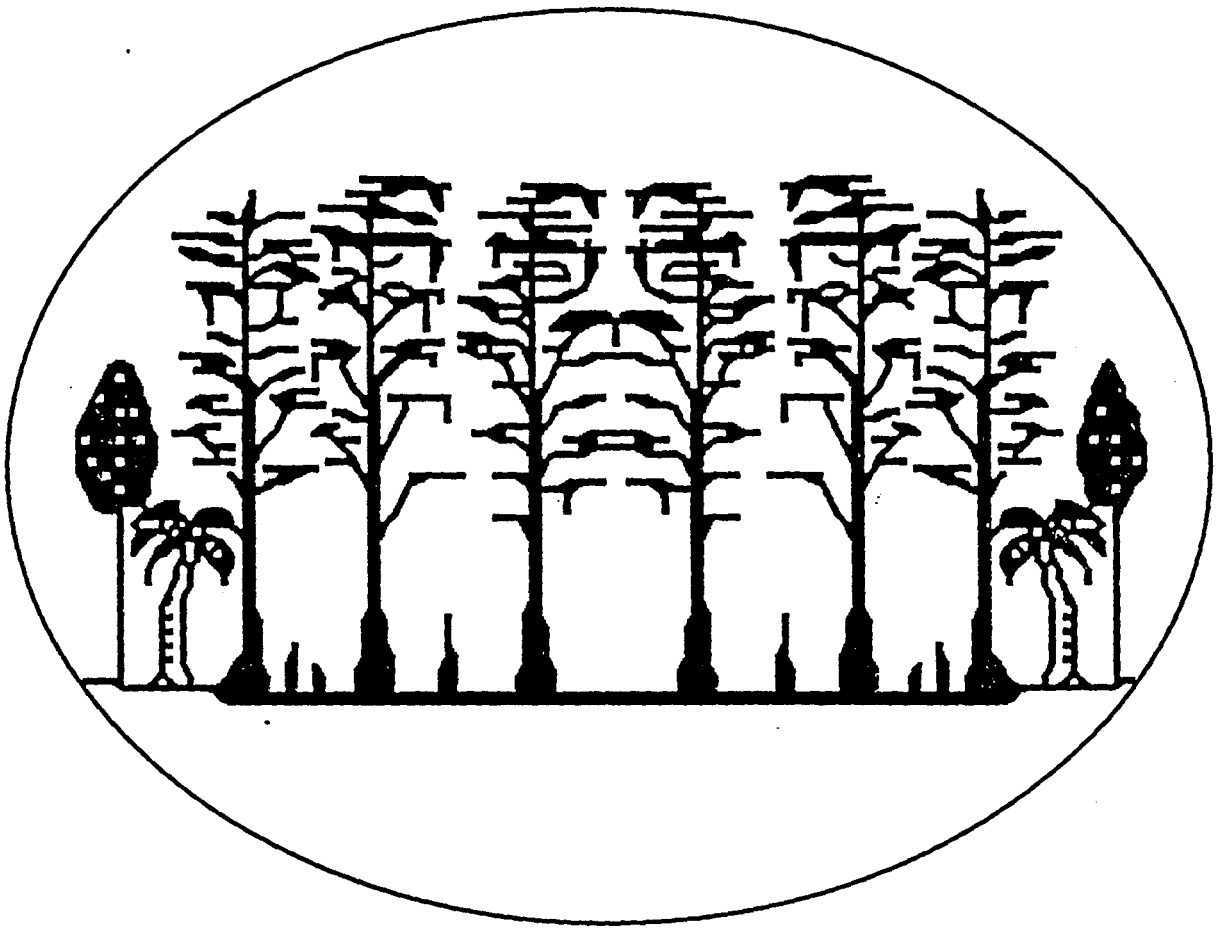
Proceedings of the Southern Forested Wetlands Ecology and Management Conference



Consortium for Research on Southern Forested Wetlands
Clemson University, Clemson, South Carolina
March 25-27, 1996

Edited by
Kathryn M. Flynn

INITIAL COMPARISON OF BIRD COMMUNITIES OF THREE SOUTHERN FORESTED WETLANDS

Hamel, Paul B.[1], Wylie C. Barrow, Jr.[2], Richard A. Fischer[3], Michael P. Guilfoyle[3], Terry J. Spengler[2], and James S. Wakeley[3].

