grass (%)	19.73	(16.77)	2.95	(5.83)
Forb (%)	15.02	(16.15)	4.54	(6.26)
Moss and lichen (%)	0.42	(0.60)	5.01	(7.48)
Woody shrub and vine (%)	2.04	(7.62)	5.09	(7.45)
Tree seedling (%)	0.00	(0.00)	1.77	(3.38)
Total foliar (%)	43.95	(20.09)	20.87	(17.09)

Table 9. Stems per hectare of trees by size class found on Pea Ridge National Military Park, Arkansas during the 2008 bird-breeding season. Stems per hectare of trees are reported by family.

Family	<1.0 cm	1.1 – 2.5 cm	2.6 – 8.0 cm	8.1 – 15.0 cm	15.1 – 23.0 cm	23.1 – 38.0 cm	>38.0 cm
Aceraceae	0.00	2.57	7.72	1.29	1.29	0.00	1.29
Cornaceae	1.29	0.00	68.16	28.29	2.57	0.00	0.00
Cupressaceae	0.00	2.57	29.58	37.30	20.58	20.58	3.86
Ebenaceae	0.00	0.00	7.72	2.57	2.57	0.00	0.00
Fabaceae	0.00	0.00	0.00	6.43	0.00	0.00	0.00
Fagaceae	7.72	0.00	39.87	45.01	21.86	23.15	46.30
Hippocastanaceae	0.00	2.57	0.00	0.00	0.00	0.00	0.00
Juglandaceae	0.00	1.29	11.57	9.00	0.00	3.86	1.29
Lauraceae	36.01	73.31	27.01	11.57	2.57	0.00	0.00
Moraceae	0.00	0.00	0.00	2.57	0.00	0.00	0.00
Oleacea	0.00	0.00	6.43	0.00	2.57	7.72	0.00
Rosaceae	2.57	0.00	0.00	0.00	0.00	1.29	0.00
Ulmaceae	5.14	5.14	46.30	11.57	2.57	0.00	1.29
Total stems	**45.01**	**95.17**	**244.36**	**155.62**	**56.59**	**56.59**	**54.02**
Snags	20.58	60.45	149.19	56.59	7.72	7.72	2.57

Discussion

Bird surveys and habitat assessment work were initiated at Pea Ridge National Military Park, Arkansas in 2008, to assist the park in assessing the integrity of their grasslands and woodlands through time. Fifty-eight of the 63 bird species recorded during the breeding bird surveys are permanent or summer residents to the area (Stokes and Stokes 1996). Therefore, these 58 species have some value in characterizing the breeding bird community of PERI. Changes in the number of the most common and widely distributed species in the park—Yellow-throated vireo, Indigo bunting, and Northern cardinal—will serve as better measures for assessing changing habitat conditions, especially in the woodlands. For example, species like the Northern cardinal

and Indigo bunting have improved reproductive success when shrub cover is dense and mid-canopy trees are present (Stokes and Stokes 1996). Therefore, a decline in either species' numbers could very well indicate changes in the understory and mid-story of the woodlands. Less common and widely distributed species will likely occur so infrequently that strong species-habitat relationships may not be established.

Woodland habitat, especially deciduous, dominates the habitat at PERI by nearly three to one when compared to the grassland habitat. However, the presence of grassland habitat helps create a more mixed structural composition in the overall habitat of the park, which positively influenced the number of species observed. In fact, the only habitat obligate species recorded were the grassland obligates; Eastern Meadowlark, Grasshopper sparrow, and Henslow's sparrow. Habitat diversity (structural composition) is especially important to high priority species, as their microhabitat requirements vary (Pashley and Barrow 1993). For example, Acadian flycatcher and Yellow-throated vireo prefer mature deciduous habitat, while other species of continental importance observed require thick shrubby habitat, open park-like woodlands, or grasslands (Stokes and Stokes 1996). The sixteen species of continental importance deserve extra scrutiny each time a survey is completed. Although the diverse mix of habitats provides potentially satisfactory habitat for all the birds of continental importance as well as most other bird species, this habitat is easily altered if trees are thinned, insect infestations occur, or brushy fields are burned. Our baseline data suggest that six of the sixteen species of continental importance (i.e., Acadian flycatcher, Carolina wren, Eastern towhee, Indigo bunting, Red-bellied woodpecker, and Yellow-throated vireo) occur frequently enough at PERI to aid significantly in assessing the influence of woodland habitat management actions on their numbers. Similar to the habitat requirements listed above for the Acadian flycatcher and Yellow-throated vireo, the habitat requirement of the other four species can be identified: Carolina wren, forest understory and shrubby habitat; Eastern towhee, shrubby edges or open woods with a shrub understory; Indigo bunting, brush and low trees of overgrown fields; and Red-bellied woodpecker, woodlands and urban/suburban forest (Stokes and Stokes 1996). Though not occurring in large numbers across the park, the two grassland obligate species of continental importance—Grasshopper sparrow and Henslow's sparrow—will aid in assessing the influences of grassland management actions on their numbers.

The Northern cardinal, one of the most common species on the park, has remained relatively stable throughout the Ozark-Ouachita Plateau, but declined in other areas of North America (Sauer et al. 2008). Therefore, the importance of the park to conservation of even its more common species cannot be underestimated. Management decisions aimed at influencing bird populations should center on those identified as species of local or continental importance. Species common to the park, however, such as the Northern cardinal, need consideration in a broader context of bird conservation when making management decisions. An interesting finding from this initial bird survey is that even moderately widespread species, such as the Indigo Bunting, may be species of continental importance.

In planning management actions that aim to improve habitat for birds, one should refer to Figure 2 and Appendix 1. Figure 2 identifies areas where species richness and the richness of species of continental importance are greatest, allowing managers to prioritize areas for habitat improvement. Appendix 2 describes in detail each habitat parameter found on a plot. Managers

may choose to manipulate a particular habitat element to benefit a particular species. Management actions aimed at improving habitat for a single species, however, may come at a price to other species, unless that species is a keystone species for the desired habitat conditions (i.e., Ovenbirds in mature woodlands or Grasshopper sparrow in grasslands).

Species richness, diversity, and evenness values are generally greater for bird communities in woodland and mixed habitats (Kelsey 2001) than grasslands (Cody 1966, Knopf 1997, Wiens 1973, Wiens 1974, Zimmerman 1992). Kelsey (2001) reported species richness for breeding birds on 271 transects (0.5 ha) to be between 5.3 and 6.5 individuals in woodland habitats. Using spot mapping techniques on 4.0 – 10.6 ha plots, Cody (1966) reported species richness across seasons in grasslands as generally less than 10 and Wiens (1973) reported breeding species richness much less than this, 2 - 6. Therefore, species richness, diversity, and distribution evenness values for the breeding bird community in the mixed habitat types at PERI appear to be slightly low (woodland habitat) to normal (grassland habitat). Average species richness of 4.4 individuals was recorded in both the grassland and woodland habitats. Our distribution evenness values suggest that a number of breeding species contributed significantly to diversity measures in both habitat types, with species being slightly more evenly distributed in the woodland habitat than the grassland habitat. The utility of richness, diversity, and evenness values will increase when we examine changes in the bird community through time—20, 30 or more years—and these changes may be linked to management activity rather than innate variability of the habitats present.

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Appendix

Appendix 1. Bird species counts by plot for Pea Ridge National Military Park, Arkansas in 2008. Data include all species recorded from a plot during a 5 min. survey. A species may have been recorded as a flyover only. No species recorded outside a 5 min. survey were included.

	Species code																																	
PLOT	**ACFL**	AMCR	AMGO	AMRE	AMRO	BARS	BAWW	BEWR	BGGN	BHCO	BLJA	**BRTH**	**BWWA**	CACH	**CARW**	CHSP	COYE	EABL	EAKI	EAME	EAPH	**EATO**	EAWP	ETTI	FISP	GCFL	GRCA	**GRSP**	HAWO	**HESP**	**INBU**	**KEWA**	**LOWA**	MOOD	NOBO
1	**0**	0	0	0	0	0	0	0	1	1	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**1**	0	0	0	0	0	**0**	0	**0**	**2**	**1**	**0**	0	0
2	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
3	**0**	0	0	0	0	0	0	0	2	1	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**1**	**0**	**0**	0	0
4	**1**	0	0	0	0	0	0	0	2	0	0	**0**	**0**	0	**0**	0	0	0	0	0	1	**0**	1	1	0	0	0	**0**	0	**0**	**1**	**0**	**0**	0	0
5	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**1**	**0**	**0**	0	0
6	**0**	0	0	0	0	0	0	0	0	0	1	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
7	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	1	0	1	0	**0**	0	**0**	**0**	**0**	**0**	0	0
8	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	1	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
9	**1**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	1	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
10	**2**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	1	**0**	**0**	**0**	**0**	0	0
11	**1**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
12	**1**	0	0	0	0	0	0	1	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
13	**1**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**1**	**0**	0	0
14	**0**	1	2	0	0	0	0	0	0	0	0	**0**	**1**	0	**0**	0	0	0	0	0	0	**0**	0	0	3	0	0	**0**	0	**0**	**2**	**0**	**0**	0	0
15	**0**	0	0	0	0	0	0	0	0	0	1	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	2	1	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
16	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
17	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	1	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
18	**0**	0	0	0	0	0	0	1	0	0	0	**0**	**0**	0	**1**	0	0	0	0	0	0	**0**	1	1	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
19	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	1	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
20	**1**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	1	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
21	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**1**	0	0	3	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
22	**0**	0	0	0	0	0	1	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
23	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**1**	0	0	0	0	0	0	**0**	0	1	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
24	**0**	0	0	0	0	0	1	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	1	0	0	0	**0**	0	**0**	**0**	**1**	**0**	0	0
25	**0**	0	0	0	0	0	0	0	1	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	1	0	0	0	**0**	0	**0**	**0**	**1**	**0**	0	0
26	**0**	0	0	0	0	0	1	0	1	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**1**	**0**	**0**	0	0
27	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**1**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
28	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**1**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
29	**1**	0	0	0	0	0	0	0	1	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
30	**0**	1	0	0	0	0	0	0	0	1	0	**1**	**0**	0	**1**	0	0	0	2	0	0	**0**	0	1	2	0	0	**0**	0	**0**	**1**	**0**	**0**	0	0
31	**0**	1	0	0	0	0	0	0	0	0	0	**2**	**0**	0	**0**	0	2	0	0	0	0	**1**	0	0	0	0	0	**0**	0	**0**	**2**	**0**	**0**	0	0

