

COMPARISON OF WINTER BIRD USE IN RESTORED NATIVE GRASSLANDS AND EXOTIC PASTURES IN THE SOUTHEASTERN UNITED STATES

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INTRODUCTION

Historically, pine parklands, grassy forest openings, and large cane brakes dominated the southeastern United States landscape providing habitat for breeding and wintering bird species. Exclusion of fire and introduction of exotic, sod-forming grasses modified these grasslands decreasing their suitability for wildlife. Grasslands, whether dominated by exotic or native grasses, are superficially similar in structure, but have very different impacts on local wildlife species. Birds dependent on native grasslands for breeding or wintering habitat are experiencing severe population declines throughout the United States. Populations of several grassland associated birds are of concern at both regional and national levels.

Landscape changes have created a mix of intensively managed pastureland, cropland, and pine plantations. This habitat mosaic is likely responsible for population declines in many bird species. Restoration of native grasslands is an important tool that accelerates the establishment of functional grasslands. Native grasslands may provide higher quality habitat for wintering grassland birds than exotic grasslands. Restoration may allow maintenance of healthy populations of wintering grassland birds.

The purpose of our research was to determine whether it was possible to convert fields dominated by Johnson grass (*Sorghum halepense*), fescue (*Festuca arundinacea*), bermuda (*Cynodon dactylon*), and bahia grass (*Paspalum notatum*) to native grassland of switch grass (*Panicum virgatum*), big bluestem (*Andropogon gerardi*), little bluestem (*Schizachyrium scoparium*), and Indian grass (*Sorghastrum nutans*). We studied the differences in the bird communities between the native and exotic grasslands during the winter. We were particularly interested in whether bird use differed between native and exotic grasslands and how the surrounding landscape influenced the bird community response.

METHODS

This study had two treatments. The planted treatment consisted of native warm season grasses planted in spring 2002. The control treatment consisted of exotic grass pastures typical of the Georgia

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Piedmont and managed with periodic burning and annual mowing. We established our grassland restoration areas in an agricultural area or on openings within a largely forested landscape (Figure 1). We established three planted and three control plots within each landscape (forest and agricultural).

Establishment of Native Grasses: We selected our native grass treatments in late summer 2001. We mowed the plots and applied Round-up™ 2 weeks later. During winter 2001-2002, we burned the planted plots to remove all dead plant material. In spring 2002 we tilled and planted the plots with a mixture of Indian grass, big bluestem, little bluestem, and switch grass at 7.8 kg-pure live seed (PLS)/ha using a native grass seed drill. During spring 2002 and 2003 we spot sprayed any remaining exotic grasses with Round-up™ and Plateau™.

Bird Monitoring: We sampled bird abundance and diversity using mist netting during January-March 2003 and 2004. We set up four (approx. 40-foot) mist nets in each plot for 6 hours beginning at sunrise each day. Each plot was sampled only once every 10 days. We collected basic measurements on each captured bird (such as length and weight), breeding condition, sex, and age. We also banded each captured bird with a USGS metal band then released them where captured. We used this information to calculate capture rate for all birds as well as sparrows. Sparrows are of particular concern because they are experiencing severe population declines and tend to be the most grassland obligate birds that winter in the southeast.

