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Natural Resources Conservation Service

CEAP Conservation Insight
Conservation Effects Assessment Project

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Bobwhite and Upland Songbird Response to CCRP Practice CP33, Habitat Buffers for Upland Birds

Summary Findings

- The Habitat Buffers for Upland Birds practice (CP33) is the first Federal conservation practice to target species-specific population recovery goals of a national wildlife conservation initiative (the Northern Bobwhite Conservation Initiative).
- Over 14 states, breeding bobwhite densities were 70 to 75 percent greater around CP33 buffered fields than around unbuffered crop fields.
- Fall bobwhite covey densities were 50 to 110 percent greater around CP33 fields than around unbuffered crop fields, and this positive response to CP33 increased each subsequent year of the study.
- Several upland songbirds (e.g., dickcissel, field sparrow) responded strongly to CP33 in the landscape.
- Area-sensitive grassland birds (e.g., grasshopper sparrow) exhibited little response to CP33 buffers.
- These findings illustrate the wildlife value of field borders and other buffer practices implemented through EQIP, WHIP, and other conservation programs.

Recommendations

- Conservation buffers such as CP33, which entail relatively small changes to primary land use at little or no cost to landowners, can provide essential wildlife habitat in productive working agricultural landscapes.
- Broader application of this effective conservation practice can be used to accomplish regional recovery of bobwhite populations in agricultural landscapes.

PHOTO: JOE MAC HUDSPETH

Adult male northern bobwhite

Background

Advances in agricultural technology and practices have produced large-scale loss of natural communities in North American agricultural landscapes. These changes have contributed to dramatic population declines of many bird species dependent on early-successional plant communities. Based on the North American Breeding Bird Survey (BBS), 50 percent of grassland and 39 percent of successional-scrub species are significantly declining (Sauer et al. 2008). Some of the most dramatic declines include populations of northern bobwhite (3.9%/year), grasshopper sparrow (3.3%/year), eastern meadowlark (3.1%/year), and field sparrow (2.3%/year) (fig. 1).

Declines of northern bobwhite, a socioeconomically valuable game bird, are of particular concern. In 2002, the Northern Bobwhite Conservation Initiative (NBCI) was developed to provide a framework for recovery of bobwhite populations to sustainable levels (Dimmick et al. 2002). The NBCI is a habitat-based recovery plan with regionally explicit habitat and population goals designed to recover bobwhites to 1980 average population densities on extant improvable acres. The NBCI suggests that the majority of population recovery could be achieved through alteration of primary land use on 6.2 percent of farm, forest, and rangeland acreage. This could be accomplished, in part, by realizing potential wildlife benefits of conservation buffer practices implemented through a number of USDA Farm Bill conservation programs.

The Conservation Reserve Program (CRP) is a voluntary, incentive-driven Farm Bill program that provides annual payments and cost share to private landowners for retirement and management of arable farmlands. Although initially designed to offset excess commodity production and enhance soil and water quality, beginning in 1997 wildlife benefits became an explicit statutory objective of the CRP. CRP lands have the potential to provide suitable habitat for many at-risk wildlife species. Lands enrolled in the CRP have been shown to provide habitat for myriad grassland birds, supporting higher densities and productivity than row crops or alternative grassland habitats, and contribute to regional recovery of some species (e.g., waterfowl, Henslow's sparrow). However, grassland bird response to CRP