[1]USDA Forest Service, Southern Hardwoods Lab., P. O. Box 227, Stoneville, MS, 38776
[2]National Biological Service, Texas Gulf Coast Field Station, Campus Box 339, TAMU-CC, 6300 Ocean Drive, Corpus Christi, TX, 78412
[3]U.S. Army Corps of Engineers, Waterways Experiment Station, ATTN: CEWES-ER-W, 3909 Halls Ferry Road, Vicksburg, MS, 39180-6199.

ABSTRACT

The Southern Forested Wetlands Initiative (SFWI), an interagency team of scientists from the National Biological Service, the USDA Forest Service, the U.S. Army Corps of Engineers, and the U.S. Geological Survey, is cooperating to characterize the major biological, chemical, and physical functions of southern BLH forests. This interagency team selected three relatively undisturbed BLH forest tracts ≥ 320 ha for study. Four hypotheses will be tested with data from this long-term field study: a) bird community composition of extensive BLH systems is independent of plant community composition; b) bird community composition of extensive BLH systems is independent of geographical and floodplain location; c) bird community dynamics and population trends of individual species are independent of location; and d) bird community dynamics and individual species population trends are in equilibrium in these systems. Our initial summary allows us to identify the long-term hypotheses we will test in this study, and to indicate the sorts of data we have gathered in the first year.

INTRODUCTION

Bottomland hardwood (BLH) forests provide habitat for a large number of bird species, many of which are Neotropical migrant songbirds. Extensive tracts of BLH often contain substantial numbers of habitat specialists, including species dependent on forest-interior habitats. Long-term censuses of bird communities in the eastern United States indicate major declines in some Neotropical migrants, especially these forest-interior species (Johnston and Hagan 1992). The Southern Forested Wetlands Initiative (SFWI), an interagency team of scientists from the National Biological Service, the USDA Forest Service, the U.S. Army Corps of Engineers, and the U.S. Geological Survey, is cooperating to characterize the major biological, chemical, and physical functions of southern BLH forests (Harms and Stanturf 1994). Within the larger study, objectives of the bird research (Hamel et al. 1995) are to (1) compare avian diversity and abundance among the three sites, (2) relate bird diversity and individual species distributions to hydrologic and vegetation gradients, and (3) monitor long-term trends in the avian communities of the these wetlands focusing on breeding Neotropical migrants and wintering Nearctic migrants.

METHODS

The SFWI team selected three relatively undisturbed BLH forest tracts ≥ 320 ha for study: Iatt Creek (LA), a minor stream bottom in Winn Parish, Louisiana; Cache River (AR), an alluvial stream and tributary of the White River in Woodruff Co., Arkansas; and Coosawhatchie River (SC), a blackwater river system in Jasper Co., South Carolina. From a random point in each site, a sampling grid was established with intersections at 250-m intervals (Cache River n=47, Coosawhatchie River n=61, Iatt Creek n=44 intersections). All grid intersections were sampled once, using 5-min point counts, in May and June, 1995, first breeding season sampled. All grid intersections were sampled once, using 10-min point counts, during December, 1995 or January, 1996, first winter season

sampled. Density and basal area of canopy tree species were measured in 0.04-ha circles centered on the counting stations (James and Shugart 1970). Similarity values for species composition were calculated using the coefficient S = 2*(Number of species shared)/(Species richness on first site + species richness on second site). ANOVAs of number of species and number of birds were conducted and mean values compared using Duncan's Multiple Range test. We calculated 95% confidence intervals around frequency of occurrence values for species recorded on at least 33% of seasonal counts.