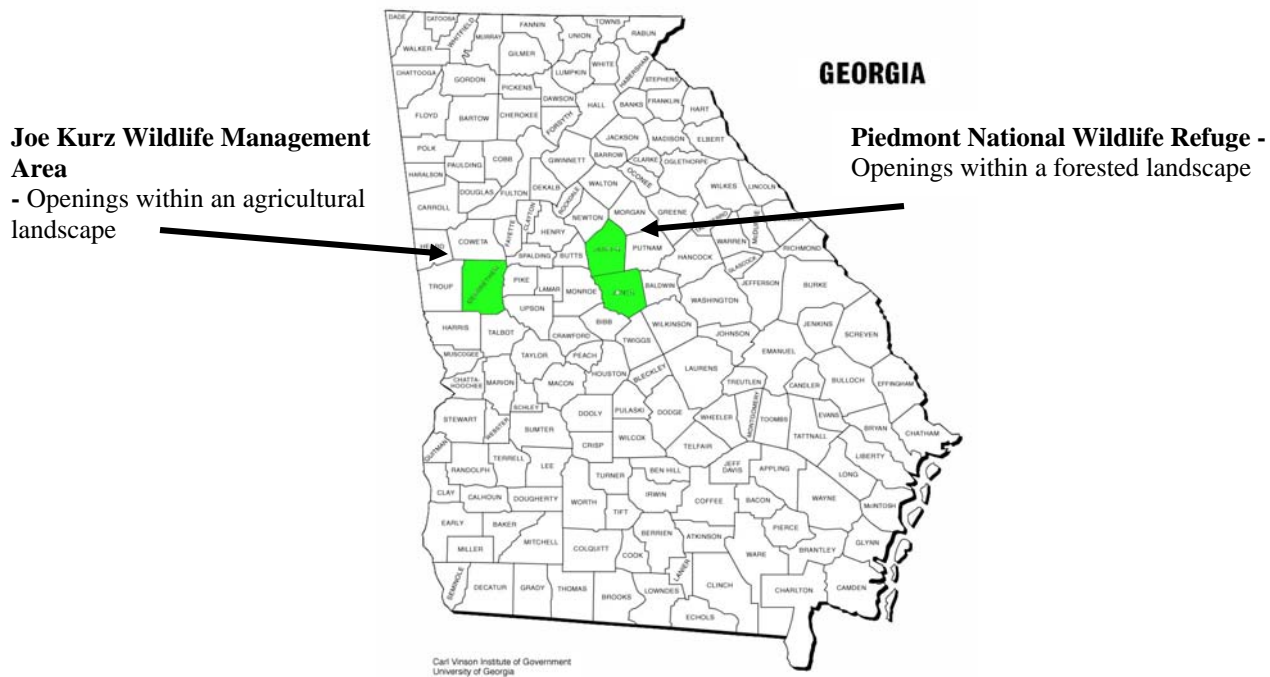


Figure 1. Study site locations within the state of Georgia, USA

RESULTS

In winter 2003, 183 individuals of 23 species were captured (Figure 2). We captured 16 bird species and 45 individuals on the exotic grasslands in the agricultural landscape (Figure 2 – Open Control column). In comparison, we caught only 10 bird species but 75 individuals on the native grasslands in the agricultural landscape (Figure 2 – Open Planted column). The results were different however in the forested landscape. We captured only five bird species on the exotic grasslands in the forested landscape (Forest Control column) compared to eight bird species and 57 individuals in the native grasslands (Forest Planted column).

Capture rates, or number of individuals caught per hour of net time, were higher in the restored (planted) grasslands in both open and forested landscapes. Capture rates were statistically greater in the planted forested landscape than in the forested control plots (Figure 3). Capture rates of grassland sparrows were statistically greater in planted plots in both the open and forested landscapes (Figure 4).

Figure 2-Bird species and number of captures in control and planted plots within open and forested landscapes during winter 2003.

| Bird Species | Open Control | Open Planted | Forest Control | Forest Planted |
|--|--------------|--------------|----------------|----------------|
| American Kestrel (<i>Falco sparverius</i>) | 0 | 0 | 0 | 1 |
| Red-bellied Woodpecker (<i>Melanerpes carolinus</i>) | 1 | 0 | 0 | 0 |
| Eastern Phoebe (<i>Sayornis phoebe</i>) | 2 | 0 | 1 | 1 |
| Blue-headed Vireo (<i>Vireo solitarius</i>) | 0 | 0 | 1 | 0 |
| Carolina Chickadee (<i>Poecile carolinensis</i>) | 1 | 2 | 0 | 0 |
| Golden-crowned Kinglet (<i>Regulus satrapa</i>) | 1 | 0 | 0 | 0 |
| Ruby-crowned Kinglet (<i>Regulus calendula</i>) | 0 | 0 | 0 | 1 |
| Eastern Bluebird (<i>Sialia sialis</i>) | 2 | 2 | 0 | 1 |
| American Robin (<i>Turdus migratorius</i>) | 5 | 0 | 0 | 0 |
| Hermit Thrush (<i>Catharus guttatus</i>) | 0 | 0 | 1 | 0 |
| Northern Mockingbird (<i>Mimus polyglottos</i>) | 2 | 0 | 0 | 0 |
| Yellow-rumped Warbler (<i>Dendroica coronata</i>) | 2 | 0 | 0 | 0 |
| Palm Warbler (<i>Dendroica palmarum</i>) | 1 | 0 | 0 | 0 |
| Pine Warbler (<i>Dendroica pinus</i>) | 9 | 7 | 0 | 0 |
| Northern Cardinal (<i>Cardinalis cardinalis</i>) | 1 | 1 | 0 | 0 |
| Field Sparrow (<i>Spizella pusilla</i>) | 6 | 27 | 0 | 0 |
| Chipping Sparrow (<i>Spizella passerina</i>) | 4 | 0 | 0 | 36 |
| Savannah Sparrow (<i>Passerculus sandwichensis</i>) | 1 | 6 | 0 | 4 |
| Vesper Sparrow (<i>Pooecetes gramineus</i>) | 0 | 2 | 0 | 0 |
| White-throated Sparrow (<i>Zonotrichia albicollis</i>) | 0 | 1 | 0 | 0 |
| Song Sparrow (<i>Melospiza melodia</i>) | 3 | 21 | 2 | 11 |
| Swamp Sparrow (<i>Melospiza georgiana</i>) | 4 | 0 | 0 | 0 |
| American Goldfinch (<i>Carduelis tristis</i>) | 0 | 6 | 1 | 2 |
| Total Captures | 45 | 75 | 6 | 57 |