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	Species code																											
PLOT	NOCA	NOMO	NOPA	OVEN	PIWO	**PRAW**	**RBWO**	REVI	RTHA	RTHU	RWBL	SCTA	SOSP	SUTA	SWTH	TUVU	VEER	WBNU	**WEVI**	**WEWA**	**WOTH**	WPWI	YBCH	YBCU	**YTVI**	YWAR	**SPP**	**SCI**
1	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**5**	**3**
2	0	0	0	0	0	**0**	**1**	0	0	0	0	0	0	1	0	0	0	0	**0**	**0**	**0**	0	0	0	**2**	0	**4**	**2**
3	0	0	1	0	0	**0**	**0**	0	1	0	0	0	0	2	0	0	0	0	**0**	**0**	**0**	0	0	0	**2**	0	**7**	**2**
4	0	0	0	0	0	**0**	**0**	0	0	0	0	1	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**7**	**2**
5	2	0	0	0	0	**0**	**0**	0	0	0	0	0	0	1	0	0	1	0	**0**	**0**	**1**	0	0	0	**0**	0	**5**	**2**
6	0	0	0	0	1	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**3**	**0**
7	0	0	0	0	1	**0**	**1**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**5**	**2**
8	0	0	0	0	0	**0**	**1**	0	0	0	0	1	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**4**	**1**
9	0	0	1	0	0	**0**	**1**	0	0	0	0	0	0	0	0	0	0	1	**0**	**0**	**0**	0	0	0	**1**	0	**6**	**3**
10	0	0	0	0	0	**0**	**0**	1	0	0	0	0	0	0	0	0	1	0	**0**	**0**	**0**	0	0	0	**0**	0	**4**	**1**
11	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	1	0	**0**	**0**	**0**	0	0	0	**1**	0	**3**	**2**
12	0	0	1	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**5**	**2**
13	0	0	1	0	0	**0**	**1**	0	0	0	0	0	0	0	1	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**6**	**4**
14	1	0	0	0	0	**1**	**0**	0	0	0	0	0	0	0	0	0	0	0	**1**	**0**	**0**	0	0	0	**0**	0	**8**	**4**
15	0	0	0	0	0	**0**	**1**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**4**	**1**
16	0	0	1	0	0	**0**	**1**	0	0	0	0	0	0	0	0	2	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**5**	**2**
17	2	0	0	0	0	**0**	**1**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**2**	**1**
18	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	2	0	1	0	**0**	**0**	**0**	1	0	0	**1**	0	**8**	**2**
19	0	0	1	0	0	**0**	**1**	0	0	0	0	0	0	1	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**6**	**2**
20	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	1	0	**0**	**1**	**0**	0	0	0	**0**	0	**4**	**2**
21	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	1	0	**0**	0	**3**	**1**
22	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	1	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**2**	**0**
23	1	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**3**	**1**
24	0	0	0	0	1	**0**	**0**	0	0	0	0	0	0	2	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**6**	**1**
25	0	0	1	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	1	0	**0**	**0**	**0**	0	0	0	**2**	0	**6**	**2**
26	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	2	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**5**	**2**
27	0	0	0	1	0	**0**	**1**	0	0	0	0	0	0	1	0	0	0	0	**0**	**1**	**0**	0	0	0	**1**	0	**7**	**4**
28	0	0	0	0	0	**0**	**1**	0	0	0	0	0	0	1	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**5**	**3**
29	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	1	**0**	**1**	**0**	0	0	0	**1**	0	**5**	**3**
30	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**8**	**3**
31	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	1	0	**0**	0	**6**	**3**

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	Species code																																		
PLOT	**ACFL**	AMCR	AMGO	AMRE	AMRO	BARS	BAWW	BEWR	BGGN	BHCO	BLJA	**BRTH**	**BWWA**	CACH	**CARW**	CHSP	COYE	EABL	EAKI	EAME	EAPH	**EATO**	EAWP	ETTI	FISP	GCFL	GRCA	**GRSP**	HAWO	**HESP**	**INBU**	**KEWA**	**LOWA**	MODO	NOBO
32	**0**	0	0	1	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
33	**0**	0	0	0	0	0	1	0	0	0	1	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
34	**0**	0	0	0	0	0	0	0	1	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**1**	**0**	**0**	0	0
35	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**1**	0	1	0	0	0	**0**	0	**0**	**3**	**0**	**0**	0	0
36	**0**	0	0	0	0	0	1	0	1	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	1	0	0	0	**0**	0	**0**	**1**	**0**	**0**	0	0
37	**1**	0	0	0	0	0	0	0	1	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**1**	0	0	0	0	0	**0**	0	**0**	**2**	**1**	**0**	0	0
38	**1**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**1**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
39	**1**	0	0	0	0	0	0	0	1	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
40	**0**	0	0	0	0	1	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	2	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
41	**0**	2	0	0	0	0	0	0	0	0	1	**0**	**0**	1	**0**	0	0	0	0	0	0	**0**	0	0	0	0	1	**0**	0	**0**	**0**	**0**	**0**	0	0
42	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**1**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**3**	**0**	**0**	0	0
43	**0**	0	0	0	0	0	0	0	0	0	2	**0**	**0**	0	**0**	0	0	0	0	0	0	**1**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
44	**0**	0	0	0	0	0	0	0	1	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**3**	**0**	**0**	0	0
45	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
46	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	1	0	0	0	0	0	**0**	0	1	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
47	**0**	1	0	1	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**2**	**0**	**1**	0	0
48	**0**	0	0	0	0	0	0	0	1	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
49	**0**	0	0	0	0	0	0	0	0	1	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**1**	**0**	**0**	**0**	0	1
50	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	1	0	**1**	1	0	1	0	0	**0**	0	**0**	**1**	**0**	**0**	0	0
51	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**1**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
52	**0**	0	0	2	0	0	0	0	0	0	0	**0**	**0**	0	**1**	0	0	0	0	0	0	**0**	0	0	1	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
53	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**1**	0	0	0	0	0	0	**1**	0	0	0	0	0	**0**	0	**0**	**1**	**0**	**0**	0	0
54	**0**	0	0	0	0	3	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	3	0	**1**	0	0	1	0	0	**1**	0	**0**	**0**	**0**	**0**	0	0
55	**0**	0	0	0	0	0	0	0	1	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
56	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
57	**0**	1	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	1	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
58	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**2**	**0**	**0**	0	0
59	**0**	2	0	0	0	0	0	0	1	0	1	**0**	**0**	0	**1**	0	0	2	0	1	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
60	**0**	0	0	0	0	0	0	0	1	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**1**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
61	**1**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	2	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
62	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
63	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
64	**1**	1	0	0	0	0	0	0	0	0	1	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	1	2	0	0	**0**	0	**0**	**2**	**0**	**0**	0	0
65	**1**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	1	0	0	**0**	0	**0**	**2**	**0**	**0**	0	0

Appendix 1. Bird species counts by plot for Pea Ridge National Military Park, Arkansas in 2008. Data include all species recorded from a plot during a 5 min. survey. A species may have been recorded as a flyover only. No species recorded outside a 5 min. survey were included (continued).

	Species code																											
PLOT	NOCA	NOMO	NOPA	OVEN	PIWO	**PRAW**	**RBWO**	REVI	RTHA	RTHU	RWBL	SCTA	SOSP	SUTA	SWTH	TUVU	VEER	WBNU	**WEVI**	**WEWA**	**WOTH**	WPWI	YBCH	YBCU	**YTVI**	YWAR	**SPP**	**SCI**
32	1	0	0	0	0	**0**	**0**	0	0	0	0	0	0	3	0	0	0	0	**0**	**0**	**3**	0	0	0	**1**	0	**6**	**2**
33	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	1	0	0	0	1	**0**	**0**	**0**	0	0	0	**0**	0	**5**	**0**
34	1	0	0	0	0	**0**	**0**	0	0	0	0	1	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**4**	**1**
35	0	0	1	0	0	**0**	**0**	0	0	0	0	0	0	1	0	0	0	0	**0**	**0**	**0**	0	0	1	**0**	0	**6**	**2**
36	0	0	0	0	0	**0**	**0**	1	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**6**	**2**
37	0	0	1	0	1	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**1**	0	0	0	**0**	0	**8**	**5**
38	0	0	0	0	0	**0**	**0**	0	0	1	0	0	0	1	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**6**	**3**
39	0	0	0	0	0	**0**	**0**	1	0	0	0	0	0	0	0	0	0	2	**0**	**0**	**0**	0	0	0	**0**	0	**5**	**1**
40	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**2**	**0**
41	2	0	2	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	1	0	0	**0**	0	**7**	**0**
42	1	0	0	0	0	**0**	**0**	0	0	0	0	0	0	1	0	0	0	0	**1**	**0**	**0**	0	0	0	**0**	0	**5**	**3**
43	1	0	2	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**5**	**2**
44	0	0	0	0	0	**0**	**1**	0	0	0	0	0	0	1	0	0	0	0	**0**	**0**	**0**	0	0	0	**2**	0	**5**	**3**
45	1	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	2	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**2**	**0**
46	1	0	0	0	0	**0**	**0**	1	0	0	0	0	0	0	1	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**5**	**0**
47	0	0	0	0	0	**0**	**1**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**6**	**4**
48	0	0	0	0	0	**0**	**0**	0	1	0	0	0	0	0	0	0	0	1	**0**	**1**	**0**	0	0	0	**0**	0	**4**	**1**
49	0	0	0	0	0	**0**	**0**	0	0	0	3	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**4**	**1**
50	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**5**	**2**
51	1	0	0	0	0	**0**	**0**	0	0	0	0	0	0	2	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**3**	**1**
52	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**3**	**1**
53	0	0	2	0	0	**0**	**0**	0	0	0	0	0	0	0	0	1	0	0	**0**	**0**	**0**	0	1	1	**0**	0	**7**	**3**
54	1	0	0	0	0	**0**	**1**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**7**	**3**
55	0	0	1	0	0	**0**	**0**	0	0	0	0	0	0	1	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**4**	**1**
56	1	0	1	0	0	**0**	**0**	1	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**3**	**0**
57	0	0	1	0	1	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**5**	**1**
58	0	0	1	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**3**	**2**
59	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	1	0	**0**	0	**7**	**1**
60	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	1	0	**0**	**0**	**0**	0	0	0	**1**	0	**4**	**2**
61	0	0	0	0	0	**0**	**1**	0	0	0	0	0	0	1	0	0	0	1	**0**	**0**	**0**	0	0	0	**2**	0	**7**	**3**
62	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**1**	**0**
63	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**2**	0	**1**	**1**
64	1	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**8**	**3**
65	0	0	0	0	2	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**4**	**2**

Appendix 1. Bird species counts by plot for Pea Ridge National Military Park, Arkansas in 2008. Data include all species recorded from a plot during a 5 min. survey. A species may have been recorded as a flyover only. No species recorded outside a 5 min. survey were included (continued).