RESULTS

A total of 6153 detections of 78 species were made, 2282 during the breeding season (Tab. 1), and 3871 in winter (Tab. 2). Twenty-four resident species were recorded during both breeding and winter seasons 1995, 8 were resident species recorded during the breeding season only, 5 were resident species recorded during the winter season only, 23 species were Neotropical migratory birds recorded during the breeding season only, 17 were North Temperate or short distance migrants recorded in the winter only (Fig. 1). One black-and-white warbler (*Mniotilta varia*), a Neotropical migratory bird, was recorded only during the winter on the SC. Breeding species frequencies among sites were significantly different for 22 of 30 comparisons among the 10 most frequent species, indicating that the study design and sample size of stations are adequate for generating and testing additional hypotheses in future studies on these sites.

Species Richness. Mean species richness of Neotropical Migratory birds for LA and SC exceeded those at AR ($F=18.2$, $P=0.0001$, $R^2=0.20$; Fig.2a), while values for breeding residents at AR and LA exceeded those at SC ($F=20.0$, $P=0.0001$, $R^2=0.20$; Fig. 2b). LA had higher mean breeding species richness overall ($F=11.09$, $P=0.0001$, $R^2=0.13$). In the winter, mean species richness of temperate migrants at LA exceeded that at SC which exceeded that at AR ($F=37.99$, $P=0.0001$, $R^2=0.34$; Fig. 2c), while mean species richness of winter resident species at LA exceeded that at AR which exceeded that at SC ($F=35.43$, $P=0.0001$, $R^2=0.32$; Fig. 2d). LA had higher mean winter species richness ($F=55.39$, $P=0.0001$, $R^2=0.43$).

Relative Abundance. Mean abundance of breeding Neotropical Migratory birds for LA exceeded that at the other sites ($F=10.46$, $P=0.0001$, $R^2=0.12$). Mean abundance of breeding residents in SC was lower than that at the other two sites ($F=12.96$, $P=0.0001$, $R^2=0.15$). Overall mean breeding abundance in LA exceeded AR which exceeded SC ($F=19.37$, $P=0.0001$, $R^2=0.21$). Mean abundance of wintering Temperate Migrants in SC exceeded AR, though neither value differed from LA ($F=3.29$, $P=0.04$, $R^2=0.04$). Mean winter abundance of residents in AR exceeded the other sites ($F=8.03$, $P=0.0005$, $R^2=0.10$). Overall mean winter abundance was similar on all sites ($F=2.86$, $P=0.06$, $R^2=0.04$).

Community Similarity. Similarity values for the sites based upon breeding species richness indicated that SC and LA were more similar to each other ($s=0.91$), than was either to AR (SC:AR = 0.61; LA:AR = 0.78). Similarity values based upon winter species richness indicated that these communities were much more similar than those in the breeding season (AR:SC = 0.82; AR:LA = 0.79; SC:LA = 0.80). However, similarities among the sites based upon abundance of shared species were more distinct in the winter (AR:SC = 0.97; AR:LA = 0.67; SC:LA = 0.84) than in the breeding season (AR:SC = 0.86; AR:LA = 0.85; SC:LA = 0.95).

DISCUSSION AND CONCLUSION

The patterns observed among sites, coupled with the relatively different landscape context of the Cache River site, surrounded by agricultural rather than forested land, suggest that landscape features external to the sites determine some aspects of avian community metrics. Our future investigations on these sites will address landscape context as well as (a) the relationship of avian measures to hydrologic and vegetation gradients and (b) long-term trends in avian community structure.

Table 1. Breeding bird species observed during 5 minute point count surveys on the three study areas for the Southern Forested Wetlands Initiative (SFWI), 1995. Species in bold type represent Neotropical migrant species; regular type represents resident species