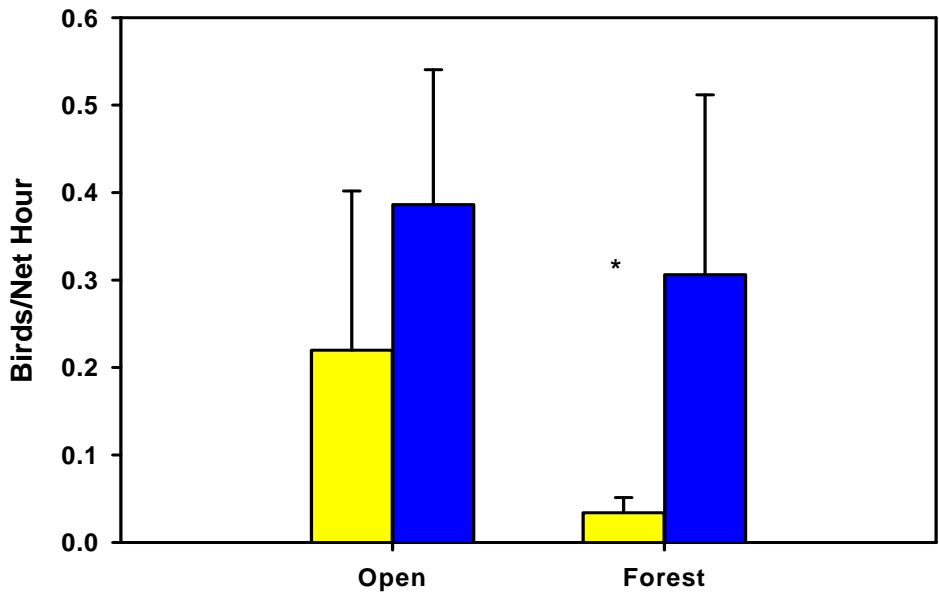


Figure 3-Winter 2003 capture rates in open and forested landscapes. Significant difference ($p < 0.1$) indicated by (*).

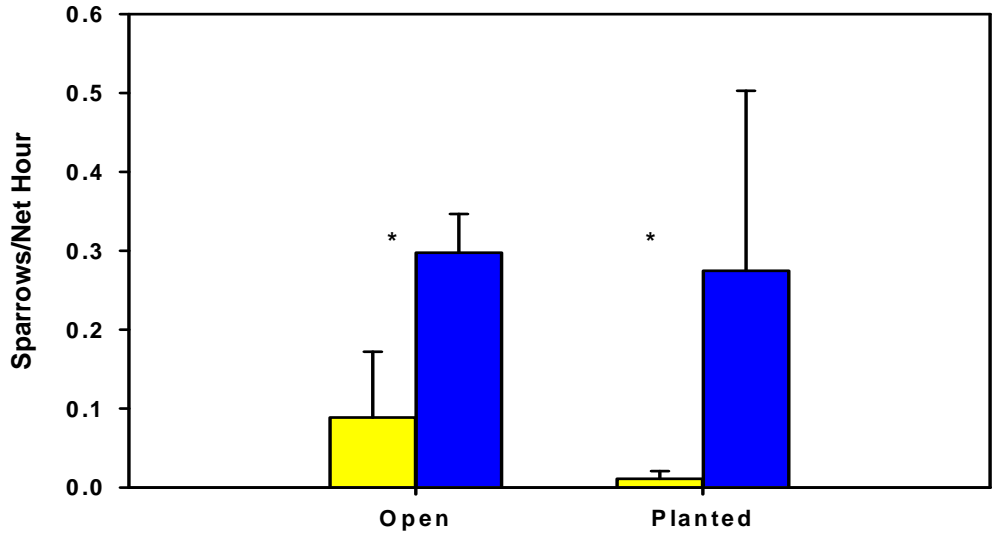


Figure 4-Winter 2003 sparrow capture rates in open and forested landscapes. Significant difference ($p < 0.1$) indicated by (*).

