BENEFITS OF A CONSERVATION BUFFER-BASED CONSERVATION MANAGEMENT SYSTEM FOR NORTHERN BOBWHITE AND GRASSLAND SONGBIRDS IN AN INTENSIVE PRODUCTION AGRICULTURAL LANDSCAPE IN THE LOWER MISSISSIPPI ALLUVIAL VALLEY

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INTRODUCTION

This project evaluates grassland songbird and Northern Bobwhite response to a buffer-based conservation management system (CMS) in an agricultural matrix in the Mississippi Alluvial Valley (MAV). Specific habitat practices being examined include CP-21 filter strips of NWSG (30 m) and NWSG/shrub mixture (15 m), CP-33 field borders (10 m), and CP-22 riparian forest buffers in the early-successional growth stage. These practices are advocated through the National Conservation Buffer Initiative (NCBI). Furthermore, we are comparing these practices with large block Conservation Reserve Program (CRP) habitat that is currently in the early-successional growth stage.

The combination of these habitat practices will offer unique insight on the efficacy of each specific habitat treatment as well as the collective benefits of a CMS to the avian community. Such an examination has not yet been executed for these habitats in the MAV, despite increased landowner interest in such habitat enrollment. The physiographic location of this study is of further interest, as the landscape has been severely fragmented for agricultural production. We will also evaluate the influence of width on conservation buffer habitat to determine threshold widths appropriate for an effective balance of landowner economy with wildlife needs.

OBJECTIVES

1) Determine reproductive success and productivity of grassland birds relative to habitat treatment and buffer width.
2) Estimate avian density and richness relative to habitat practices and buffer widths during the breeding season.
3) Evaluate the collective effect of all habitat treatments as well as specific treatment effects on local abundance of Northern Bobwhite.
4) Determine return rates, nest-site fidelity and fecundity for Dickcissel and Grasshopper Sparrows in large block and buffer habitats.

5) Assess Northern Bobwhite spatial habitat use across landscape scale and statistically model preferences for established habitats.

PROGRESS TO DATE

The 2006 field season went smoothly and we surpassed sample sizes achieved in 2005 for most aspects of the study. Our study continues to investigate differential avian benefits amongst habitat treatments (filter strips, FS; field border, FB; riparian buffer, RB, early-succession blocks, Block) by surveying the entire avian community, measuring nest density and reproductive success, studying Northern Bobwhite habitat-use, and this year, adding a study of post-fledging Dickcissel ecology.

Current results have elucidated the benefits provided by early-succession block habitat, which supported the greatest avian abundance and richness as well as highest nesting density, richness, and success. We also documented a trend of increased survival later in the season for nests and Dickcissel fledglings. Tentative conclusions indicate that avian benefits relate positively to habitat area and vegetative composition and structural diversity. The early-succession blocks have proven as beneficial for nesting Dickcissels. Relative to grass blocks filter strips and field borders produced fewer benefits for grassland bird communities, likely associated with the extremely dense vegetation currently defining these buffers. In sections below, we summarize additional key findings from the 2006 field season.

Avian Community—Line-transect surveys were conducted on every study plot for each treatment three times during the field season (May, June, and July). Negligible differences were detected amongst conservation buffer habitats, whereas early-succession blocks supported considerably greater abundance than all buffer habitats (Figure 1).