Species List	Cache River, AR (n=47)			Coosawhatchie River, SC (n=61)			Lac Creek, LA (n=44)			Total Obs.
Bird Species	total obs.	mean/point	% occurrence	total obs.	mean/point	% occurrence	total obs.	mean/point	% occurrence	
Acadian Flycatcher	46	0.98	77	85	1.39	80	102	2.32	91	233
Red-eyed Vireo	8	0.17	17	93	1.52	84	109	2.48	100	210
Eastern Tufted Titmouse	52	1.68	77	47	0.77	48	71	1.61	82	170
Red-bellied Woodpecker	63	1.38	87	51	0.84	59	48	1.09	57	162
Carolina Wren	12	0.26	23	42	0.74	59	60	1.36	77	117
Chimney Swift	111	2.36	87	2	0.03	3	1	0.02	2	114
Blue-gray Gnatcatcher	32	0.68	43	59	0.97	61	10	0.23	18	101
Great Crested Flycatcher	14	0.30	21	34	0.56	43	32	0.73	55	80
Northern Parula	3	0.06	6	60	0.98	72	17	0.39	30	80
Prothonotary Warbler	67	1.43	77	11	0.18	13	1	0.02	2	79
American Crow	6	0.13	6	22	0.43	30	47	1.07	59	79
Northern Cardinal	12	0.26	28	13	0.21	15	54	1.23	77	79
Common Grackle	38	1.60	57	0	0.00	0	0	0.00	0	75
Carolina Chickadee	27	0.57	32	30	0.49	30	16	0.36	23	73
Hooded Warbler	0	0.00	0	13	0.23	23	55	1.25	77	70
White-breasted Nuthatch	41	0.87	57	16	0.26	23	1	0.02	2	58
Yellow-billed Cuckoo	14	0.30	26	14	0.23	23	22	0.50	36	50
Downy Woodpecker	21	0.45	43	21	0.34	31	7	0.16	16	49
Pileated Woodpecker	9	0.19	15	12	0.20	18	19	0.43	34	40
White-eyed Vireo	0	0.00	0	20	0.33	26	17	0.39	30	37
Eastern Wood-Pewee	25	0.53	45	7	0.11	11	2	0.05	5	34
Yellow-throated Vireo	1	0.02	2	17	0.28	23	14	0.32	27	32
Summer Tanager	6	0.13	13	6	0.10	10	10	0.23	18	22
White Ibis	0	0.00	0	22	0.36	10	0	0.00	0	22
Pine Warbler	0	0.00	0	10	0.16	11	11	0.25	18	21
Blue Jay	7	0.15	9	0	0.00	0	12	0.27	23	19
Wood Thrush	12	0.26	19	1	0.02	2	4	0.09	9	17