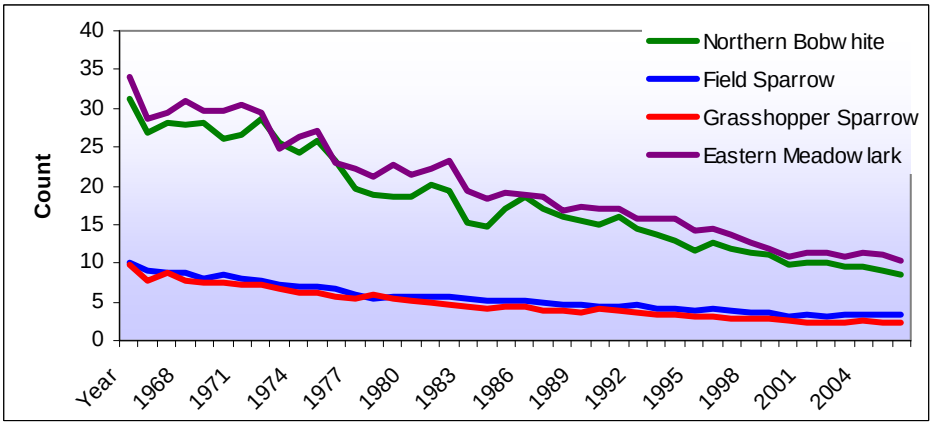


Figure 1 U.S. BBS population trends for northern bobwhite, grasshopper sparrow, eastern meadowlark, and field sparrow (1966-2008) (Sauer et al. 2008).

PHOTO: KRISTINE EVANS

Figure 2 An example of a diverse native herbaceous community established along a crop-field margin through CP33, Habitat Buffers for Upland Birds.

varies by species, climate, vegetation structure, CRP practice type and management regime.

The Continuous Conservation Reserve Program (CCRP) was established in 1996 to provide additional incentives for targeted enrollment of environmentally sensitive lands into select conservation practices. Many conservation practices encouraged under CCRP make use of conservation buffers. Conservation buffers are linear strips of vegetation designed to reduce soil erosion, retain agrichemicals, improve water quality, and enhance biodiversity. Conservation buffers provide a programmatic option to create permanent wildlife habitat in productive landscapes where removal of whole fields from crop production is not economically feasible. Economic incentives that encourage establishment of herbaceous buffers around cropped fields may provide critical habitat for bobwhite and other early-successional songbirds, addressing the habitat goals of the NBCI and other recovery plans.

Of the many practices available under CCRP, Conservation Practice 33 (CP33, Habitat Buffers for Upland Birds) is one of the few specifically designed to create wildlife habitat. CP33 was initiated in 2004 by the USDA Farm Service Agency (FSA) as part of the Bush Administration's "Presidential Bobwhite Habitat Initiative," and offers landowner incentives for establishment of a diverse native herbaceous community along crop field edges to provide habitat for northern bobwhite and other upland birds (USDA 2004) (fig. 2). The FSA allocated 250,000 CP33 acres to 35 states within the bobwhite range for establishment of 30 to 120 ft (9–36 m) upland habitat buffers under 10-year contracts. More than 209,000 CP33 acres have been enrolled since 2004 (fig. 3a).

CP33 exemplifies progressive conservation in working landscapes because it allows landowners to remove unproductive field margins from production with minimal or positive economic impact on whole-farm profitability (Barbour et al. 2007). CP33 is unique because it is one of the few exceptions to the standard down-slope requirement of most conservation buffers, thus allowing producers to buffer perimeters of entire fields if desired. CP33 is also the first Federal conservation practice specifically designed to help meet the habitat objectives of a large-scale wildlife conservation initiative, the NBCI. Finally, because of its unique and progressive qualities, CP33 is the first practice with a wildlife monitoring requirement following implementation (USDA 2004).

The National CP33 Monitoring Program

To fulfill the CP33 monitoring requirement the FSA supported the development of a coordinated monitoring effort among states containing the majority of CP33 acreage allocation. In a collaborative effort, the Southeast Quail Study Group (now the National Bobwhite Technical Committee) and Southeast Partners in Flight developed a national CP33 monitoring protocol with the goal of obtaining robust and comparative measures of bobwhite and upland songbird density at multiple spatial scales within the core bobwhite range (Burger et al. 2006). Subsequently, the national CP33 monitoring program was implemented on ~1,100 bird survey points (~550 CP33 fields, ~550 unbuffered reference fields) in 14 states from 2006 to 2008 (fig. 3b). States involved in the coordinated CP33 monitoring effort contain 80 percent of actual enrolled acreage. Survey points in the national CP33 monitoring program are located in nine Bird Conservation Regions (BCRs), allowing for comparisons of bobwhite and upland songbird response to CP33 among physiographic regions used to delineate habitat goals under the NBCI (fig. 3c).