In winter 2004, overall capture rates were lower than in 2003 with only 73 individuals of 19 species captured (Figure 5). In the forested landscape, capture rates were again statistically greater in the planted than control plots (Figure 6). Capture rates of sparrows were not statistically different between treatments within either landscape (Figure 7).

Figure 5-Bird species and number of captures in control and planted plots within open and forested landscapes during winter 2004.

| Bird Species | Open Control | Open Planted | Forest Control | Forest Planted |
|---|--------------|--------------|----------------|----------------|
| Eastern Phoebe (<i>Sayornis phoebe</i>) | 0 | 1 | 1 | 0 |
| Blue-headed Vireo (<i>Vireo solitarius</i>) | 0 | 0 | 0 | 1 |
| Tufted Titmouse (<i>Baeolophus bicolor</i>) | 0 | 2 | 2 | 0 |
| Carolina Chickadee (<i>Poecile carolinensis</i>) | 0 | 1 | 0 | 0 |
| Ruby-crowned Kinglet (<i>Regulus calendula</i>) | 0 | 1 | 0 | 4 |
| Carolina Wren (<i>Thryothorus ludovicianus</i>) | 0 | 0 | 1 | 0 |
| Eastern Bluebird (<i>Sialia sialis</i>) | 1 | 0 | 2 | 0 |
| American Robin (<i>Turdus migratorius</i>) | 3 | 0 | 0 | 5 |
| Hermit Thrush (<i>Catharus guttatus</i>) | 0 | 1 | 0 | 2 |
| Brown Thrasher (<i>Toxostoma rufum</i>) | 0 | 1 | 0 | 0 |
| Pine Warbler (<i>Dendroica pinus</i>) | 1 | 0 | 1 | 3 |
| Northern Cardinal (<i>Cardinalis cardinalis</i>) | 0 | 0 | 0 | 1 |
| Field Sparrow (<i>Spizella pusilla</i>) | 1 | 5 | 0 | 1 |
| Chipping Sparrow (<i>Spizella passerina</i>) | 2 | 0 | 0 | 0 |
| Savannah Sparrow (<i>Passerculus sandwichensis</i>) | 6 | 4 | 0 | 0 |
| Vesper Sparrow (<i>Pooecetes gramineus</i>) | 0 | 1 | 0 | 0 |
| Fox Sparrow (<i>Passerella iliaca</i>) | 0 | 0 | 1 | 0 |
| Song Sparrow (<i>Melospiza melodia</i>) | 1 | 5 | 0 | 6 |
| Swamp Sparrow (<i>Melospiza georgiana</i>) | 0 | 5 | 0 | 0 |
| Total Captures | 15 | 27 | 8 | 23 |