Mourning Dove	13	0.28	28	2	0.03	3	1	0.02	2	16
Red-shouldered Hawk	0	0.00	0	0	0.00	0	16	0.36	32	16
Yellow-throated Warbler	2	0.04	4	12	0.20	16	0	0.00	0	14
Yellow-shafted Flicker	0	0.00	0	13	0.21	20	1	0.02	2	14
American Redstart	0	0.00	0	1	0.02	2	8	0.18	14	9
Louisiana Waterthrush	0	0.00	0	2	0.03	3	7	0.16	14	9
Indigo Bunting	4	0.09	9	0	0.00	0	4	0.09	9	8
Yellow-breasted Chat	0	0.00	0	1	0.02	2	7	0.16	14	8
Barred Owl	1	0.02	2	2	0.03	3	4	0.09	7	7
Kentucky Warbler	0	0.00	0	2	0.03	3	3	0.07	5	5
Yellow-crowned Night-Heron	0	0.00	0	0	0.00	0	5	0.11	9	5
Brown-headed Cowbird	0	0.00	0	0	0.00	0	0	0.00	0	4
Rufous-sided Towhee	0	0.00	0	3	0.05	5	1	0.02	2	4
Ruby-throated Hummingbird	0	0.00	0	1	0.02	2	1	0.02	2	2
Brown Thrasher	0	0.00	0	1	0.02	2	1	0.02	2	2
Great Blue Heron	0	0.00	0	0	0.00	0	2	0.05	5	2
Hairy Woodpecker	0	0.00	0	1	0.02	2	1	0.02	2	2
Turkey Vulture	0	0.00	0	1	0.02	2	1	0.02	2	2
Blue Grosbeak	0	0.00	0	1	0.02	2	0	0.00	0	1
Eastern Kingbird	0	0.00	0	0	0.00	0	1	0.02	2	1
Broad-winged Hawk	0	0.00	0	0	0.00	0	1	0.02	2	1
Double-crested Cormorant	0	0.00	0	0	0.00	0	0	0.00	0	0
Eastern Phoebe	1	0.02	2	0	0.00	0	0	0.00	0	1
Fish Crow	0	0.00	0	1	0.02	2	0	0.00	0	0
Northern Bobwhite	0	0.00	0	1	0.02	2	0	0.00	0	0
Red-headed Woodpecker	0	0.00	0	0	0.00	0	0	0.00	0	0
Wild Turkey	0	0.00	0	0	0.00	0	0	0.00	0	0
Wood Duck	1	0.02	2	0	0.00	0	0	0.00	0	1
TOTAL # DETECTIONS	713	15.17		764	12.52		805	18.30		2,282
TOTAL # SPECIES	31	9.00		42	9.87		44	10.86		53
TOTAL # MIGRANTS	345	7.34		445	7.30		429	9.68		1,219
TOTAL # MIGRANT SPECIES	14	6.40		21	5.10		22	5.61		23
TOTAL # RESIDENTS	368	7.83		319	5.23		376	8.54		1,063
TOTAL # RESIDENT SPECIES	17	4.68		21	3.77		22	5.25		32