The national CP33 monitoring program included breeding season point-transect surveys for bobwhite and priority upland songbirds and fall bobwhite covey surveys. Both were conducted on paired CP33 and unbuffered row crop fields (with unbuffered fields located 1 to 3 km from CP33 fields) from 2006 to 2008.

Breeding season surveys were conducted up to four times annually between May and July. Fall covey surveys were conducted once annually from September to November depending on geographic location. Distance sampling was used to derive estimates of density for breeding bobwhites, priority upland songbirds, and fall bobwhite coveys at multiple spatial scales. Distance sampling allows for the robust estimation of density by incorporating the probability of detecting an individual at a given radial distance from the survey point (Buckland et al. 2001).

Bobwhite Response to CP33

The researchers observed substantively greater densities of breeding male bobwhites and fall bobwhite coveys on CP33 fields compared to unbuffered fields in each year from 2006 to 2008. Overall bobwhite density was 70 to 75 percent higher on CP33 fields compared to unbuffered fields—approximately 0.20 males/ha (~0.8 males/10 ac) on

Figure 3 National distribution of CP33 contracts as of January 2009 (3a), national distribution of CP33 survey points in 14 states in 2006-2008 (3b), and geographic location of Bird Conservation Regions (BCR) included in the 2006-2008 breeding and fall CP33 monitoring program (3c).

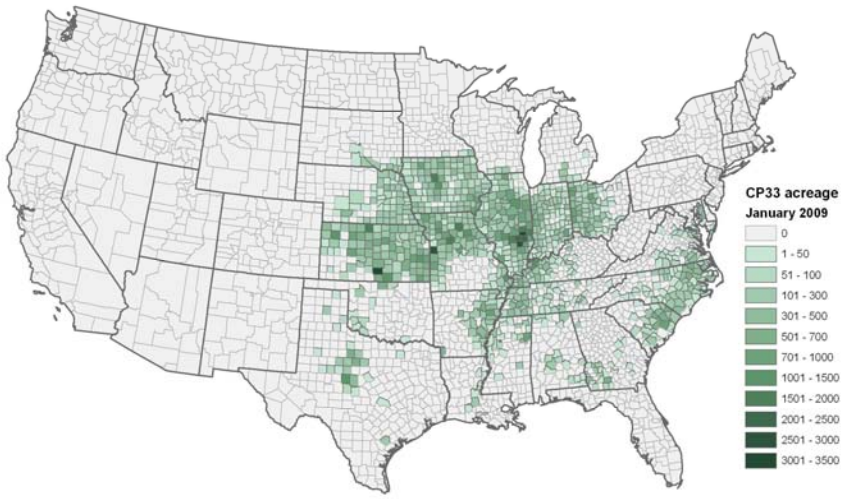
CP33 fields compared to 0.12 males/ha (~0.5 males/10 ac) on unbuffered fields (fig. 4).

Overall, fall bobwhite covey density ranged from 0.023 to 0.033 coveys/ha (0.93–1.33 coveys/100 ac) on unbuffered fields, and from 0.044 to 0.056 coveys/ha (1.78–2.27 coveys/100 ac) on CP33 fields, and this effect increased from 50 percent in 2006 to 110 percent in 2008 (fig. 5). Although annually variable, breeding season bobwhite densities in most BCR's were about two times greater on CP33 fields than on unbuffered crop fields. Breeding bobwhite densities were greatest in the Central Mixed-grass Prairie (BCR 19) each year, but the largest differences between buffered and unbuffered fields were observed in the Eastern Tallgrass Prairie (BCR 22), Mississippi Alluvial Valley (BCR 26), and Southeastern Coastal Plain (BCR 27) (fig. 4). Fall bobwhite covey densities were also up to two times greater on CP33 fields than unbuffered fields in most BCRs. Densities on CP33 fields in the Central Hardwoods (BCR 24), Mississippi Alluvial Valley (BCR 26), and Southeastern Coastal Plain (BCR 27) were double or triple those of control fields in most years (fig. 5).

