BREEDING BIRD SURVEY AND DISTANCE SAMPLING ESTIMATE BREEDING BIRD DENSITY

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INTRODUCTION

- The deep, erodible soils of the loess bluffs along the eastern edge of the Mississippi Alluvial Valley support lush, mesic, hardwood forests in moist valleys separated by steep hillsides and drier ridgetop forests.

- To assess bird use of loess bluff forests we conducted bird surveys within the 636 ha Vicksburg National Military Park (VNMP), Vicksburg, Mississippi.

- Our objective was to assess the merits of combining Breeding Bird Survey methodology and distance sampling.

The Loess Bluffs (outlined below in red) are a sub-region of the East Gulf Coastal Plain within Louisiana, Mississippi, Tennessee, and Kentucky.

Vicksburg National Military Park (outlined in yellow).

Population estimates (N) of breeding migrants within VNMP based on detections (n) during 160 point counts along a mini-BBS route. Detection probability (P_a), bird densities (D; birds per km^2), their coefficient of variation (CV), and forest cover covariate (%) from program Distance. Relative abundances (a), uncorrected for detection probability and extrapolated to total abundance (A) are presented for comparison.

Species	%	n	P_a	D	CV	N	a	A
Yellow-billed Cuckoo	-	75	0.22	30.4	28.3	**193**	10.1	64
Acadian Flycatcher	-	57	0.26	44.3	30.5	**282**	11.3	72
White-eyed Vireo	-	134	0.09	130.2	15.4	**827**	23.7	151
Red-eyed Vireo	H	73	0.19	52.0	18.3	**271**	13.7	87
	L	7	-	-	-			
Blue-gray Gnatcatcher	H	75	0.07	412.8	17.6	**2156**	85.1	541
	L	38	-	-	-			
Hooded Warbler	-	55	0.17	28.8	23.5	**183**	10.1	65
Summer Tanager	-	95	0.10	88.8	14.9	**565**	15.9	101
Indigo Bunting	-	95	0.12	68.9	19.1	**438**	16.1	102

Population estimates (N) of resident birds within VNMP based on detections (n) during 660 point counts along a mini-BBS route. Detection probability (P_a), bird densities (D; birds per km^2), their coefficient of variation (CV), and forest cover covariate (%) from program Distance. Relative abundances (a), uncorrected for detection probability and extrapolated to total abundance (A) are presented for comparison.

Species	%	n	P_a	D	CV	N	a	A
Red-bellied Woodpecker	-	494	0.48	21.9	9.5	**139**	15.0	95
Downy Woodpecker	H	70	0.15	15.2	23.0	**79**	4.5	29
	L	37	-	-	-			
Carolina Chickadee	H	203	0.10	68.7	20.7	**376**	11.6	74
	L	72	0.28	15.6	25.6			
Tufted Titmouse	H	349	0.29	39.3	15.8	**246**	14.3	91
	L	108	0.68	9.8	28.5			
Carolina Wren	-	969	0.25	84.5	14.9	**537**	35.0	223
Northern Mockingbird	-	115	0.44	5.6	38.1	**36**	3.7	24
Northern Cardinal	-	1224	0.14	182.3	7.0	**1163**	43.8	279
Eastern Towhee	H	75	0.16	15.9	28.2	**82**	4.0	25
	L	34	-	-	-			
Brown-headed Cowbird	H	397	0.13	99.2	18.7	**564**	23.8	151
	L	160	0.24	41.1	17.3			
House Sparrow	-	108	0.18	13.1	61.9	**83**	3.6	23

METHODS

- We conducted mini-Breeding Bird Surveys (20 stops, at 0.8 km intervals) within VNMP.

- Surveys were conducted during spring migration (27 March – 5 May) and the breeding season (7 May – 27 June) during 2003 and 2004.

- We recorded all birds detected during 3-min periods and recorded detections in distance annuli (0-25, 26-50, 51-100, or 100-150 m).

- We used program *Distance* to estimate detection probability and density of 8 migrant species during the breeding season (8 surveys) and 10 resident breeding species (33 surveys).

- Forest cover was used as a categorical covariate (**H** - High ≥65% vs. **L** - Low <65%) to correct for habitat induced bias in detection probability.

- We compared relative abundances that were uncorrected for detection probability, as can be obtained from current BBS data, with densities corrected for detection probability.

RESULTS

- We had sufficient detections to estimate density of 8 breeding migrants and 10 resident species.

- Detection probability differed between forest cover categories for 2 migrant and 5 resident species.

- Population estimates, uncorrected for detection probability, were markedly lower than were population estimates that we corrected for detection probability.

CONCLUSIONS

- Combining BBS protocol with distance sampling yielded species specific estimates of detection probability and density.

- Use of the quantitative habitat measure (% forest cover) as a covariate improved our population estimate for some species.

- Population estimates that were uncorrected for detection probability were >50% lower than those corrected for detection probabilities.

- The quality of data collected during Breeding Bird Surveys would be enhanced by incorporating distance sampling and habitat characterization.