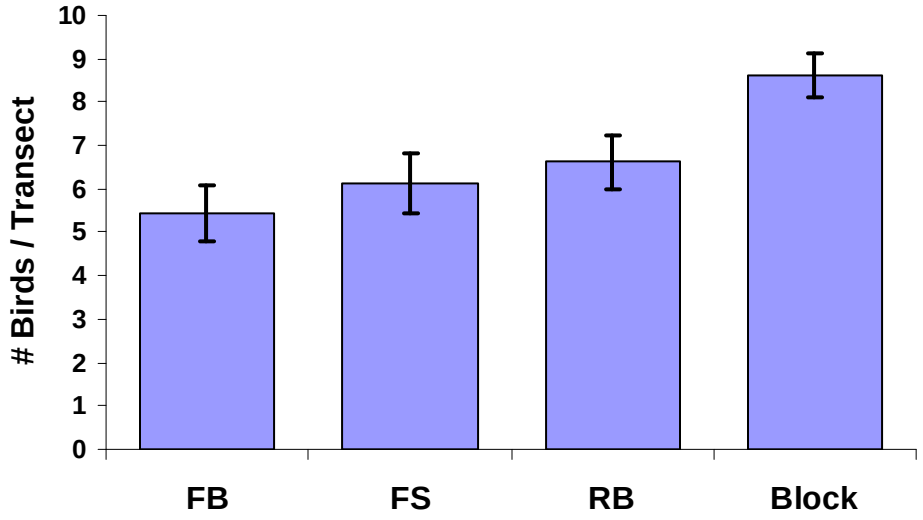

Figure 1. Mean (±SE) birds counted per transect for each habitat treatment.

Riparian buffers and early-succession blocks supported greater avian richness than either field borders or filter strips (Figure 2). This effect is likely a result of (1) increased habitat area and/or (2) increased vegetative diversity. Field borders and filter strips were both planted with grasses and have not yet received any disturbance management. As such, they lack the vegetative and structural diversity present in riparian buffers and blocks. The similarity between riparian buffers and blocks reveals the potential of buffer habitat to provide comparable avian benefits as block habitats.

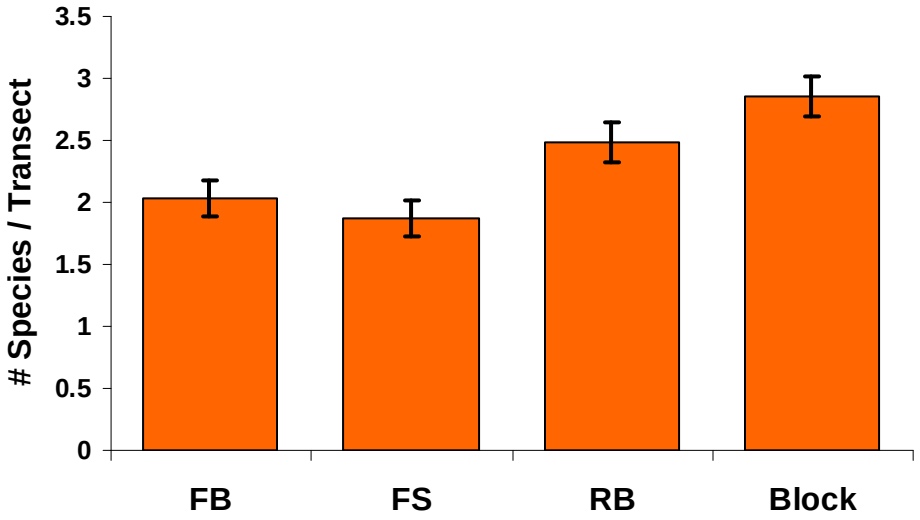

Figure 2. Mean (±SE) species richness per transect for all habitat treatments.

Northern Bobwhite—We conducted call counts during mid-June to investigate context-specific Northern Bobwhite distribution across the farm landscape. Surveys were conducted at 100-call count stations in a 10 x 10 grid across the 6,500-acre farm (Figures 3, 4). Surveys documented enhanced Northern Bobwhite occurrence at call stations within the farm compared to those outside the farm (Figures 3, 4), which likely relates to the paucity of non-crop habitat that surrounds the farm. Landscape-use differences existed between 2005 and 2006, in which Northern Bobwhite use appears to have shifted towards habitats adjacent to row-crop fields. Successional changes in buffer habitats between 2005 and 2006 may account for increased use of these habitats in 2006.