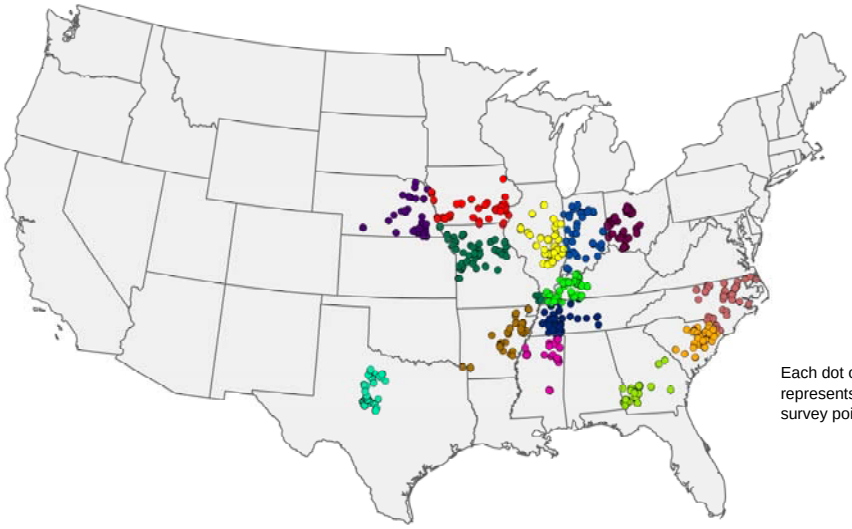
Upland Songbird Response to CP33

Several priority upland songbird species responded dramatically to CP33, whereas others showed little response. We observed strong overall and BCR-level effects in dickcissel and field sparrow, with overall dickcissel densities 80 to 127 percent greater and field sparrow densities 94 to 190 percent greater on CP33 fields than unbuffered fields from 2006 to 2008 (fig. 6). Indigo bunting, a scrub-successional species, exhibited a strong response in 2006 and 2007, but a smaller response in 2008 (fig. 6). Other less numerous species also preferred CP33 fields, including painted bunting

3a—Acres enrolled in CP33

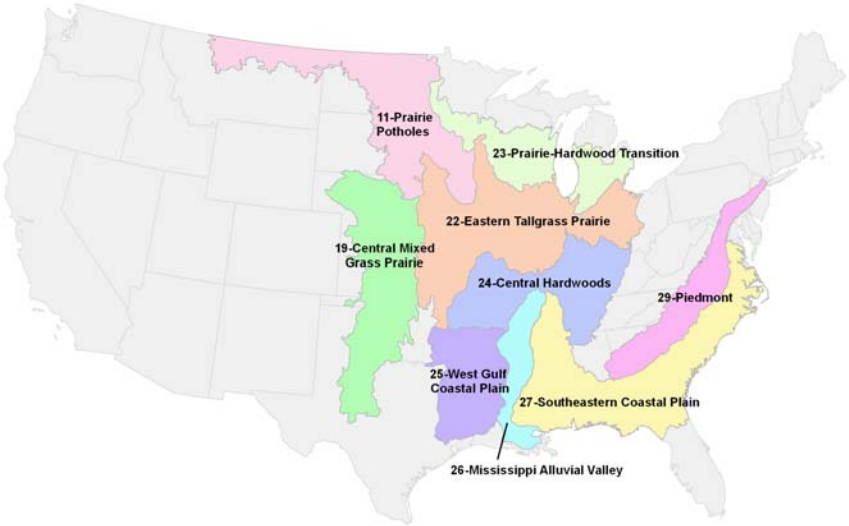


3b—Survey points in the national CP33 monitoring program



Each dot on the map represents four CP33 survey points.