	Species code																																		
PLOT	**ACFL**	AMCR	AMGO	AMRE	AMRO	BARS	BAWW	BEWR	BGGN	BHCO	BLJA	**BRTH**	**BWWA**	CACH	**CARW**	CHSP	COYE	EABL	EAKI	EAME	EAPH	**EATO**	EAWP	ETTI	FISP	GCFL	GRCA	**GRSP**	HAWO	**HESP**	**INBU**	**KEWA**	**LOWA**	MODO	NOBO
66	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**2**	0	1	0	0	0	**0**	0	**0**	**1**	**0**	**0**	0	0
67	**0**	0	0	2	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
68	**0**	1	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
69	**0**	0	0	0	0	0	0	0	0	1	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**1**	0	0	0	0	0	**0**	0	**2**	**0**	**0**	**0**	0	0
70	**1**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
71	**1**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
72	**0**	0	0	0	0	0	0	0	1	1	0	**0**	**0**	1	**0**	0	0	0	0	0	0	**0**	0	0	0	0	1	**0**	0	**0**	**0**	**0**	**0**	0	0
73	**0**	0	0	0	0	1	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	3	0	**0**	0	0	1	0	0	**1**	0	**0**	**0**	**0**	**0**	0	0
74	**0**	0	0	0	0	0	0	0	1	0	0	**0**	**0**	0	**0**	1	1	2	0	0	0	**1**	1	0	2	0	0	**0**	0	**0**	**0**	**0**	**0**	1	0
75	**0**	1	0	0	0	0	1	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	1	**1**	0	0	0	0	0	**0**	0	**0**	**1**	**0**	**0**	0	0
76	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**2**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
77	**0**	0	0	0	0	0	0	0	0	0	1	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
78	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	1	0	0	1	0	**0**	0	1	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
79	**0**	1	0	0	1	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	2	0	**0**	0	1	0	0	0	**1**	0	**0**	**0**	**0**	**0**	0	0
80	**0**	0	0	0	0	0	1	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**1**	0	0	0	0	0	**0**	0	**0**	**2**	**0**	**0**	0	0
81	**0**	0	0	0	0	0	0	0	2	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
82	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	1	0	**1**	0	0	1	0	0	**2**	0	**0**	**1**	**0**	**0**	0	0
83	**0**	2	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	3	0	**0**	1	0	0	0	0	**1**	0	**0**	**0**	**0**	**0**	0	0
84	**0**	0	0	0	0	0	0	0	1	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**1**	0	0	0	1	0	**0**	0	**0**	**0**	**0**	**0**	0	0
85	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	1	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
86	**0**	0	0	0	1	0	0	0	0	0	0	**0**	**0**	0	**1**	0	0	0	0	0	0	**1**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
87	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**2**	0	0	0	0	0	0	**0**	0	0	1	0	0	**0**	0	**0**	**2**	**0**	**0**	0	0
88	**0**	0	0	0	0	0	0	0	1	0	0	**0**	**0**	0	**1**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**1**	**0**	**0**	0	0
89	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**1**	1	0	0	0	0	**0**	0	**0**	**3**	**0**	**0**	0	0
90	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	2	0	**0**	0	0	1	0	0	**1**	0	**0**	**0**	**0**	**0**	0	0
91	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	1	0	**0**	0	2	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
92	**0**	0	2	0	0	0	0	0	0	0	0	**0**	**1**	0	**1**	0	0	0	0	0	0	**1**	0	0	1	0	0	**0**	0	**0**	**1**	**0**	**0**	0	0
93	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	0	1	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
94	**2**	0	0	0	0	0	1	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
95	**0**	0	0	0	0	0	0	0	0	0	1	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	1	0	0	0	**0**	0	**0**	**3**	**0**	**0**	0	0
96	**0**	0	0	0	0	0	0	1	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	0	1	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
97	**0**	0	0	0	0	0	0	0	0	1	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	1	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
98	**1**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**0**	0	0	0	0	0	0	**0**	2	1	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0
99	**0**	0	0	0	0	0	0	0	0	0	0	**0**	**0**	0	**2**	0	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	0	0

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	Species code																											
PLOT	NOCA	NOMO	NOPA	OVEN	PIWO	**PRAW**	**RBWO**	REVI	RTHA	RTHU	RWBL	SCTA	SOSP	SUTA	SWTH	TUVU	VEER	WBNU	**WEVI**	**WEWA**	**WOTH**	WPWI	YBCH	YBCU	**YTVI**	YWAR	**SPP**	**SCI**
66	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	1	0	0	0	0	**1**	**0**	**0**	0	0	0	**1**	0	**6**	**4**
67	1	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**2**	**0**
68	3	0	1	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**3**	**0**
69	2	0	0	0	0	**1**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	1	0	**0**	0	**6**	**3**
70	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**2**	0	0	0	**0**	0	**2**	**2**
71	1	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	1	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**4**	**1**
72	1	0	0	0	0	**0**	**0**	0	0	0	0	0	0	1	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**6**	**0**
73	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**4**	**1**
74	0	0	1	0	0	**0**	**0**	0	0	0	0	0	0	1	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**10**	**1**
75	3	0	0	0	0	**0**	**0**	0	0	0	0	0	0	1	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**8**	**3**
76	1	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	1	**5**	**2**
77	0	0	0	0	1	**0**	**0**	0	0	0	0	1	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**5**	**1**
78	2	0	0	0	0	**0**	**0**	0	0	0	2	0	0	1	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**6**	**0**
79	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**5**	**1**
80	0	1	1	0	0	**0**	**1**	1	0	0	0	0	0	1	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**8**	**3**
81	0	0	0	0	0	**0**	**0**	1	0	0	0	0	0	0	0	0	0	0	**0**	**3**	**0**	0	0	0	**0**	0	**3**	**1**
82	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**5**	**3**
83	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**5**	**2**
84	1	0	0	0	0	**0**	**0**	0	0	0	0	0	1	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**6**	**2**
85	0	0	1	0	0	**0**	**0**	0	1	0	0	0	1	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**4**	**0**
86	2	0	1	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	1	0	**0**	0	**6**	**2**
87	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**3**	**2**
88	0	0	1	0	0	**0**	**0**	0	0	0	0	0	0	1	0	0	0	0	**1**	**0**	**0**	0	0	0	**0**	0	**7**	**3**
89	1	0	0	0	0	**1**	**0**	0	0	0	0	0	0	2	0	0	0	0	**0**	**0**	**0**	0	1	0	**0**	0	**7**	**3**
90	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**3**	**1**
91	1	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**3**	**0**
92	0	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**1**	**0**	**0**	0	0	0	**0**	0	**7**	**5**
93	2	0	0	0	1	**0**	**0**	0	0	0	0	0	0	1	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**5**	**1**
94	1	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**4**	**1**
95	0	0	1	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**1**	0	**5**	**2**
96	1	0	1	0	1	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**5**	**0**
97	0	0	0	0	0	**0**	**0**	1	0	0	0	0	0	1	0	0	0	1	**0**	**0**	**0**	0	0	0	**0**	0	**5**	**0**
98	0	0	0	0	0	**0**	**1**	0	0	0	0	0	0	2	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	0	**5**	**2**
99	2	0	0	0	0	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	0	0	0	**0**	1	**3**	**1**

SPP = Species Richness; SCI = The Species Richness for a plot of "Species of Continental Importance"

Appendix 2. Listed are the measured habitat parameters at Pea Ridge National Military Park, Arkansas during the 2008 bird breeding season. Within the scale in which habitat parameters are collected, 50-m plot, 5-m subplot, and 1.78-m sample plot, percentages of coverage may not necessarily sum to 100% as values are averaged over mid-point values of cover classes (i.e. class 1 = 0.5%, class 2 = 3.0%, class 3 = 15.0%, class 4 = 37.5%, class 5 = 62.5%, class 6 = 85.0%, and class 7 = 97.5%).

