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Grassland Bird Population Responses to Agricultural Field Border Establishment

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Enhancement of farmlands for grassland birds can be accomplished by incorporating conservation practices as part of a comprehensive resource management system. Available through several U.S. Department of Agriculture Farm Bill programs, conservation buffers are practical cost-effective conservation practices which provide multiple environmental benefits (increased herbicide and nutrient retention, reduced soil erosion) while providing habitat for grassland birds. Conservation buffers are vegetative barriers (grass, shrubs, trees) strategically located within or at the edge of crop fields to protect elements of the natural environment from effects of weather and human activities. Within intensive agricultural production systems, conservation buffers may be the only source of semi-permanent grassland habitat for nesting birds. Idle herbaceous field borders are one type of conservation buffer, but unlike other buffer practices, such as riparian buffers and filter strips, field borders can be deployed around the entire field margin, instead of just along down-slope edges.

The U.S. Department of Agriculture-Farm Services Agency recently announced the availability of a new CRP conservation buffer practice, CP33-Habitat Buffers for Upland Birds (field borders). Field borders are intentionally managed non-crop herbaceous plant communities along crop field edges to provide environmental and wildlife habitat benefits. Field borders are often employed in addition to existing field edge habitats such as fence rows and drainage ditches and may vary in species composition or width depending upon the objectives for their establishment. Whereas CP33 was designed as part of a national conservation initiative for northern bobwhite, the presumption is that other grassland bird species would also benefit from this practice.

Field borders may offer opportunities for enhancing farmlands for numerous grassland birds throughout the United States. If field borders are to be implemented on a nationwide basis to enhance grassland bird habitat within agricultural production systems, as encouraged through multiple government sponsored conservation programs (Environmental Incentives Program, Wildlife Habitat Incentives Program), information regarding grassland bird use of field border habitats is required. Our objectives were to measure the effects of field borders on populations of breeding and wintering grassland birds and northern bobwhite in the Black Belt prairie of northeastern Mississippi.

Our studies were conducted on 3 privately owned working farms located within the Black Prairie physiographic region in Clay and Lowndes counties, Mississippi. Primary agricultural practices were row crop (approximately 60-80% row crop; soybean and corn), forage, and livestock production. During early spring 2000, experimental field borders (20 ft wide) were established along

agricultural field margins (fence rows, drainage ditches, access roads, and contour filter strips) on half of each farm. The average percentage of the row crop field area established as field borders was 6%, and field borders comprised about 1% of the land base of each farm. Producers were paid a monetary incentive similar to those used in common USDA conservation buffer programs at the end of each growing season for land placed into field borders. Furthermore, producers were required not to mow, herbicide, or disk field borders during the duration of the study.



Grassland Songbird Response to Field Border Management

We used transect sampling techniques during June and July, 2002 to estimate abundance and diversity of breeding season grassland birds relative to field border management practices. We used transect sampling techniques during February-March, 2002-2003 to estimate density and diversity of wintering grassland birds relative to field border management practices.

Breeding Season Songbird Response

We recorded 53 species (1,443 individual birds) while sampling transects during the 2002 breeding season. The 6 most abundant species were Mourning Dove (8%),

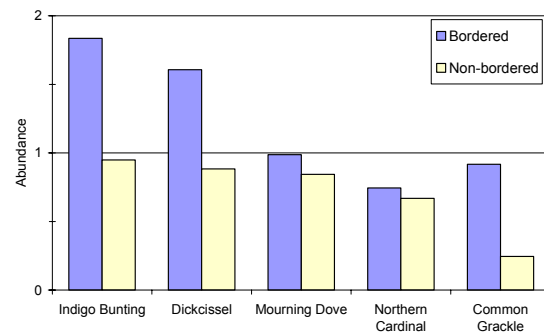
Northern Cardinal (7%), Indigo Bunting (15%), Dickcissel (13%), Red-winged Blackbird (20%), and Common Grackle (6%).

Dickcissel and Indigo Bunting were nearly twice as abundant where field borders were established, regardless of adjacent plant community type or width. Dickcissels and Indigo Buntings have been declining at 4%/year and 1.5%/year, respectively, during the previous 24 years in the Black Prairie region (based on Breeding Bird Survey trends), so field border habitats may contribute to regional conservation. Although Indigo Buntings are primarily a forest bird, the field borders provided an herbaceous plant community along existing wooded areas, edges making these areas more favorable for foraging, loafing, and nesting sites. Field borders provide vertical and horizontal vegetation complexity and may enhance the suitability of existing linear habitats (ditch banks, fencerows, road edges) for Dickcissels.