3c—Bird Conservation Regions with CP33 monitoring



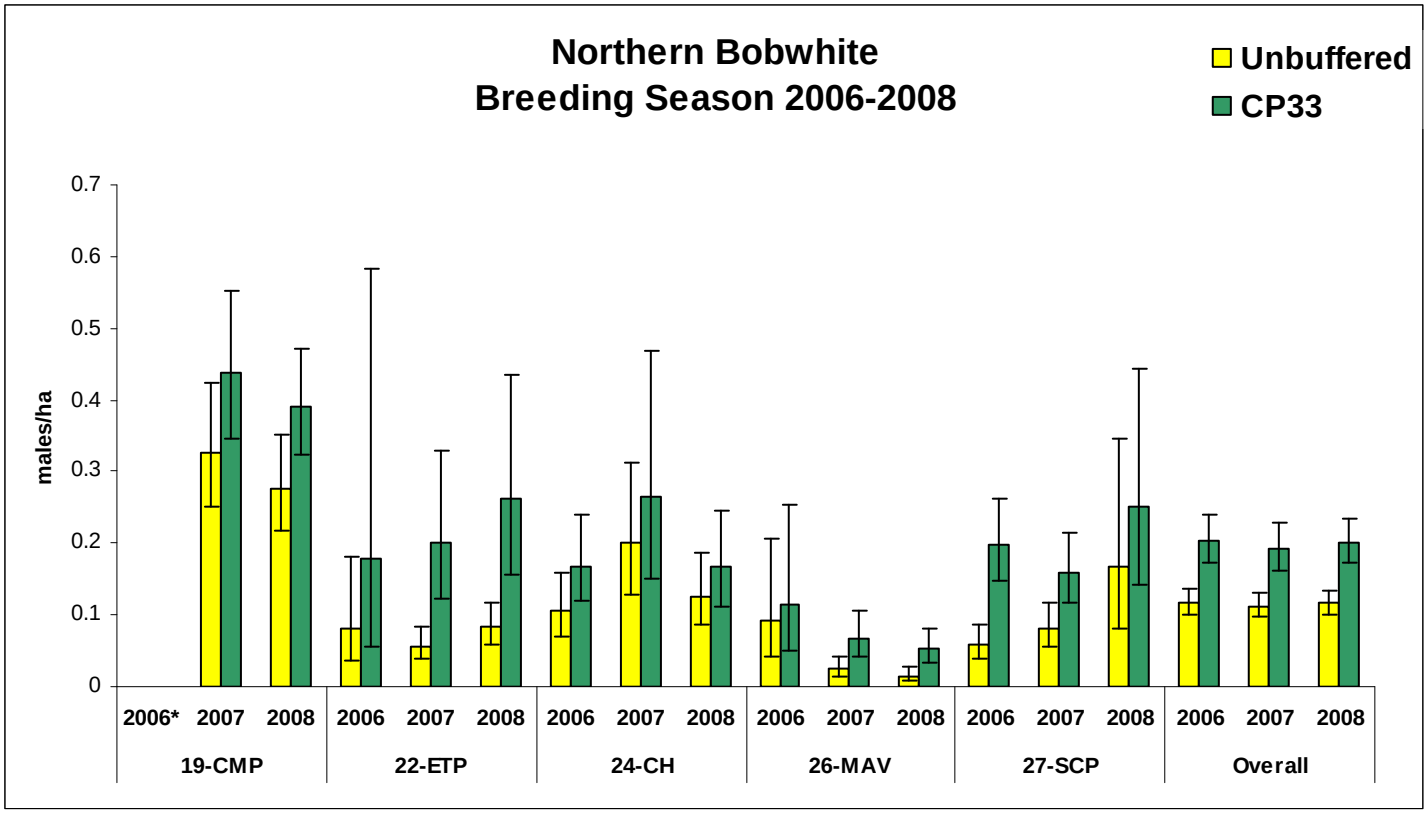


Figure 4 Bird Conservation Region (BCR)-level and overall breeding male bobwhite density (males/ha ± 95% CI) on surveyed CP33 and unbuffered fields from 2006 to 2008. (CMP = Central Mixed-grass Prairie; ETP = Eastern Tallgrass Prairie; CH = Central Hardwoods; MAV = Mississippi Alluvial Valley; SCP = Southeastern Coastal Plain). CMP results for 2006 are not included due to limitations of inference from distance sampling.