	Plot														
Habitat Parameter	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
50 meter plot coverage															
Fescue/Orchard Grass (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Field / Prairie (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	97.5	0.0
Highway Right of Way (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lawn (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Field (%)	62.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Open Woodland (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking Lot (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pasture Road (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0
Paved Road (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pond (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Riparian Woodland (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shrub (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stream (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trail (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tree Line (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Woodland (%)	15.0	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	0.0	97.5
5 meter subplot															
Canopy cover															
Hardwood (%)	34.6	95.7	97.0	98.5	0.0	96.2	98.8	94.9	98.0	99.1	99.6	95.7	96.5	0.0	93.1
Conifer (%)	13.0	0.0	0.0	0.0	99.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.2	0.0
Total cover (%)	48.6	95.7	97.0	98.5	99.8	96.2	98.8	94.9	98.0	99.1	99.6	95.7	96.5	5.2	93.1
Canopy Height															
Hardwood (m)	9.3	22.3	34.8	18.8	0.0	14.5	20.9	14.2	27.7	28.1	27.4	16.0	17.5	0.0	15.7
Conifer (m)	0.0	0.00	0.0	0.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basal Area															
Hardwood (m^2/ha)	5.0	9.0	13.0	7.0	0.0	7.0	9.0	10.0	11.00	8.0	11.0	14.0	4.0	0.0	12.0
Conifer (m^2/ha)	1.0	0.0	0.0	0.0	13.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Horizontal vegetation profile at 15-m															
0.0 – 0.25 m (%)	62.5	62.5	37.5	62.5	15.0	62.5	37.5	15.0	97.5	97.5	97.5	97.0	37.5	85.0	62.5
0.25 – 0.50 m (%)	15.0	37.5	3.0	37.5	3.0	15.0	37.5	0.0	97.5	85.0	37.5	62.0	3.0	3.0	37.5
0.50 – 0.75 m (%)	0.0	0.0	15.0	0.0	85.0	0.0	3.0	0.0	0.0	0.0	0.5	0.0	0.0	3.0	3.0

Appendix 2. Listed are the measured habitat parameters at Pea Ridge National Military Park, Arkansas during the 2008 bird breeding season. Within the scale in which habitat parameters are collected, 50-m plot, 5-m subplot, and 1.78-m sample plot, percentages of coverage may not necessarily sum to 100% as values are averaged over mid-point values of cover classes (i.e. class 1 = 0.5%, class 2 = 3.0%, class 3 = 15.0%, class 4 = 37.5%, class 5 = 62.5%, class 6 = 85.0%, and class 7 = 97.5%) (continued).

	Plot														
Habitat Parameter	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0.75 – 1.0 m (%)	0.0	0.0	3.0	0.0	85.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.5
1.0 – 1.25 m (%)	0.0	0.0	15.0	0.0	85.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.5
1.25 – 1.5 m (%)	0.0	0.0	3.0	3.0	97.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.5	0.0
1.5 – 1.75 m (%)	0.0	0.0	15.0	97.5	97.5	0.0	15.0	0.0	0.5	0.0	0.0	0.0	85.0	3.0	0.0
1.75 - 2.0 m (%)	0.0	0.0	37.5	15.0	97.5	0.0	3.0	0.0	15.0	0.5	0.0	0.0	85.0	15.0	0.0
Vertical Profile: Deciduous															
0.0 – 1.0 m (%)	0.0	50.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0
1.0 – 2.0 m (%)	0.0	50.0	0.0	25.0	0.0	50.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	25.0	50.0	0.0	25.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	25.0	25.0	25.0	0.0	0.0	50.0	25.0	0.0	25.0	0.0	25.0	0.0	0.0	0.0	0.0
4.0 – 5.0 m (%)	0.0	25.0	25.0	50.0	0.0	50.0	0.0	25.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0
5.0 – 6.0 m (%)	0.0	25.0	25.0	75.0	0.0	50.0	25.0	25.0	25.0	0.0	50.0	0.0	0.0	0.0	0.0
6.0 – 7.0 m (%)	0.0	25.0	50.0	0.0	0.0	50.0	50.0	0.0	25.0	0.0	50.0	75.0	0.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	50.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vertical Profile: Conifer															
0.0 – 1.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.0 – 5.0 m (%)	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0 – 6.0 m (%)	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	0.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vertical Profile: Herbaceous															
0.0 – 1.0 m (%)	100.0	0.0	25.0	75.0	0.0	50.0	0.0	50.0	100.0	75.0	75.0	100.0	75.0	75.0	0.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.0 – 5.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0 – 6.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix 2. continued

Habitat Parameter	Plot 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.78 meter sample plot coverage															
Deciduous litter (%)	0.5	85.0	97.5	15.0	0.5	85.0	97.5	97.5	62.5	62.5	37.5	85.0	62.5	0.5	85.0
Conifer litter (%)	3.0	0.0	0.0	0.0	62.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Grass litter (%)	0.5	0.5	0.5	0.5	0.5	0.5	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Bare soil (%)	85.0	0.5	0.5	15.0	15.0	0.0	0.5	0.5	15.0	15.0	3.0	0.5	15.0	85.0	0.5
Rock (%)	3.0	3.0	3.0	62.5	0.5	0.5	3.0	3.0	15.0	15.0	62.5	3.0	15.0	0.0	15.0
Woody debris (%)	0.5	3.0	3.0	3.0	3.0	15.0	0.5	3.0	3.0	15.0	3.0	3.0	3.0	3.0	15.0
Unvegetated (%)	85.0	97.5	97.5	37.5	97.5	85.0	97.5	97.5	97.5	62.5	67.5	85.0	97.5	97.5	97.5
Warm-season grass (%)	15.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Cool-season grass (%)	0.5	0.5	0.5	0.5	0.0	0.0	0.0	3.0	3.0	0.5	0.5	3.0	0.5	0.5	0.5
Forb (%)	37.5	0.5	0.5	3.0	0.5	0.5	0.5	3.0	3.0	3.0	3.0	15.0	0.5	15.0	0.5
Moss and lichen (%)	0.5	3.0	0.5	37.5	3.0	3.0	3.0	0.5	3.0	15.0	0.5	3.0	3.0	0.5	3.0
Woody shrub and vine (%)	0.5	3.0	3.0	0.5	0.0	15.0	3.0	3.0	0.5	3.0	3.0	3.0	15.0	0.5	0.0
Tree seedling (%)	0.0	15.0	3.0	0.5	0.0	0.0	3.0	0.5	0.0	0.5	0.5	0.5	3.0	0.0	3.0
Total foliar (%)	37.5	15.0	15.0	37.5	3.0	15.0	15.0	3.0	15.0	15.0	3.0	37.5	15.0	15.0	3.0

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	Plot														
Habitat Parameter	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
50 meter plot coverage															
Fescue/Orchard Grass (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	97.5
Field/Prairie (%)	0.0	0.0	0.0	0.0	0.0	85.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Highway Right of Way (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lawn (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Field (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Open Woodland (%)	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking Lot (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pasture Road (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paved Road (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pond (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Riparian Woodland (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shrub (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stream (%)	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trail (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tree Line (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Woodland (%)	97.5	62.5	97.5	97.5	97.5	0.0	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	0.0
5 meter subplot															
Canopy cover															
Hardwood (%)	95.4	5.2	96.2	99.1	90.0	0.0	92.0	84.0	94.6	92.3	98.3	95.7	92.8	98.5	0.0
Conifer (%)	0.0	34.6	0.0	0.0	0.0	0.0	0.0	24.4	0.0	0.0	0.0	3.1	0.0	0.0	0.0
Total cover (%)	95.4	40.0	96.2	99.1	90.0	0.0	92.0	97.2	94.6	92.3	98.3	98.8	92.8	98.5	0.0
Canopy Height															
Hardwood (m)	16.3	6.0	16.3	21.2	29.0	0.0	12.3	8.5	14.3	18.2	18.3	25.9	26.4	26.2	0.00
Basal Area															
Hardwood (m^2/ha)	9.0	0.0	12.0	10.0	7.0	0.0	4.0	6.0	8.0	8.0	11.0	3.0	9.0	8.0	0.0
Conifer (m^2/ha)	0.0	3.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
Horizontal vegetation profile at 15m															
0.0 – 0.25 m (%)	62.5	85.0	37.5	37.5	97.5	85.0	85.0	37.5	15.0	37.5	62.5	3.0	15.0	97.5	97.5
0.25 – 0.5 m (%)	0.0	62.5	3.0	15.0	97.5	3.0	62.5	3.0	0.0	3.0	62.5	0.0	0.5	97.5	97.5
0.5 – 0.75 m (%)	0.0	15.0	0.0	0.0	62.5	0.0	37.5	0.0	0.0	0.0	3.0	0.0	0.0	0.5	37.5

Appendix 2. Listed are the measured habitat parameters at Pea Ridge National Military Park, Arkansas during the 2008 bird breeding season. Within the scale in which habitat parameters are collected, 50-m plot, 5-m subplot, and 1.78-m sample plot, percentages of coverage may not necessarily sum to 100% as values are averaged over mid-point values of cover classes (i.e. class 1 = 0.5%, class 2 = 3.0%, class 3 = 15.0%, class 4 = 37.5%, class 5 = 62.5%, class 6 = 85.0%, and class 7 = 97.5%) (continued).