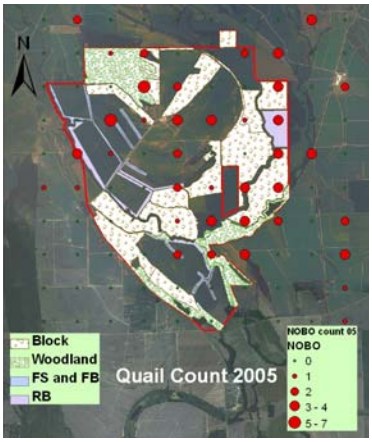

Figure 3. Abundance of singing, male Northern Bobwhites in relation to non-crop habitat types in 2005.

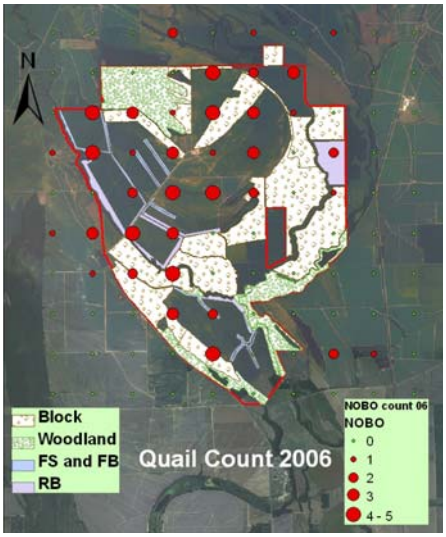

Figure 4. Abundance of singing, male Northern Bobwhites in relation to non-crop habitat types in 2006.

Avian Nesting Ecology—We conducted an intensive nest searching effort across all study plots and treatments throughout the nesting season (May 15 through July 15). We nest searched for all bird species and monitored nests every 2-4 days until completion. The predominant shift of nesting activity between 2005 and 2006 was a switch in dominant nesting species, as a surge in Dickcissel nesting activity replaced Red-winged Blackbirds as the most abundant nesting species on the farm. We found a total of 554 nests of 9 species this year. Dickcissels accounted for 57.2% of all nesting activity, whereas less abundant nesting species included Red-winged Blackbird (32.5%), Mourning Dove (5.5%), Eastern Meadowlark (3.1%), Northern Bobwhite (1.3%), Grasshopper Sparrow (<1%), Indigo Bunting (<1%), Blue Grosbeak (<1%), and Brown Thrasher (<1%). Northern Bobwhite nests were found almost exclusively in riparian buffers, which may be related to the decreased vegetative density in this habitat. Nest density was considerably higher in early-successional blocks than conservation buffer treatments, which may have been related to the presence of woody vegetation and increased habitat area in early-succession blocks (Figure 5).

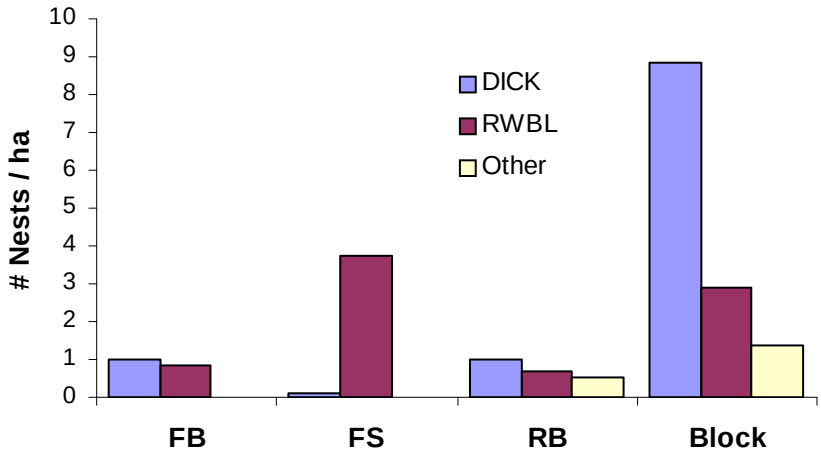

Figure 5. Nest density (nests/ha) for Dickcissel (DICK), Red-winged Blackbird (RWBL) and other birds in all habitat treatments.