Species richness was greater along bordered than non-bordered transects, however diversity did not differ. Overall bird abundance was greater along bordered linear habitats than unbordered similar edges. However, addition of field borders along larger patches of grasslands or woodlands did not alter the number of birds using these edges. We speculate that in linear habitats

characteristic of modern agricultural landscapes, the field borders provided greater plant structure and diversity, thus supporting a greater number individuals and species. Although our results are based on 1 year of data, we believe that the magnitude of observed field border effects suggests that field borders may increase the abundance of selected species of grassland/shrub birds during the breeding season.



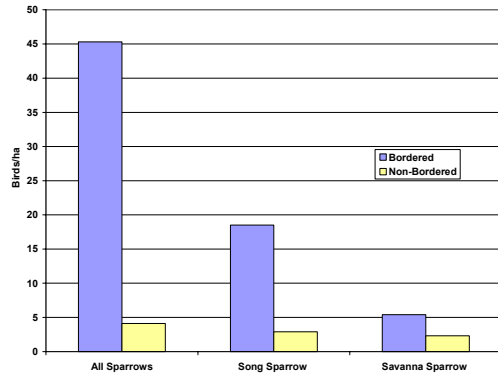
Breeding season abundance of common songbird species at 3 Black Belt Prairie farms, 2002.

Wintering Songbird Response

We recorded 71 bird species while sampling transects during winters 2002-2003. Of 17,562 individual birds, the 5 most abundant species were Red-winged Blackbird (45%), American Pipit (11%), Song Sparrow (7%), Savannah Sparrow (6%), and American Robin (5%).

Most sparrows are ground foragers and their use of linear habitats often depends on vegetation structure. Collectively, across most adjacent plant communities, we observed greater densities of Song, Field, and Swamp sparrows along bordered transects than unbordered. Song Sparrow and Swamp Sparrow densities were greater where field borders were established along existing grasslands. Whereas the addition of herbaceous field borders adjacent to grasslands may seem redundant, most grasslands within our study farms were monotypic stands of cool-season, exotic

forage grasses and provided little vertical structure and few quality food producing plants. Song Sparrow densities were also greater along field borders adjacent to wooded strip habitats than comparable wooded strips without a field border.



Winter density of sparrows on 3 Black Belt Prairie Farms, 2002-2003.

After crops were harvested, field border habitats provide suitable cover and food resources for many sparrow species. Field borders in our study were recently established (<3 years old) and consisted primarily of seed producing grasses and forbs coupled with a relatively open understory. This combination likely facilitated ground-based foraging. Additionally, field borders may provide escape cover in close proximity to foraging sites within the crop stubble. Therefore, we believe that field borders may enhance the value of existing grasslands and crop fields by producing additional foraging habitat and providing escape cover in close proximity to waste grain food sources.

Northern Bobwhite Response to Field Border Management

Previous studies have demonstrated that field borders may increase forging efficiency of bobwhite chicks, use of rowcrop fields, breeding season survival, usable space, and local abundance. From

2000-2002 we used pen-reared, human-imprinted northern bobwhite chicks to measure availability of insects and other arthropods within field borders and adjacent rowcrops and radio-marked adult bobwhite to assess habitat use and survival. We measured bobwhite abundance during the breeding season and fall.

During our study chicks foraging in soybean fields did forage more efficiently near the field margin than in the field interior, however, arthropod consumption did not differ between bordered and non-bordered fields.

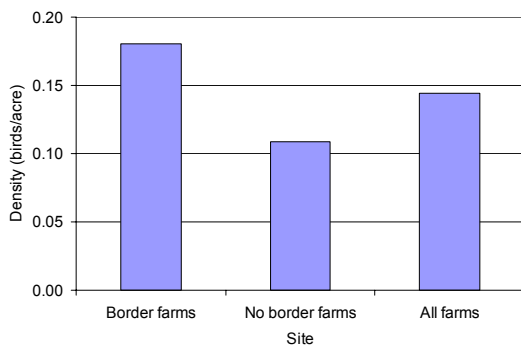


Although field borders may supply abundant arthropods for chicks in some landscapes, during our study early successional (<3 years old) field borders did not provide more arthropods than rowcrop fields.