	Plot														
Habitat Parameter	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
0.75 – 1.0 m (%)	0.0	15.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.5	3.0
1.0 – 1.25 m (%)	0.0	15.0	0.0	3.0	0.0	0.0	0.5	0.0	0.0	3.0	0.5	3.0	0.0	0.5	0.0
1.25 – 1.5 m (%)	0.0	37.5	62.5	0.0	0.5	0.0	0.5	15.0	0.0	0.0	0.5	15.0	0.0	0.0	0.0
1.5 – 1.75 m (%)	0.0	62.5	0.5	0.0	0.0	0.0	0.5	37.5	0.0	0.0	85.0	85.0	0.0	0.0	0.0
1.75 - 2.0 m (%)	0.0	15.0	15.0	0.0	0.0	0.0	0.0	37.5	0.0	0.0	62.5	62.5	0.0	15.0	0.0
Vertical Profile: Deciduous															
0.0 – 1.0 m (%)	0.0	25.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	25.0	0.0	0.0	25.0	25.0	0.0
1.0 – 2.0 m (%)	0.0	0.0	25.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	25.0	25.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	75.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	0.0	0.0	25.0	0.0	0.0	0.0	25.0	25.0	0.0	25.0	0.0	0.0	0.0	25.0	0.0
4.0 – 5.0 m (%)	25.0	0.0	50.0	25.0	0.0	0.0	0.0	50.0	0.0	0.0	25.0	75.0	0.0	25.0	0.0
5.0 – 6.0 m (%)	0.0	0.0	50.0	25.0	0.0	0.0	0.0	50.0	25.0	25.0	0.0	50.0	0.0	25.0	0.0
6.0 – 7.0 m (%)	50.0	0.0	25.0	50.0	25.0	0.0	0.0	25.0	50.0	0.0	25.0	50.0	0.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0
Vertical Profile: Conifer															
0.0 – 1.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	25.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.0 – 5.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0 – 6.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vertical Profile: Herbaceous															
0.0 – 1.0 m (%)	0.0	100.0	50.0	50.0	50.0	100.0	0.0	0.0	0.0	25.0	75.0	0.0	75.0	0.0	100.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.0 – 5.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0 – 6.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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	Plot														
Habitat Parameter	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1.78 meter sample plot coverage															
Deciduous litter (%)	62.5	15.0	62.5	62.5	85.0	0.0	85.0	15.0	37.5	85.0	85.0	97.5	62.5	85.0	0.5
Conifer litter (%)	0.0	15.0	0.0	0.0	0.0	0.0	0.5	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grass litter (%)	0.5	37.5	0.5	0.5	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0	15.0
Bare soil (%)	15.0	15.0	37.5	15.0	0.5	85.0	0.5	15.0	62.5	3.0	0.5	0.5	3.0	3.0	62.5
Rock (%)	37.5	0.0	0.0	3.0	3.0	0.0	3.0	0.0	3.0	3.0	15.0	0.5	37.5	3.0	0.0
Woody debris (%)	15.0	0.5	3.0	3.0	3.0	0.5	15.0	15.0	3.0	3.0	3.0	3.0	3.0	3.0	0.0
Unvegetated (%)	85.0	62.5	85.0	85.0	85.0	85.0	85.0	62.5	97.5	97.5	85.0	97.5	62.5	85.0	62.5
Warm-season grass (%)	0.0	15.0	3.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Cool-season grass (%)	0.5	0.5	0.5	3.0	0.0	3.0	0.5	0.5	0.5	3.0	3.0	0.5	3.0	0.0	62.5
Forb (%)	0.5	3.0	3.0	3.0	3.0	15.0	0.5	0.5	3.0	3.0	3.0	0.5	3.0	3.0	0.5
Moss and lichen (%)	15.0	3.0	15.0	15.0	0.5	0.5	3.0	15.0	0.5	3.0	3.0	3.0	15.0	3.0	0.5
Woody shrub and vine (%)	3.0	15.0	0.5	3.0	15.0	0.5	15.0	3.0	0.5	0.5	0.5	0.5	0.5	0.5	3.0
Tree seedling (%)	0.5	0.0	0.5	0.5	15.0	0.0	3.0	0.0	0.5	0.5	0.5	3.0	3.0	3.0	0.0
Total foliar (%)	15.0	37.5	15.0	15.0	37.5	37.5	15.0	37.5	3.0	15.0	15.0	3.0	37.5	15.0	62.5

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	Plot														
Habitat Parameter	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
50 meter plot coverage															
Fescue/Orchard Grass (%)	85.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0
Field/Prairie (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	97.5	0.0	0.0	0.0	0.0	0.0
Highway right of Way (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0
Lawn (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Field (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.5	0.0	0.0	0.0	0.0
Open Woodland (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.0	37.5	0.0
Parking Lot (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pasture (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paved Road (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0	0.0	0.0
Pond (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Riparian Woodland (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shrub (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stream (%)	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trail (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tree Line (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.5	0.0
Woodland (%)	0.0	97.5	97.5	97.5	97.5	97.5	85.0	97.5	97.5	0.0	15.0	85.0	37.5	0.0	97.5
5 meter subplot															
Canopy cover															
Hardwood (%)	19.8	96.2	96.5	86.1	96.5	89.7	98.5	88.1	94.6	0.0	1.3	16.3	6.2	33.5	90.2
Conifer (%)	0.0	0.0	0.0	21.8	0.0	0.0	0.0	0.0	0.0	0.0	71.2	43.7	88.7	68.1	10.1
Total cover (%)	19.8	96.2	96.5	98.8	96.5	89.7	98.5	88.1	94.6	0.0	72.5	61.7	93.3	96.7	99.6
Canopy Height															
Hardwood (m)	11.0	19.1	19.7	12.5	10.8	12.2	17.9	23.0	22.0	0.0	8.9	14.1	5.7	13.0	18.6
Conifer (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.2	11.9	6.8
Basal Area															
Hardwood (m^2/ha)	1.0	6.0	13.0	7.0	9.0	10.0	6.0	8.0	8.0	0.0	0.0	1.0	0.0	3.0	9.0
Conifer (m^2/ha)	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	6.0	2.0	4.0
Horizontal vegetation profile at 15m															
0.0 – 0.25 m (%)	97.5	97.5	15.0	3.0	85.0	85.0	85.0	85.0	97.5	97.5	97.5	62.5	85.0	97.5	0.5
0.25 – 0.5 m (%)	97.5	97.5	0.0	0.5	62.5	3.0	97.5	0.5	97.5	62.5	62.5	15.0	37.5	85.0	0.0
0.5 – 0.75 m (%)	62.5	0.0	0.0	15.0	0.0	0.0	62.5	0.5	37.5	0.0	0.0	0.0	85.0	15.0	0.0

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	Plot														
Habitat Parameter	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
0.75 – 1.0 m (%)	62.5	0.0	0.0	3.0	0.5	0.0	62.5	0.0	15.0	0.0	0.0	0.0	85.0	15.0	0.0
1.0 – 1.25 m (%)	62.5	0.0	0.0	62.5	3.0	0.5	62.5	3.0	0.0	0.0	0.0	0.0	62.5	62.5	0.5
1.25 – 1.5 m (%)	15.0	0.0	0.0	3.0	37.5	0.0	85.0	62.5	0.0	0.0	3.0	0.0	85.0	62.5	85.0
1.5 – 1.75 m (%)	0.5	0.0	0.0	3.0	62.5	0.0	85.0	0.0	0.0	0.0	0.0	0.0	85.0	85.0	85.0
1.75 – 2.0 m (%)	0.5	0.0	0.0	0.5	0.5	0.0	62.5	0.0	15.0	0.0	0.0	0.0	85.0	85.0	62.5
Vertical Profile: Deciduous															
0.0 – 1.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	100.0	0.0	0.0	25.0	0.0	0.0	0.0
1.0 – 2.0 m (%)	50.0	0.0	0.0	0.0	25.0	0.0	50.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	25.0	0.0	25.0	25.0	25.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0
3.0 – 4.0 m (%)	0.0	25.0	50.0	0.0	25.0	50.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	50.0
4.0 – 5.0 m (%)	0.0	50.0	25.0	0.0	50.0	50.0	25.0	0.0	0.0	0.0	0.0	25.0	25.0	0.0	50.0
5.0 – 6.0 m (%)	0.0	25.0	75.0	0.0	50.0	75.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0
6.0 – 7.0 m (%)	0.0	25.0	0.0	0.0	50.0	25.0	25.0	25.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0
7.0 – 7.5 m (%)	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	25.0	0.0	0.0	0.0
Vertical Profile: Conifer															
0.0 – 1.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	25.0	25.0	0.0
3.0 – 4.0 m (%)	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	25.0	25.0	25.0
4.0 – 5.0 m (%)	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	50.0	0.0
5.0 – 6.0 m (%)	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	50.0	50.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	25.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	0.0
Vertical Profile: Herbaceous															
0.0 – 1.0 m (%)	50.0	25.0	0.0	0.0	75.0	75.0	75.0	100.0	0.0	100.0	100.0	100.0	75.0	75.0	25.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.0 – 5.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0 – 6.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix 2. Listed are the measured habitat parameters at Pea Ridge National Military Park, Arkansas during the 2008 bird breeding season. Within the scale in which habitat parameters are collected, 50-m plot, 5-m subplot, and 1.78-m sample plot, percentages of coverage may not necessarily sum to 100% as values are averaged over mid-point values of cover classes (i.e. class 1 = 0.5%, class 2 = 3.0%, class 3 = 15.0%, class 4 = 37.5%, class 5 = 62.5%, class 6 = 85.0%, and class 7 = 97.5%) (continued).

	Plot														
Habitat Parameter	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
1.78 meter sample plot coverage															
Deciduous litter (%)	3.0	85.0	85.0	85.0	62.5	97.5	15.0	97.5	62.5	0.0	0.5	15.0	3.0	15.0	85.0
Conifer litter (%)	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	62.5	0.0	85.0	62.5	3.0
Grass litter (%)	3.0	0.5	0.5	0.0	0.5	0.5	0.5	0.5	0.0	0.5	0.5	3.0	3.0	0.5	0.5
Bare soil (%)	85.0	15.0	3.0	0.5	15.0	0.0	62.5	0.0	3.0	85.0	37.5	37.5	0.5	0.5	3.0
Rock (%)	0.0	15.0	3.0	0.0	0.0	0.0	15.0	0.0	37.5	0.0	0.0	0.0	0.0	3.0	3.0
Woody debris (%)	37.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	0.0	0.5	0.5	3.0
Unvegetated (%)	62.5	85.0	97.5	97.5	85.0	97.5	62.5	97.5	97.5	62.5	85.0	62.5	85.0	85.0	97.5
Warm-season grass (%)	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	15.0	0.5	0.5	3.0	0.0	0.0
Cool-season grass (%)	37.5	0.5	0.5	0.0	3.0	3.0	15.0	3.0	0.0	15.0	3.0	3.0	0.5	3.0	0.5
Forb (%)	3.0	3.0	0.5	0.5	0.5	3.0	3.0	0.5	15.0	3.0	15.0	15.0	3.0	37.5	0.5
Moss and lichen (%)	3.0	3.0	3.0	3.0	3.0	0.0	15.0	0.5	3.0	0.5	0.0	15.0	3.0	0.5	3.0
Woody shrub and vine (%)	37.5	3.0	3.0	3.0	3.0	3.0	3.0	15.0	3.0	0.0	3.0	0.5	3.0	0.5	0.5
Tree seedling (%)	0.0	3.0	0.0	0.0	0.5	0.0	0.0	15.0	0.0	0.0	0.0	0.5	3.0	0.0	0.5
Total foliar (%)	85.0	15.0	3.0	3.0	15.0	15.0	37.5	37.5	15.0	37.5	37.5	62.5	15.0	37.5	3.0