Early-succession blocks and riparian buffers yielded eight and six nesting species, respectively, whereas field borders and filter strips attracted only Dickcissels and Red-winged Blackbirds (Figure 6). The lack of nesting activity in field borders and filter strips was likely related to their paucity of vegetative structural diversity compared to riparian buffers and early-succession blocks.

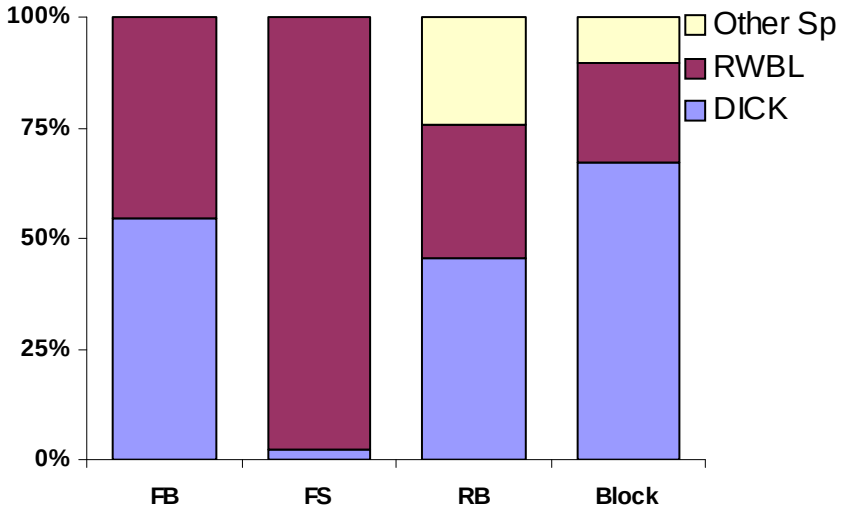

Figure 6. This shows proportions of nesting species for habitat treatments.

To illustrate nest survival patterns for Dickcissels, the primary nesting species, we modeled daily stage-specific nest survival rates in Program MARK. Nest survival was lowest for Dickcissels during the period of highest nest density (mid-season) and highest at the end of the season (Figure 7). This trend highlights the importance of late-season nesting for birds inhabiting these habitats. Nest survival was generally greatest during the egg-laying period when there is relatively little activity at the nest.

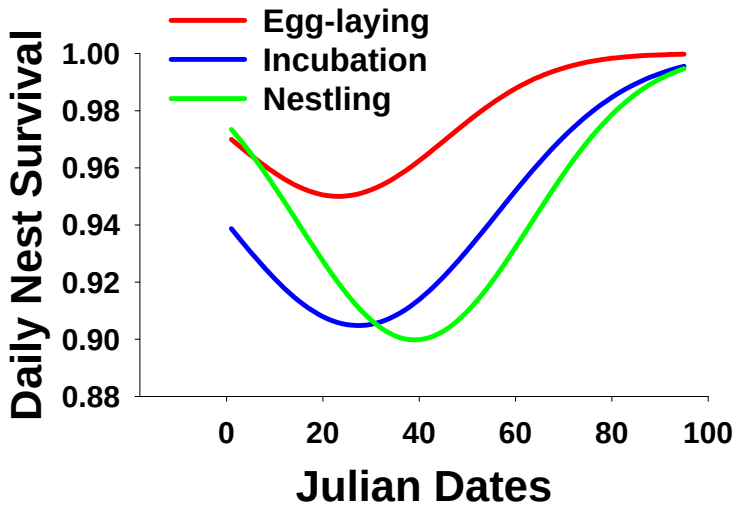

Figure 7. This graph depicts daily nest survival for Dickcissels between May 15 (Julian Date=0) and August 15.