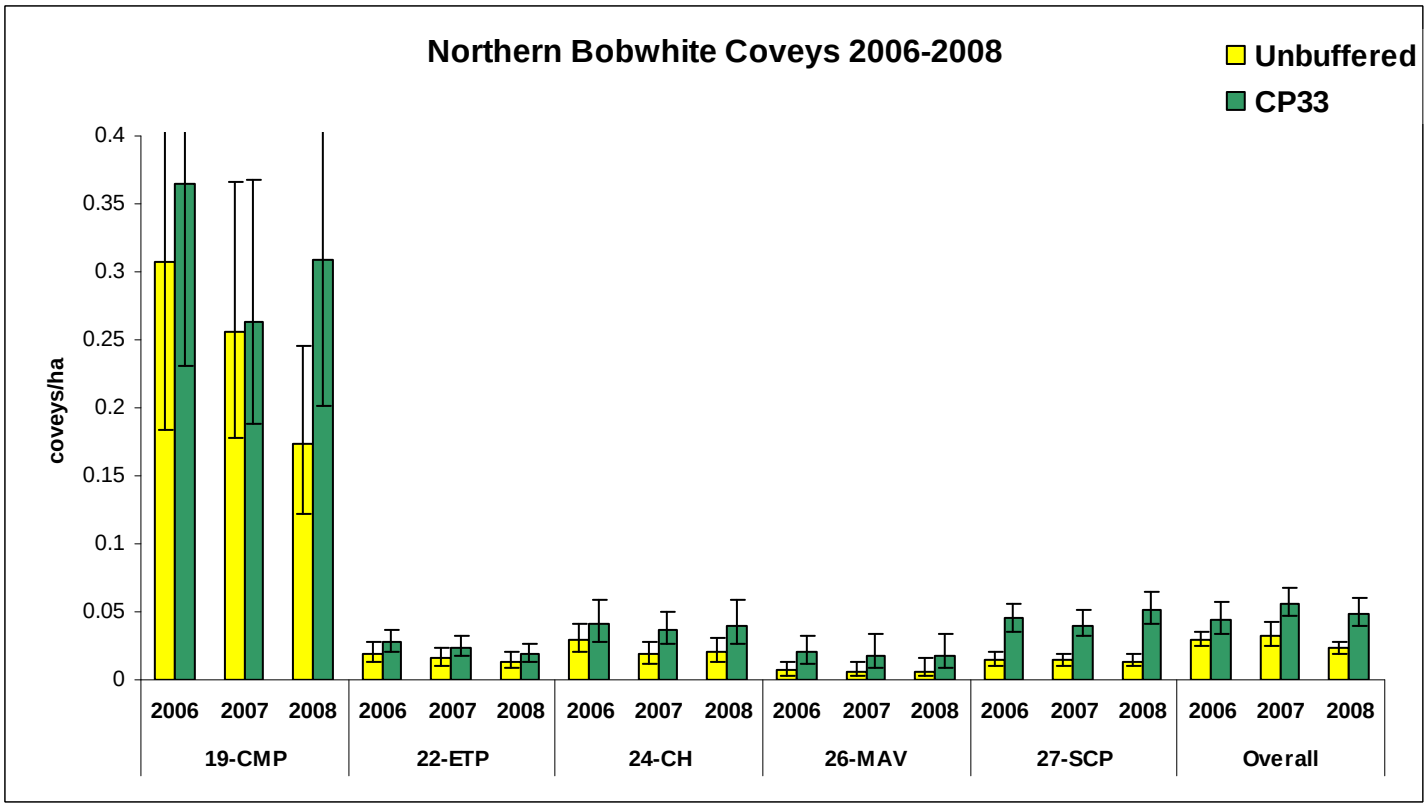


Figure 5 Bird Conservation Region (BCR)-level and overall fall bobwhite covey density (coveys/ha ± 95% CI) on surveyed CP33 and unbuffered fields from 2006 to 2008. (CMP = Central Mixed-grass Prairie; ETP = Eastern Tallgrass Prairie; CH = Central Hardwoods; MAV = Mississippi Alluvial Valley; SCP = Southeastern Coastal Plain)