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	Plot														
Habitat Parameter	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
50 meter plot coverage															
Fescue/Orchard grass (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	97.5	0.0	0.0	0.0	0.0	0.0	0.0
Field/Prairie (%)	0.0	0.0	0.0	97.5	97.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.5	0.0
Highway right of Way (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Lawn (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0
Old Field (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Open Woodland (%)	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking Lot (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0
Pasture Road (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0	0.0	0.0
Paved Road (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Pond (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Riparian Woodland (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.5	0.0	0.0
Shrub (%)	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stream (%)	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0
Trail (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tree Line (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Woodland (%)	97.5	97.5	97.5	0.0	0.0	97.5	52.5	62.5	0.0	85.0	97.5	97.5	62.5	37.5	97.5
5 meter subplot															
Canopy cover															
Hardwood (%)	82.2	95.4	98.5	0.0	0.0	31.7	82.4	11.7	0.0	60.3	94.9	98.8	98.5	29.6	69.9
Conifer (%)	0.0	0.0	0.0	0.0	0.0	75.1	0.0	89.7	0.0	42.6	0.0	0.0	0.0	0.0	35.4
Total Cover (%)	82.2	95.4	98.5	0.0	0.0	94.9	82.4	96.7	0.0	93.1	94.9	98.8	98.5	29.6	96.5
Canopy Height															
Hardwood (m)	15.1	29.7	24.5	0.0	0.0	17.0	14.5	5.3	0.0	12.2	24.5	22.2	28.2	0.0	15.8
Conifer (m)	0.0	0.0	0.0	0.0	0.0	11.6	0.0	14.7	0.0	8.5	0.0	0.0	0.0	0.0	6.6
Basal Area															
Hardwood (m^2/ha)	7.0	10.0	13.0	0.0	0.0	4.0	3.0	0.0	0.0	6.0	7.0	13.0	6.0	1.0	11.0
Conifer (m^2/ha)	0.0	0.0	0.0	0.0	0.0	3.0	0.0	13.0	0.0	2.0	1.0	0.0	0.0	0.0	1.0
Horizontal vegetation profile at 15m															
0.0 – 0.25 m (%)	97.5	97.5	37.5	97.5	97.5	85.0	97.5	85.0	97.5	97.5	97.5	3.0	97.5	97.5	3.0
0.25 – 0.5 m (%)	97.5	97.5	97.5	97.5	62.5	15.0	97.5	85.0	97.5	85.0	97.5	0.0	97.5	97.5	0.5
0.5 – 0.75 m (%)	0.0	97.5	85.0	85.0	0.0	0.5	15.0	0.5	15.0	0.5	15.0	0.0	85.0	15.0	0.0

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	Plot														
Habitat Parameter	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
0.75 – 1.0 m (%)	0.0	97.5	37.5	3.0	0.0	3.0	0.5	3.0	0.5	0.0	3.0	0.0	37.5	0.5	0.0
1.0 – 1.25 m (%)	0.0	97.5	0.0	0.5	0.0	0.0	0.0	15.0	0.0	0.0	85.0	0.0	97.5	0.0	0.0
1.25 – 1.5 m (%)	0.0	97.5	0.0	0.5	0.0	0.0	0.0	85.0	0.0	0.0	85.0	15.0	0.5	0.0	0.0
1.5 – 1.75 m (%)	0.0	97.5	0.0	0.0	0.0	0.0	0.0	85.0	0.0	0.5	85.0	15.0	15.0	0.0	0.0
1.75 – 2.00 m (%)	0.0	97.5	15.0	0.0	0.0	0.0	0.0	85.0	0.0	2.0	85.0	85.0	0.0	0.0	0.0
Vertical Profile: Deciduous															
0.0 – 1.0 m (%)	0.0	0.0	100.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	75.0	0.0	0.0
1.0 – 2.0 m (%)	25.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	50.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	25.0	0.0	25.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	25.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	25.0	25.0	0.0	25.0	0.0	0.0
4.0 – 5.0 m (%)	0.0	25.0	25.0	0.0	0.0	0.0	0.0	25.0	0.0	25.0	50.0	0.0	25.0	0.0	0.0
5.0 – 6.0 m (%)	50.0	25.0	25.0	0.0	0.0	50.0	25.0	0.0	0.0	50.0	50.0	25.0	50.0	0.0	0.0
6.0 – 7.0 m (%)	25.0	25.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	75.0	0.0	50.0	75.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	0.0	0.0
Vertical Profile: Conifer															
0.0 – 1.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.0 – 5.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0 – 6.0 m (%)	0.0	0.0	0.0	0.0	0.0	25.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	0.0	0.0	25.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vertical Profile: Herbaceous															
0.0 – 1.0 m (%)	25.0	75.0	0.0	75.0	100.0	50.0	100.0	50.0	100.0	25.0	100.0	0.0	50.0	100.0	0.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.0 – 5.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0 – 6.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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	Plot														
Habitat Parameter	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
1.78 meter sample plot coverage															
Deciduous litter (%)	62.5	85.0	97.5	0.5	0.0	37.5	62.5	115.0	0.0	15.0	15.0	3.0	62.5	0.0	85.0
Conifer litter (%)	0.0	0.0	0.0	0.0	0.0	15.0	0.0	85.0	0.0	3.0	0.0	0.0	0.0	0.0	3.0
Grass litter (%)	0.5	0.5	0.0	62.5	0.5	0.5	37.5	0.5	37.5	0.5	0.5	0.5	0.0	3.0	0.5
Bare soil (%)	0.5	0.5	0.5	37.5	85.0	3.0	0.5	0.5	62.5	15.0	62.5	37.5	15.0	62.5	3.0
Rock (%)	0.5	0.5	0.0	0.0	0.0	3.0	0.0	0.0	0.0	37.5	3.0	15.0	15.0	0.0	3.0
Woody debris (%)	37.5	15.0	3.0	0.0	0.0	15.0	0.5	15.0	0.0	0.5	3.0	37.5	15.0	0.0	15.0
Unvegetated (%)	85.0	97.5	97.5	85.0	85.0	85.0	85.0	97.5	62.5	97.5	97.5	62.5	85.0	62.5	97.5
Warm-season grass (%)	0.0	0.0	0.0	15.0	3.0	0.0	15.0	0.0	0.5	0.5	3.0	0.0	0.0	0.5	0.0
Cool-season grass (%)	0.5	0.5	0.0	3.0	15.0	3.0	37.5	0.5	15.0	3.0	3.0	0.5	0.0	15.0	3.0
Forb (%)	3.0	0.5	15.0	3.0	3.0	0.5	3.0	3.0	62.5	3.0	15.0	3.0	15.0	15.0	3.0
Moss and lichen (%)	3.0	0.5	0.5	0.5	0.0	15.0	0.0	3.0	0.0	15.0	0.5	15.0	3.0	0.5	3.0
Woody shrub and vine (%)	3.0	15.0	3.0	0.5	0.0	3.0	15.0	3.0	0.0	3.0	3.0	0.5	3.0	0.0	3.0
Tree seedling (%)	0.5	0.0	0.5	0.0	0.0	3.0	15.0	3.0	0.0	0.5	0.5	0.5	0.5	0.0	0.5
Total foliar (%)	15.0	15.0	15.0	15.0	37.5	15.0	62.5	15.0	85.0	37.5	15.0	15.0	37.5	62.5	15.0

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	Plot														
Habitat Parameter	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
50 meter plot coverage															
Fescue/Orchard Grass (%)	0.0	0.0	97.5	97.5	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	97.5	62.5	0.0
Field/Prairie (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.5	0.0	3.0	0.0	0.0	0.0	0.0
Highway Right of Way (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lawn (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Field (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Open Woodland (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.5	0.0	0.0	0.0
Parking Lot (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pasture Road (%)	0.0	0.0	0.0	0.0	0.0	3.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paved Road (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Pond (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Riparian Woodland (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shrub (%)	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Stream (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trail (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tree Line (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Woodland (%)	97.5	97.5	0.0	0.0	97.5	62.5	62.5	97.5	15.0	97.5	85.0	62.5	0.0	15.0	97.5
5 meter subplot															
Canopy cover															
Hardwood (%)	95.9	95.2	0.0	0.0	15.18	20.0	85.5	49.1	0.0	97.8	60.8	15.6	0.0	0.0	64.0
Conifer (%)	0.0	0.0	0.0	0.0	28.6	0.0	0.0	31.2	0.0	0.0	41.1	88.1	0.0	0.0	2.1
Total Cover (%)	95.9	95.2	0.0	0.0	42.6	20.0	85.5	92.3	0.0	97.8	99.1	98.5	0.0	0.0	66.0
Canopy Height															
Hardwood (m)	17.3	20.0	0.0	0.0	12.1	0.0	27.5	7.3	0.0	19.2	8.8	20.1	0.0	0.0	14.5
Conifer (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.5	0.0	0.0	12.9	0.0	0.0	0.0	0.0
Basal Area															
Hardwood (m^2/ha)	7.0	7.0	0.0	0.0	0.0	1.0	8.0	0.0	0.0	8.0	3.0	1.0	0.0	3.0	4.0
Conifer (m^2/ha)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	0.0	0.0	4.0	5.0	0.0	0.0	0.0
Horizontal vegetation profile at 15m															
0.0 – 0.25 m (%)	97.5	62.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	85.0	85.0	97.5	97.5	62.5	97.5
0.25 – 0.5 m (%)	62.5	0.5	97.5	62.5	97.5	97.5	97.5	97.5	97.5	3.0	85.0	37.5	62.5	3.0	97.5
0.5 – 075 m (%)	3.0	0.0	0.5	0.0	97.5	62.5	15.0	85.0	3.0	0.0	15.0	15.0	3.0	0.0	97.5

Appendix 2. Listed are the measured habitat parameters at Pea Ridge National Military Park, Arkansas during the 2008 bird breeding season. Within the scale in which habitat parameters are collected, 50-m plot, 5-m subplot, and 1.78-m sample plot, percentages of coverage may not necessarily sum to 100% as values are averaged over mid-point values of cover classes (i.e. class 1 = 0.5%, class 2 = 3.0%, class 3 = 15.0%, class 4 = 37.5%, class 5 = 62.5%, class 6 = 85.0%, and class 7 = 97.5%) (continued).