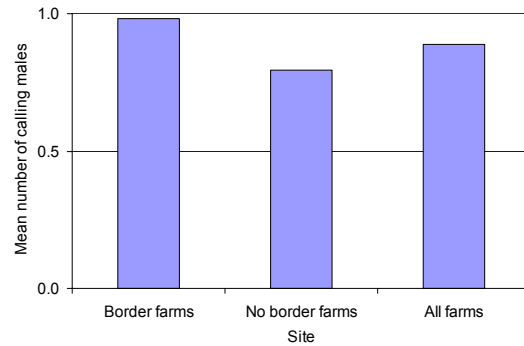
Survival of radio-marked bobwhite during the breeding seasons of 2000-2002 was similar between bordered (37%) and non-bordered (43%) farms. Overall survival among all study sites and years was about 41%. Bobwhite on farms with and without borders exhibited similar habitat selection, establishing breeding season ranges based on the distribution of croplands and

grasslands, and disproportionately using both grasslands and croplands within seasonal ranges. Although, when available, bobwhite used field borders, we were not able to demonstrate that field borders increased the use of rowcrop fields.

We estimated autumn density of wild northern bobwhite using covey call-counts. Covey counts were conducted during late-October-early-November, 1999-2002. We used breeding season call-counts during mid-June, 1999-2002 to index breeding season bobwhite density. For autumn and breeding season abundance measures, we evaluated differences in abundance measures between bordered and non-bordered sites during the 3 years of study. Although autumn and breeding season bobwhite density measures at bordered and non-bordered farms were not statistically different, the average autumn density at bordered sites was about 66% greater and the average number of males during the breeding season was about 23% greater than non-bordered sites. These relative effect sizes were similar to those from previous field border studies.



Autumn bobwhite density at 3 Black Belt Prairie farms, 1999-2002 (years and sites pooled).



Breeding bobwhite density index at 3 Black Belt Prairie farms, 1999-2002 (years and sites pooled).

Summary

Within intensive agricultural landscapes, field borders provide important idle herbaceous cover for grassland and early successional birds. Field borders may provide nesting, foraging, roosting, loafing, and escape cover. During winter, field borders may provide important habitat in southern agricultural systems where most short distance migrants overwinter. The availability of field borders may increase local abundance and species richness.

On our study sites, during the breeding season, the presence of field borders increased total bird abundance, species richness, and density of 2 regionally declining early successional species. Additionally field borders provided wintering habitat for resident and short distance migrants and increased local density of wintering sparrows.

Although field borders have elicited bobwhite population responses in other studies, we did not observe differences in survival, habitat use, or abundance when field borders comprised about 1% of a study site.

Collectively, we suggest that field borders provided important habitat for many grassland birds due to their greater

abundance of food (weed seeds) and more complex vegetation structure for nesting, roosting, loafing, thermal, and escape cover than adjacent rowcrop and grasslands within our study sites. Whereas agricultural intensification has led to increased simplification of farmland structure, we contend that field borders provide an additional and important structural component for breeding and wintering birds within intensive agricultural landscapes.

Field border management practices encouraged by the USDA can be used specifically to enhance northern bobwhite populations. However, the amount of field border habitats established will likely dictate their ability to evoke measurable changes in populations (e.g. abundance). Given our results in the context of those reported elsewhere, we recommend that at least 5-10% of a study area be placed in field border habitats to elicit measurable responses of northern bobwhite populations. We suggest that field borders be maintained as early successional communities through periodic disturbance (e.g. winter disking) to maintain seed producing plants, vegetation structure, and arthropods for grassland birds.

Resource management systems that support both birds and farm operators are important for maintenance of a diverse farmland bird population. However, implementation of conservation practices rest solely upon farm operators. Only farmland conservation practices that cost effectively accrue multiple environmental benefits while enhancing farmland wildlife will gain widespread acceptance and implementation. Environmental benefits (increased herbicide and nutrient retention, reduced soil erosion and sedimentation, etc.) of field border conservation practices are well documented, and most farm operators recognize the economic, environmental and societal benefits of CRP conservation practices; with

>75% of farm operators deeming wildlife as an important component. Therefore, we contend that USDA National Conservation Buffer Initiative practices such as field borders (CP33-Habitat Buffers for Upland Birds), filter strips, and riparian buffers are compatible with the needs of farm operators while diversifying farmland structure to enhance wildlife.



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