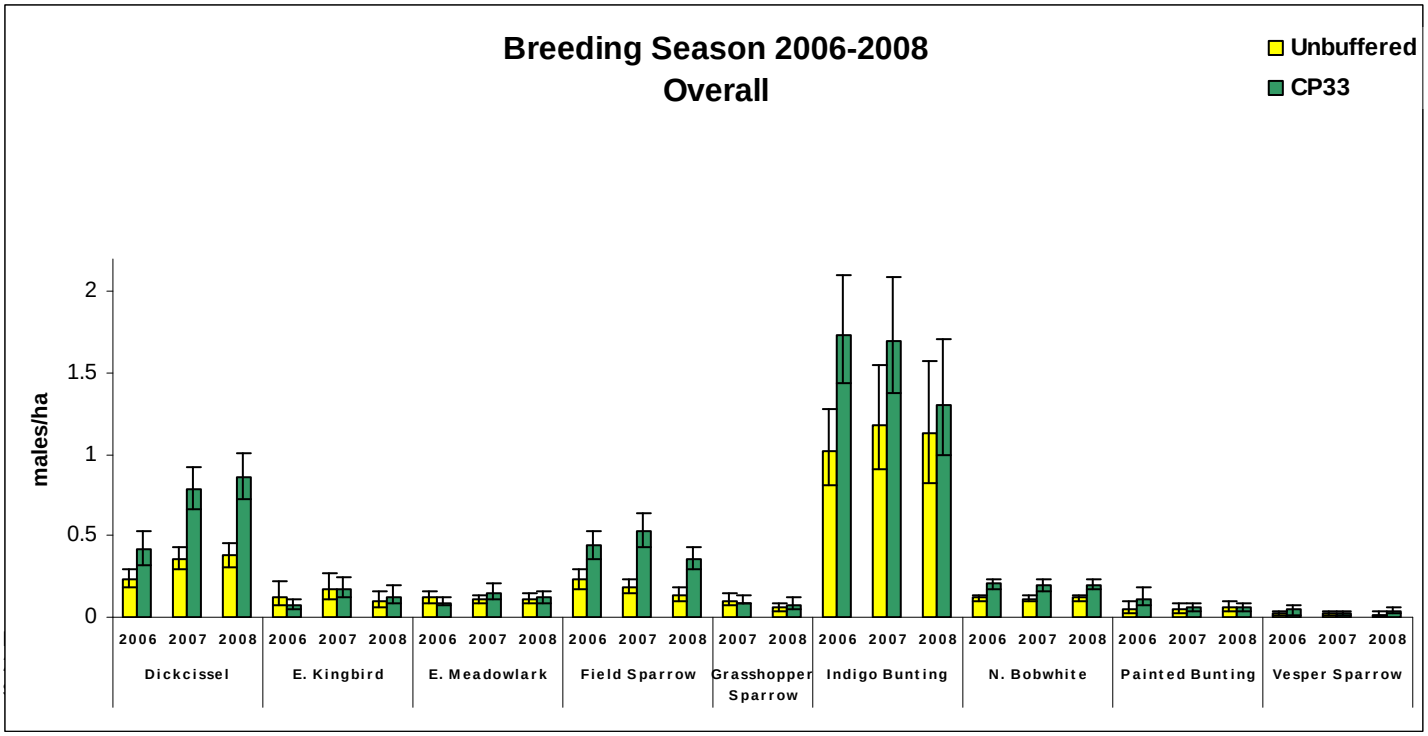


Figure 6 Overall density estimates (males/ha ± 95% confidence interval) of species of interest on surveyed CP33 and unbuffered fields during the 2006-2008 breeding season. Painted Bunting analysis includes sites in only Arkansas, Mississippi, South Carolina, and Texas; Vesper Sparrow analysis includes sites in only Iowa, Illinois, Indiana, and Ohio.