	Plot														
Habitat Parameter	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
0.75 – 1.0 m (%)	0.0	0.0	0.0	0.0	62.5	97.5	62.5	1.0	0.5	0.0	0.5	15.0	3.0	0.0	97.5
1.0 – 1.25 m (%)	0.0	0.0	0.0	0.0	0.5	97.5	0.0	15.0	0.5	0.0	15.0	37.5	0.0	0.0	62.5
1.25 – 1.5 m (%)	0.0	0.0	0.0	0.0	3.0	37.5	0.0	0.0	0.0	0.0	62.5	37.5	0.0	0.0	37.5
1.5 – 1.75 m (%)	0.0	0.0	0.0	0.0	62.5	85.0	0.0	3.0	0.0	0.0	85.0	62.5	0.0	0.0	85.0
1.75 – 2.00 m (%)	0.0	0.0	0.0	0.0	85.0	62.5	0.0	0.0	0.0	0.0	15.0	85.0	0.0	0.0	85.0
Vertical Profile: Deciduous															
0.0 – 1.0 m (%)	0.0	0.0	0.0	0.0	25.0	0.0	25.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0
3.0 – 4.0 m (%)	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0
4.0 – 5.0 m (%)	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0 – 6.0 m (%)	25.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	25.0	25.0	25.0	0.0	0.0	25.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	25.0	0.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vertical Profile: Conifer															
0.0 – 1.0 m (%)	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	0.0	0.0	25.0	0.0	0.0	25.0	0.0	0.0	25.0	25.0	0.0	0.0	25.0
3.0 – 4.0 m (%)	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	50.0	25.0	0.0	0.0	0.0
4.0 – 5.0 m (%)	0.0	0.0	0.0	0.0	25.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0
5.0 – 6.0 m (%)	0.0	0.0	0.0	0.0	25.0	0.0	0.0	50.0	0.0	0.0	50.0	25.0	0.0	0.0	0.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	75.0	25.0	0.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	75.0	0.0	0.0	0.0	0.0
Vertical Profile: Herbaceous															
0.0 – 1.0 m (%)	50.0	25.0	100.0	100.0	100.0	100.0	75.0	75.0	100.0	75.0	25.0	100.0	100.0	100.0	100.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.0 – 5.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0 – 6.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix 2. Listed are the measured habitat parameters at Pea Ridge National Military Park, Arkansas during the 2008 bird breeding season. Within the scale in which habitat parameters are collected, 50-m plot, 5-m subplot, and 1.78-m sample plot, percentages of coverage may not necessarily sum to 100% as values are averaged over mid-point values of cover classes (i.e. class 1 = 0.5%, class 2 = 3.0%, class 3 = 15.0%, class 4 = 37.5%, class 5 = 62.5%, class 6 = 85.0%, and class 7 = 97.5%) (continued).

	Plot														
Habitat Parameter	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
1.78 meter sample plot coverage															
Deciduous litter (%)	97.5	85.0	0.0	0.0	0.5	3.0	85.0	15.0	0.5	85.0	15.0	85.0	0.0	0.5	3.0
Conifer litter (%)	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	37.5	15.0	0.0	0.0	0.5
Grass litter (%)	0.5	0.5	37.5	62.5	3.0	37.5	0.5	0.5	62.5	0.5	0.5	0.5	62.5	37.5	0.5
Bare soil (%)	0.0	0.5	62.5	15.0	85.0	37.5	3.0	37.5	37.5	0.5	15.0	0.5	15.0	74.0	62.5
Rock (%)	3.0	3.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0
Woody debris (%)	3.0	3.0	0.0	0.0	0.5	0.0	15.0	3.0	0.5	15.0	3.0	3.0	0.0	0.0	3.0
Unvegetated (%)	97.5	97.5	85.0	62.5	97.5	85.0	97.5	37.5	85.0	97.5	97.5	97.5	62.5	97.5	62.5
Warm-season grass (%)	0.0	0.0	0.5	0.5	3.0	3.0	0.0	0.5	3.0	0.0	0.5	0.0	3.0	0.5	0.0
Cool-season grass (%)	0.5	0.5	37.5	15.0	0.5	15.0	0.5	0.5	0.5	0.5	0.5	0.5	37.5	3.0	3.0
Forb (%)	0.5	3.0	3.0	37.5	3.0	3.0	0.5	3.0	15.0	3.0	0.5	3.0	3.0	15.0	15.0
Moss and lichen (%)	0.5	0.5	0.5	0.0	0.5	0.0	0.5	37.5	0.0	3.0	3.0	0.5	0.0	0.5	3.0
Woody shrub and vine (%)	3.0	0.5	0.0	0.0	3.0	0.0	15.0	3.0	3.0	0.5	3.0	3.0	0.0	0.0	37.5
Tree seedling (%)	3.0	0.5	0.0	0.0	0.0	0.5	3.0	0.5	0.0	0.5	3.0	0.0	0.0	0.0	0.5
Total foliar (%)	3.0	3.0	37.5	62.5	15.0	15.0	37.5	37.5	15.0	3.0	15.0	3.0	62.5	15.0	62.5

Appendix 2. Listed are the measured habitat parameters at Pea Ridge National Military Park, Arkansas during the 2008 bird breeding season. Within the scale in which habitat parameters are collected, 50-m plot, 5-m subplot, and 1.78-m sample plot, percentages of coverage may not necessarily sum to 100% as values are averaged over mid-point values of cover classes (i.e. class 1 = 0.5%, class 2 = 3.0%, class 3 = 15.0%, class 4 = 37.5%, class 5 = 62.5%, class 6 = 85.0%, and class 7 = 97.5%) (continued)

	Plot														
Habitat Parameter	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
50 meter plot coverage															
Fescue/Orchard Grass (%)	0.0	0.0	85.0	85.0	0.0	0.0	97.5	97.5	0.0	37.5	0.0	15.0	0.0	62.5	85.0
Field/Prairie (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.5	15.0	0.0	0.0	0.0	0.0	0.0
Highway Right of Way (%)	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lawn (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Old Field (%)	37.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Open Woodland (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.5	0.0	0.0	15.0	0.0
Parking Lot (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pasture Road (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paved Road (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pond (%)	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Riparian Woodland (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shrub (%)	0.0	0.0	3.0	0.0	37.5	0.0	0.0	0.0	0.0	0.0	15.0	0.0	62.5	0.0	0.0
Stream (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trail (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tree Line (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Woodland (%)	37.5	97.5	0.0	0.0	37.5	97.5	0.0	0.0	62.5	15.0	0.0	62.5	37.5	0.0	3.0
5 meter subplot															
Canopy cover															
Hardwood (%)	32.0	95.4	13.5	0.0	54.1	71.8	0.0	0.0	33.3	0.0	32.2	88.9	99.1	96.5	0.0
Conifer (%)	0.0	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0
Total cover (%)	32.0	99.3	13.5	0.0	54.1	71.8	0.0	0.0	33.3	0.0	33.6	88.9	99.1	96.5	0.0
Canopy Height															
Hardwood (m)	12.3	20.7	0.0	0.0	10.1	21.4	0.0	0.0	11.9	0.0	11.7	21.9	22.8	15.6	0.0
Conifer (m)	0.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basal Area															
Hardwood (m^2/ha)	1.0	9.0	0.0	0.0	1.0	13.0	0.0	0.0	3.0	0.0	1.0	5.0	6.0	1.0	0.0
Conifer (m^2/ha)	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
Horizontal vegetation profile at 15m															
0.0 – 0.25 m (%)	97.5	37.5	97.5	97.5	97.5	85.0	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5
0.25 – 0.5 m (%)	62.5	0.5	85.0	97.5	97.5	62.5	85.0	62.5	97.5	97.5	85.0	97.5	97.5	97.5	85.0
0.5 – 0.75 m (%)	0.0	0.5	0.5	3.0	85.0	37.5	3.0	0.5	62.5	3.0	3.0	97.5	97.5	15.0	3.0

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	Plot														
Habitat Parameter	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
1.5 – 1.75 m (%)	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	85.0	0.0	0.0	37.5	85.0	97.5	0.0
0.75 – 1.0 m (%)	0.0	3.0	0.0	0.0	85.0	0.0	0.0	0.0	62.5	0.5	3.0	85.0	85.0	0.5	0.0
1.0 – 1.25 m (%)	0.0	0.0	0.0	0.0	37.5	0.0	0.0	0.0	3.0	0.0	3.0	37.5	97.5	3.0	0.0
1.25 – 1.5 m (%)	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	62.5	0.0	0.5	15.0	85.0	85.0	0.0
1.75 – 2.00 m (%)	0.0	3.0	0.0	0.0	0.5	0.0	0.0	0.0	85.0	0.0	0.0	15.0	85.0	97.5	0.0
Vertical Profile: Deciduous															
0.0 – 1.0 m (%)	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	50.0	25.0	0.0	0.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	50.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	25.0	0.0	0.0	25.0	0.0	0.0	0.0	25.0	0.0	0.0	75.0	25.0	0.0	0.0
3.0 – 4.0 m (%)	0.0	25.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	25.0	0.0
4.0 – 5.0 m (%)	25.0	25.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	25.0	0.0
5.0 – 6.0 m (%)	25.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.0	50.0	0.0
6.0 – 7.0 m (%)	25.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	75.0	25.0	0.0
7.0 – 7.5 m (%)	25.0	25.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0
Vertical Profile: Conifer															
0.0 – 1.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.0 – 5.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0 – 6.0 m (%)	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vertical Profile: Herbaceous															
0.0 – 1.0 m (%)	75.0	50.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	50.0	75.0	100.0	100.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.0 – 5.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0 – 6.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix 2. Listed are the measured habitat parameters at Pea Ridge National Military Park, Arkansas during the 2008 bird breeding season. Within the scale in which habitat parameters are collected, 50-m plot, 5-m subplot, and 1.78-m sample plot, percentages of coverage may not necessarily sum to 100% as values are averaged over mid-point values of cover classes (i.e. class 1 = 0.5%, class 2 = 3.0%, class 3 = 15.0%, class 4 = 37.5%, class 5 = 62.5%, class 6 = 85.0%, and class 7 = 97.5%) (continued)