Table II. Wintering bird species observed during 10 minute point count surveys on the three study areas for the Southern Forested Wetlands Initiative (SFWI), 1996. Species in bold type represent Temperate migrant species; regular type represents resident species.

Species List	Cache River, AR (n=47)			Coosawhatchie River, SC (n=61)			Lac Creek, LA (n=44)			Total Obs.
Bird Species	total obs.	mean/point	% occurrence	total obs.	mean/point	% occurrence	total obs.	mean/point	% occurrence	
Red-winged Blackbird	777	16.53	68	*158	2.63	35	0	0.00	0	935
Eastern Tufted Titmouse	57	1.21	61	84	1.40	73	147	3.34	95	288
American Robin	6	0.12	6	217	3.62	37	18	0.41	32	241
Red-bellied Woodpecker	69	1.47	79	93	1.55	80	79	1.80	86	241
Wood Duck	17	0.36	6	219	3.50	23	0	0.00	0	236
Carolina Chickadee	87	1.85	68	41	0.68	40	82	1.86	71	210
American Crow	11	0.23	13	90	1.50	60	91	2.18	91	192
Red-headed Woodpecker	95	2.02	55	13	0.22	17	56	1.27	55	164
Yellow-rumped Warbler	1	0.02	2	105	1.75	48	31	0.71	46	137
Carolina Wren	15	0.32	28	46	0.77	50	67	1.52	73	128
White-throated Sparrow	8	0.17	6	22	0.37	10	94	2.14	43	124
Common Grackle	105	2.23	23	1	0.02	2	0	0.00	0	106
Downy Woodpecker	44	0.94	70	27	0.45	37	29	0.66	43	100
Blue Jay	20	0.43	23	10	0.17	12	52	1.18	57	82
Golden-crowned Kinglet	32	0.68	40	11	0.18	17	34	0.77	55	77
White-breasted Nuthatch	41	0.87	68	7	0.12	10	19	0.43	31	67
Yellow-shafted Flicker	27	0.57	47	14	0.23	20	24	0.55	41	65
Yellow-bellied Sapsucker	1	0.02	2	42	0.70	52	22	0.50	39	65
Pileated Woodpecker	8	0.17	17	10	0.17	15	39	0.89	35	57
Ruby-crowned Kinglet	2	0.04	4	28	0.47	37	25	0.57	46	55
Eastern Phoebe	3	0.06	6	8	0.13	12	22	0.50	41	33
European Starling	30	0.64	13	0	0.00	0	0	0.00	0	30
Hermit Thrush	6	0.13	11	7	0.12	12	16	0.36	32	29
Red-shouldered Hawk	1	0.02	2	2	0.03	3	23	0.52	39	26
American Goldfinch	8	0.17	13	1	0.02	2	16	0.36	27	25
Winter Wren	9	0.19	15	1	0.02	2	14	0.32	32	24
Northern Cardinal	4	0.09	9	5	0.08	8	14	0.32	27	23
Snow Goose	16	0.34	4	0	0.00	0	0	0.00	0	16
Hairy Woodpecker	2	0.04	4	4	0.07	7	9	0.21	18	15
Rufous-sided Towhee	0	0.00	0	7	0.12	12	5	0.11	9	12
Rusty Blackbird	10	0.21	2	0	0.00	0	0	0.00	0	10
Turkey Vulture	0	0.00	0	3	0.05	5	7	0.16	11	10
Cedar Waxwing	0	0.00	0	0	0.00	0	9	0.21	7	9
Orange-crowned Warbler	2	0.04	4	2	0.03	3	2	0.05	5	6
Pine Warbler	0	0.00	0	1	0.02	2	4	0.09	7	5
Solitary Vireo	1	0.02	2	3	0.05	5	1	0.02	2	5
Brown Creeper	4	0.09	9	0	0.00	0	0	0.00	0	4
Great Blue Heron	1	0.02	2	3	0.05	5	0	0.00	0	4
Barred Owl	0	0.00	0	0	0.00	0	3	0.07	5	3
Fish Crow	0	0.00	0	3	0.05	5	0	0.00	0	3
Belted Kingfisher	2	0.04	4	0	0.00	0	1	0.02	2	3
Purple Finch	2	0.04	2	0	0.00	0	1	0.02	2	3
Slate-colored Junco	0	0.00	0	0	0.00	0	2	0.05	2	2
Song Sparrow	0	0.00	0	2	0.03	2	0	0.00	0	2
Black-and-white Warbler*	0	0.00	0	1	0.02	2	0	0.00	0	1
Brown Thrasher	0	0.00	0	0	0.00	0	1	0.02	2	1
Common Yellowthroat	0	0.00	0	1	0.02	2	0	0.00	0	1
TOTAL # DETECTIONS	1,524	32.43		1,283	21.38		1,064	24.18		3,871
TOTAL # SPECIES	35	7.91		37	7.38		35	12.34		47
TOTAL # MIGRANTS	108	2.30		441	7.35		285	6.47		834
TOTAL # MIGRANT SPECIES	15	1.23		12	2.21		15	3.68		18
TOTAL # RESIDENTS	1,416	30.13		841	14.02		779	17.70		3,036
TOTAL # RESIDENT SPECIES	20	6.68		24	5.32		20	8.75		28