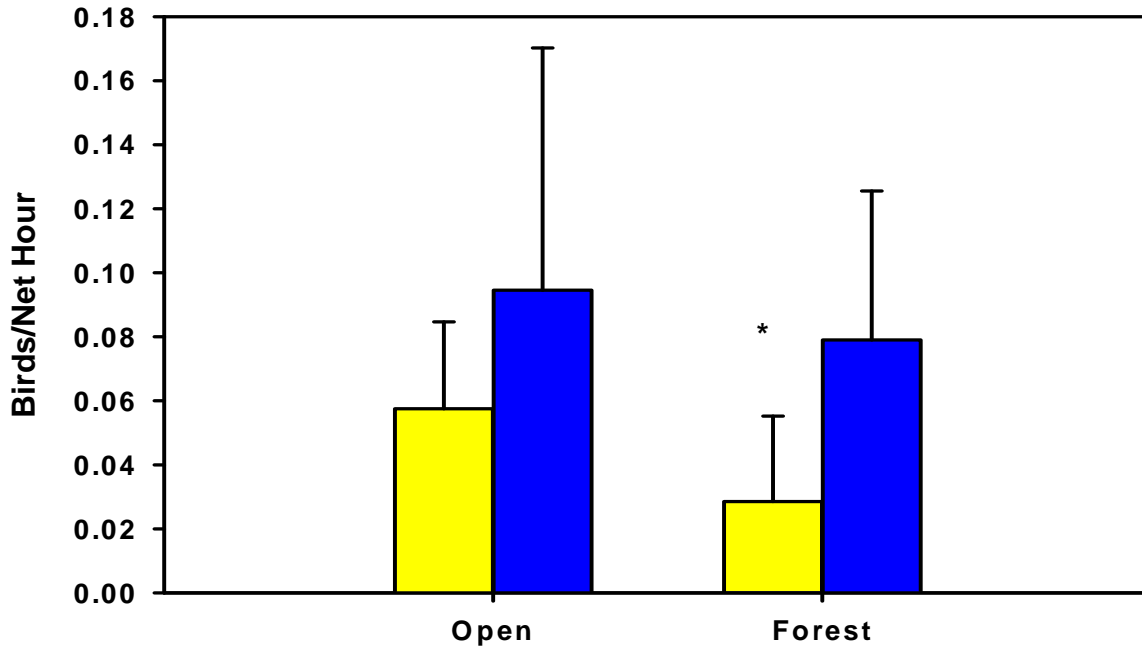


Figure 6-Winter 2004 captures rates in open and forested landscapes. Significant difference ($p < 0.1$) is indicated by (*).

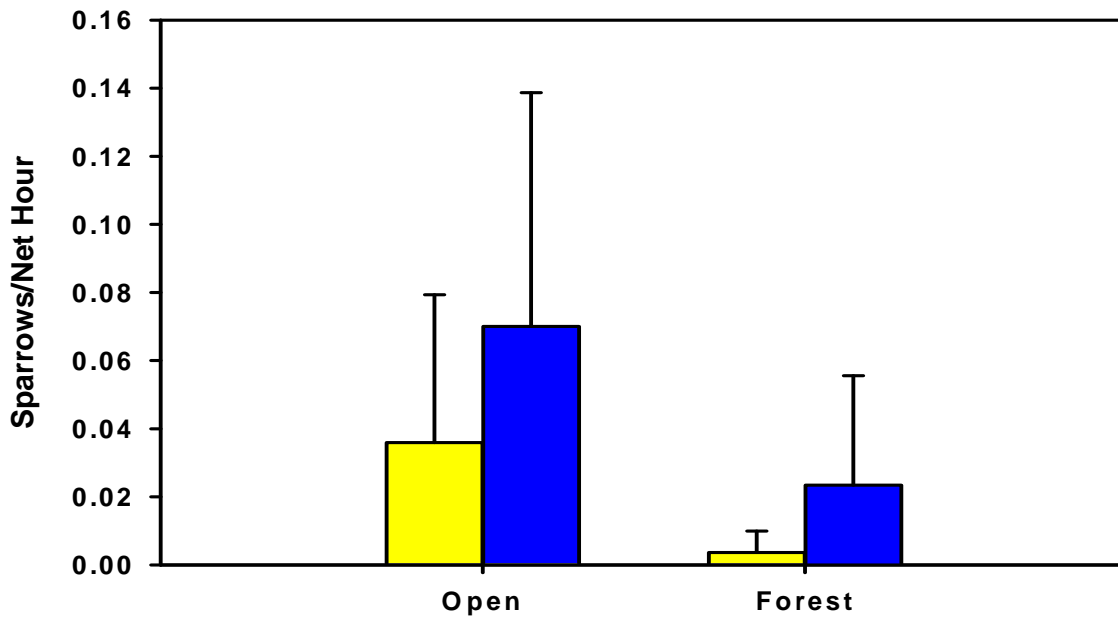


Figure 7-Winter 2004 sparrow capture rates in open and forested landscapes.

DISCUSSION

We found that winter bird abundance varied dramatically between the two years of our study. Wintering birds used restored grasslands in both open and forested landscapes. However, areas restored to native grasses in a forested landscape may provide a more critical resource that is in short supply than restoration in open habitat. The importance of restored grasslands in open areas should not be underestimated. They may provide crucial habitat for some species of concern, namely eastern meadowlarks, vesper sparrows, and swamp sparrows, which were only found in the open landscape. These three species avoid breeding in small grassland patches in other parts of their range and may be exhibiting this same small area sensitive behavior during the winter. Savannah Sparrows were found across all treatments and landscapes, but they were more common in the open landscape indicating that savannah sparrows may be able to use a wider variety of habitat types.

Winter is an important and often overlooked part of the annual cycle of passerines. Restoring native grasslands in both forested and open landscapes in the Southeastern United States has the potential to provide needed habitat for wintering grassland birds.

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