	Plot														
Habitat Parameter	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
1.78 meter sample plot coverage															
Deciduous litter (%)	0.5	85.0	0.5	0.0	37.5	37.5	0.0	0.0	0.5	0.0	15.0	62.5	15.0	37.5	0.0
Conifer litter (%)	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
Grass litter (%)	0.5	0.5	62.5	15.0	15.0	0.5	85.0	62.5	85.0	62.5	37.5	0.5	0.5	37.5	85.0
Bare soil (%)	85.0	15.0	15.0	62.5	37.5	3.0	15.0	15.0	15.0	15.0	37.5	15.0	62.5	3.0	15.0
Rock (%)	3.0	0.5	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
Woody debris (%)	15.0	3.0	0.0	0.0	0.5	3.0	0.0	0.0	3.0	0.5	3.0	3.0	3.0	3.0	0.0
Unvegetated (%)	97.5	85.0	62.5	62.5	62.5	62.5	85.0	85.0	97.5	85.0	85.0	97.5	97.5	85.0	85.0
Warm-season grass (%)	0.5	0.0	0.5	0.5	0.5	0.0	0.5	0.5	0.5	0.5	15.0	0.5	3.0	0.0	0.0
Cool-season grass (%)	15.0	0.5	37.5	15.0	15.0	3.0	37.5	37.5	15.0	15.0	0.5	0.5	0.5	15.0	15.0
Forb (%)	3.0	0.5	0.5	37.5	15.0	3.0	3.0	3.0	3.0	15.0	15.0	3.0	0.5	3.0	15.0
Moss and lichen (%)	3.0	15.0	0.0	0.5	0.0	15.0	0.5	0.5	0.0	0.5	0.5	0.0	0.0	0.5	0.0
Woody shrub and vine (%)	0.0	3.0	0.0	0.0	15.0	0.5	0.0	0.0	0.5	0.0	15.0	0.5	15.0	0.5	0.0
Tree seedling (%)	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.5	3.0	3.0	0.0	0.0
Total foliar (%)	15.0	15.0	37.5	62.5	62.5	37.5	37.5	37.5	15.0	37.5	37.5	15.0	15.0	37.5	37.5

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	Plot								
Habitat Parameter	91	92	93	94	95	96	97	98	99
50 meter plot coverage									
Fescue/Orchard Grass (%)	97.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Field/Prairie (%)	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Highway Right of Way (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lawn (%)	0.0	0.0	0.0	0.0	37.5	0.0	0.0	0.0	15.0
Old Field (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Open Woodland (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parking Lot (%)	0.0	0.0	0.0	0.0	3..0	0.0	0.0	0.0	0.0
Pasture Road (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paved Road (%)	0.5	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Pond (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Riparian Woodland (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.5
Shrub (%)	0.0	37.5	0.0	0.0	0.0	15.0	0.0	0.0	0.0
Stream (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0
Trail (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tree Line (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Woodland (%)	0.0	37.5	85.0	97.5	37.5	85.0	97.5	97.5	0.0
5 meter subplot									
Canopy cover									
Hardwood (%)	0.0	25.7	95.9	98.0	85.3	9.4	97.5	94.1	96.5
Conifer (%)	0.0	0.0	0.0	0.0	0.0	95.7	0.0	0.0	0.0
Total cover (%)	0.0	25.7	95.9	98.0	85.3	99.6	97.5	94.1	96.5
Canopy Height									
Hardwood (m)	0.0	5.7	18.3	31.1	13.8	0.0	30.7	23.9	25.7
Conifer (m)	0.0	0.0	0.0	0.0	0.0	14.4	0.0	0.0	0.0
Basal Area									
Hardwood (m^2/ha)	1.0	2.0	7.0	9.0	4.0	3.0	10.0	9.0	8.0
Conifer (m^2/ha)	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
Horizontal vegetation profile at 15-m									
0.0 – 0.25 m (%)	97.5	97.5	85.0	85.0	97.5	97.5	15.0	97.5	97.5
0.25 – 0.5 m (%)	97.5	97.5	37.5	15.0	85.0	97.5	3.0	97.5	97.5
0.5 – 0.75 m (%)	15.0	97.5	3.0	0.0	0.0	85.0	0.0	97.5	0.0

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	Plot								
Habitat Parameter	91	92	93	94	95	96	97	98	99
0.75 – 1.0 m (%)	0.5	62.5	3.0	0.0	0.0	85.0	0.0	85.0	0.0
1.0 – 1.25 m (%)	0.0	62.5	3.0	0.0	0.0	85.0	3.0	62.5	0.0
1.25 – 1.5 m (%)	0.0	3.0	15.0	0.0	0.0	85.0	0.0	85.0	37.5
1.5 – 1.75 m (%)	0.0	15.0	15.0	0.0	0.0	97.5	0.0	97.5	3.0
1.75 – 2.00 m (%)	0.0	0.5	37.5	0.0	0.0	97.5	0.0	97.5	0.0
Vertical Profile: Deciduous									
0.0 – 1.0 m (%)	0.0	0.0	25.0	0.0	0.0	75.0	0.0	75.0	0.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	0.0	25.0	0.0	25.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	25.0	0.0	25.0	50.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	50.0
4.0 – 5.0 m (%)	0.0	0.0	0.0	0.0	25.0	25.0	0.0	0.0	25.0
5.0 – 6.0 m (%)	0.0	0.0	0.0	0.0	25.0	25.0	0.0	0.0	0.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	0.0	0.0	25.0	50.0	0.0	25.0
7.0 – 7.5 m (%)	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0
Vertical Profile: Conifer									
0.0 – 1.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	0.0	0.0	25.0	0.0	0.0	25.0	0.0	0.0	0.0
4.0 – 5.0 m (%)	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0
5.0 – 6.0 m (%)	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vertical Profile: Herbaceous									
0.0 – 1.0 m (%)	100.0	100.0	75.0	50.0	100.0	100.0	75.0	0.0	75.0
1.0 – 2.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0 – 3.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.0 – 4.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.0 – 5.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0 – 6.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.0 – 7.0 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.0 – 7.5 m (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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	Plot								
Habitat Parameter	91	92	93	94	95	96	97	98	99
1.78 meter sample plot coverage									
Deciduous litter (%)	0.0	15.0	85.0	85.0	3.0	15.0	85.0	85.0	3.0
Conifer litter (%)	0.0	0.0	0.0	0.0	0.0	62.5	0.0	0.0	0.0
Grass litter (%)	37.5	15.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Bare soil (%)	62.5	37.5	15.0	15.0	85.0	15.0	15.0	0.0	3.0
Rock (%)	0.0	0.0	3.0	0.0	0.5	3.0	3.0	0.5	0.0
Woody debris (%)	0.0	0.5	3.0	3.0	0.5	3.0	3.0	15.0	3.0
Unvegetated (%)	62.5	62.5	85.0	97.5	85.0	97.5	97.5	85.0	97.5
Warm-season grass (%)	0.0	3.0	0.5	0.5	0.5	0.5	0.0	0.0	0.0
Cool-season grass (%)	37.5	15.0	3.0	0.5	15.0	0.5	3.0	0.5	0.5
Forb (%)	37.5	15.0	3.0	3.0	15.0	0.5	3.0	0.0	15.0
Moss and lichen (%)	0.0	3.0	3.0	3.0	0.5	0.0	0.5	0.5	0.5
Woody shrub and vine (%)	0.0	37.5	3.0	0.0	0.0	3.0	0.5	15.0	0.0
Tree seedling (%)	0.0	0.0	0.5	0.0	0.0	0.5	3.0	3.0	0.0
Total foliar (%)	62.5	85.0	15.0	3.0	37.5	3.0	15.0	15.0	15.0

The NPS has organized its parks with significant natural resources into 32 networks linked by geography and shared natural resource characteristics. HTLN is composed of 15 National Park Service (NPS) units in eight Midwestern states. These parks contain a wide variety of natural and cultural resources including sites focused on commemorating civil war battlefields, Native American heritage, westward expansion, and our U.S. Presidents. The Network is charged with creating inventories of its species and natural features as well as monitoring trends and issues in order to make sound management decisions. Critical inventories help park managers understand the natural resources in their care while monitoring programs help them understand meaningful change in natural systems and to respond accordingly. The Heartland Network helps to link natural and cultural resources by protecting the habitat of our history.

The I&M program bridges the gap between science and management with a third of its efforts aimed at making information accessible. Each network of parks, such as Heartland, has its own multi-disciplinary team of scientists, support personnel, and seasonal field technicians whose system of online databases and reports make information and research results available to all. Greater efficiency is achieved through shared staff and funding as these core groups of professionals augment work done by individual park staff. Through this type of integration and partnership, network parks are able to accomplish more than a single park could on its own.

The mission of the Heartland Network is to collaboratively develop and conduct scientifically credible inventories and long-term monitoring of park "vital signs" and to distribute this information for use by park staff, partners, and the public, thus enhancing understanding which leads to sound decision making in the preservation of natural resources and cultural history held in trust by the National Park Service.

www.nature.nps.gov/im/units/htln/

Heartland Network

Natural Resource Monitoring

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS D-55, April 2009

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