* Neotropical Migrant

Figure I. Annual species richness values for three southern forested wetlands during 1995 breeding and 1995-1996 wintering seasons.

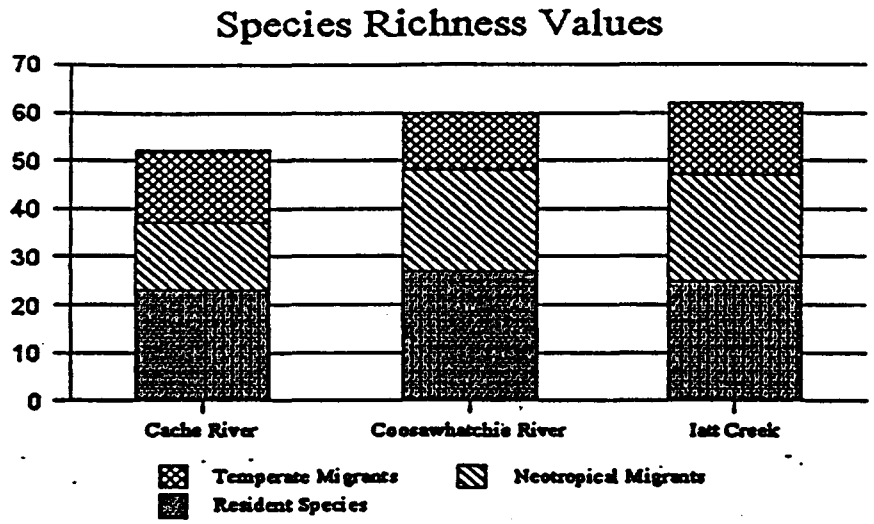
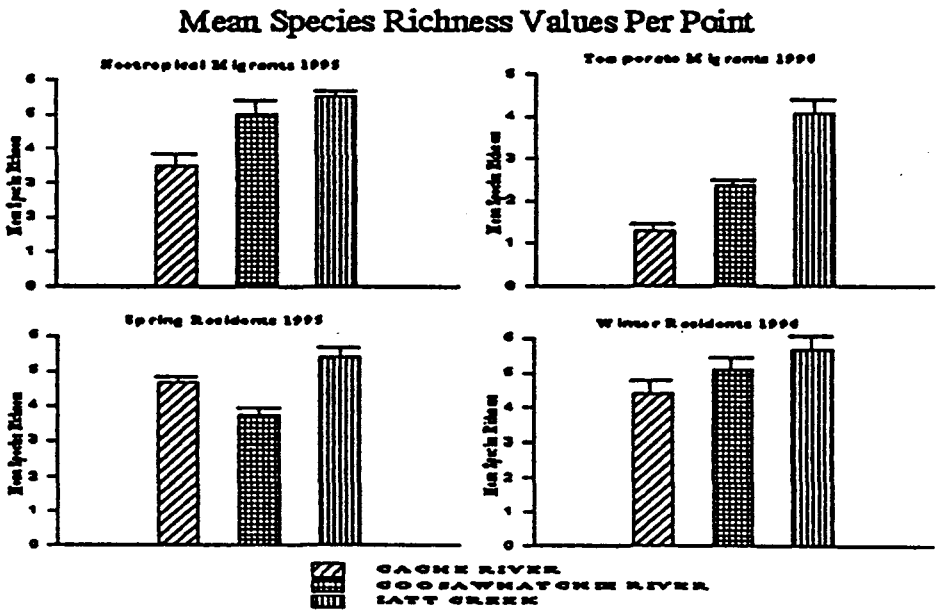


Figure II. Mean species richness values per survey point for three southern forested wetlands during the 1995 breeding (5 min point counts) and the 1995-1996 wintering (10 minute point counts) seasons.



Surveyed elevation data and measured plant community composition will be used in future analyses to relate bird community metrics to vegetation gradients and to environmental gradients. Initial comparisons in this work suggest a high degree of stochastic variation. Few long term studies of trends in the avian communities of forested wetlands exist. By focusing on breeding Neotropical migrants and wintering Nearctic migrants we will provide useful datasets for comparison of avian and vegetation communities, avian communities and climatic changes, and a historical record of bird population variation on sites of known history.

ACKNOWLEDGEMENTS

We apprieciate the assistance of the personnel of the Kisatchie National Forest for our work at Iatt Creek. Our manuscript benefited from the reviews of Emile Gardiner and Cal Meier.

REFERENCES

Hamel, P. B., W. C. Barrow, Jr., and J. S. Wakeley. 1995. Study Plan: A quantitative assessment of bird community composition and dynamics for reference sites involved in study of structure and functions of forested wetlands in bottomland hardwood ecosystems in the southern United States. Stoneville, MS: USDA Forest Service, Southern Research Station, Study Plan FS-SRS-4155. *In review.*

Harms, W. R. and J. A. Stanturf. 1994. Study Plan: A quantitative assessment of the structure and functions of forested wetlands in bottomland hardwood ecosystems in the southern United States. Charleston, SC and Stoneville, MS: USDA Forest Service, Southeastern/Southern Forest Experiment Stations, Study Plan FS-SE-4103-207/FS-SO-4152-110. 26 p.

James, F. C. and H. H. Shugart, Jr. 1970. A quantitative method of habitat description. Audubon Field Notes 24:727-736.

Johnston, D. W. and J. M. Hagan, III. 1992. An analysis of long-term breeding bird censuses from eastern deciduous forests. pp. 75-84 IN Hagan, J. M., III, and D. W. Johnston, eds. Ecology and conservation of neotropical migrant landbirds. Washington, DC: Smithsonian Institution Press. 609 p.