We compared daily nest survival rates for Dickcissels between conservation buffers and early-succession blocks using Program MARK. These preliminary estimates are derived from a constant model that compared habitat treatments without accounting for differences in nesting stages (egg-laying, incubation, nestling) or time. However, the estimates did reveal much greater nesting success in early-succession block habitats (Figure 8).

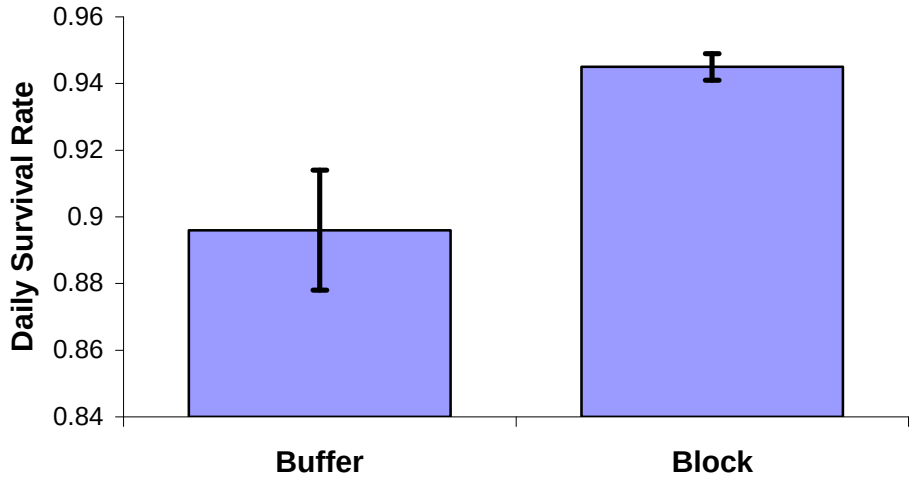

Figure 8. Mean (±SE) constant daily nest survival estimates for Dickcissels by habitat type in 2006.

Dickcissel Post-fledging Ecology—In 2006 we initiated a 2-year study of Dickcissel fledgling survival and habitat use in an attempt to further quantify benefits of our RMS to nesting songbirds. We attached radio transmitters on 181 Dickcissel nestlings to track their survival and movement after fledging. Radio-tagged birds were either found dead (121), survived until the signal disappeared (25), survived until the transmitters dropped (30), or had an unknown fate (5). Of the fledglings found dead, 91 (75%) died during their first day out of the nest and another 24 (20%) died by day 3. The oldest bird found dead was 12 days old and of the 35 birds to live at least 5 days, only 4 (11%) were found dead. Primary causes of death were snakes (41%), fire ants (23%), and mammals (12%), although many deaths were unexplainable. Snake-caused deaths were from Southern Black Racers (57%), Speckled Kingsnakes (15%), Black Rat Snakes (7%), and unidentified snakes (21%). Similar to nest survival, we also detected an apparent increase in the survival rate of fledglings during the later part of the field season. Prior to June 6, 10% of tagged fledglings lived >5 days whereas after June 6, 25% of fledglings lived >5 days. We hypothesize that one potential reason for increased survival later in the season relates to decreased snake predation. We were unable to compare postfledging survival between habitat treatments due to the paucity of Dickcissel nesting activity in conservation buffers.

PRESENTATIONS

Conover, R. R., S. J. Dinsmore, and L. W. Burger, Jr. Grassland bird nesting ecology in linear vs. block early succession habitat. The Wildlife Society 13th Annual Conference. September 25, 2006. Anchorage, AK. Abstract & Poster.

PUBLICATIONS

None to date

PARTICIPATING AGENCIES AND LANDOWNERS

Duncan Williams. Landowner. Duncan has generously provided our field crew unlimited access to his 6,500 acre farm.

Trey Cooke. Delta Wildlife, provided equipment and labor for field border establishment.

NRCS INVOLVEMENT

Kevin Nelms. Area Biologist, provided landowner contacts, background information and practice history.

Blake Lanier. Soil Conservationist, provided landowner contacts.

Glynda Clardy. State Wildlife Biologist, provided project review.