and vesper sparrow, but response varied largely by year (fig. 6). Eastern meadowlark exhibited substantial annual variability in response to CP33, with a reversal of effect from 2006 to 2007 and a slight positive response to CP33 in 2008 (fig. 6). Grasshopper sparrow exhibited virtually no response to CP33 annually from 2006-2008 (fig. 6). Grasshopper sparrows are area-sensitive, with preferences for large tracts of continuous grassland. CP33 buffers do not provide minimum area requirements for grasshopper sparrow populations, unless the surrounding landscape matrix contains additional grassland area required. However, vesper sparrow, another area-sensitive priority species, displayed a positive response to CP33 in two of the three years (fig. 6), in contrast to grasshopper sparrow. Finally, eastern kingbird, a forest mid-canopy nesting species that forages in open habitats, exhibited virtually no annual response to CP33 in 2006 and 2007, and a slight positive response in 2008 (fig. 6).

Interpretation and Implications

The CP33 monitoring program affords a rare opportunity to evaluate populations of grassland birds at large geographic scales and demonstrates that the establishment of CP33 upland habitat buffers in agricultural landscapes may provide essential habitat and produce positive and immediate responses by bobwhite and several priority songbird species. Moreover, the observed responses validate an underlying assumption of the NBCI—that a relatively small (5–15%) change in primary land use in agricultural landscapes can produce measurable and substantive population responses. This may be the result of increased and variable nesting or foraging cover, changing insect community, or seed base associated with CP33 buffers. Presuming that increases in abundance represent net population increases rather than redistribution of existing populations from the surrounding landscape, field borders and other buffer practices implemented through CP33 or other conservation programs may have the capacity to affect large-scale population changes in many declining species.

Combining results from the CP33 monitoring program with results from several other studies has led to a breadth of information on bobwhite and upland songbird response to conservation buffer habitats such as those established under CP33. These studies have demonstrated that bobwhite and upland songbird response to buffer habitats is affected by—

- configuration of the surrounding landscape. Bobwhite respond more strongly to buffers in landscapes dominated by agriculture compared to forest-dominated landscapes (Riddle et al. 2008). This is presumably related to dispersal abilities of bobwhites and permeability of landscapes;
- amount of integrated conservation in the landscape. Bobwhite and upland songbirds respond most strongly when buffers are used to connect large blocks of early-successional habitat as part of a comprehensive conservation management system (Conover 2009);
- width and configuration of conservation buffers. Bobwhite abundance is greater in landscapes with wider buffers or non-linear buffer configuration than those with very narrow linear configuration (Riddle et al. 2008). Abundance, nest density, and nest success of bobwhite and upland songbirds also may increase as buffer width increases (Conover et al. 2009);

- diversity of herbaceous cover in buffers. Bobwhite and upland songbirds exhibit greater positive response to conservation buffers composed of diverse native warm-season grasses, forbs, and legumes compared to monotypic stands (Conover 2009); and

- recurring management practices to set back succession. Implementation of management on conservation buffers will set back succession and provide optimal nesting, foraging, and brood-rearing habitat for bobwhites and upland songbirds.

Finally, the CP33 monitoring program demonstrates that coordinated multi-state monitoring efforts to examine wildlife response to Farm Bill provisions are not only feasible but also can be overwhelmingly successful if carefully planned and implemented.

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The Conservation Effects Assessment Project: Translating Science into Practice

The Conservation Effects Assessment Project (CEAP) is a multi-agency effort to build the science base for conservation. Project findings will help to guide USDA conservation policy and program development and help farmers and ranchers make informed conservation choices.

One of CEAP's objectives is to quantify the environmental benefits of conservation practices for reporting at the national and regional levels. Because fish and wildlife are affected by conservation actions taken on a variety of landscapes, the wildlife national assessment draws on and complements the national assessments for cropland, wetlands, and grazing lands. The wildlife national assessment works through numerous partnerships to support relevant studies and focuses on regional scientific priorities.

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The principal Mississippi State University investigators on this project were Wes Burger and Sam Riffell, with support from project coordinators Kristine Evans and Mark Smith.

For more information:
www.nrcs.usda.gov/technical/NRI/ceap/