Conservation Reserve Program

CP33 - Habitat Buffers for Upland Birds

Bird Monitoring and Evaluation Plan

2007 Annual Report

Mississippi Wildlife, Fisheries, & Parks

USDA Farm Service Agency

Mississippi State University College of Forest Resources Forest and Wildlife Research Center

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Conservation Reserve Program

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Bird Monitoring and Evaluation Plan
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Executive Summary

In 2004, the USDA-Farm Service Agency (FSA) implemented the Habitat Buffers for Upland Birds (CP33) practice as part of the Continuous Conservation Reserve Program (CRP). The FSA allocated 250,000 CP33 acres to 35 states to be actively managed over a period of 10 years and charged the Southeast Quail Study Group (SEQSG) with the development of a CP33 monitoring protocol with the goal of generating measures of population response for northern bobwhite (*Colinus virginianus*) and other priority bird species.

The FSA adopted the monitoring protocol developed by the SEQSG and encouraged states with CP33 allocation to participate in coordinated monitoring. The CP33 national monitoring protocol suggested monitoring in the 20 states that encompass 95% of the allocated CP33 acreage over a 3 year period. CP33 fields were randomly selected for monitoring from a pool of all CP33 contracts within a state, and then paired with a similarly cropped unbuffered control field located >1 and <3 km from each selected CP33 field. Breeding season point-transect monitoring was conducted in 11 states in 2006 and 14 states in 2007 on at least 40 paired CP33/control fields in each state. Monitoring continued in the fall of 2006 and 2007 with bobwhite covey call surveys in 13 states. Vegetation surveys were also conducted in each participating state during the 2007 growing season to evaluate vegetation establishment, characteristics, buffer width, and degree of non-compliance and mid-contract management on CP33 buffers. Comparative abundances of bobwhite and other priority bird species on CP33 and control fields were estimated for the 2006 and 2007 breeding season and fall using a 3-tiered approach (across bobwhite range (program-wide), within each Bird Conservation Region (BCR), and within each state).

Breeding season bobwhite densities were 50% greater in 2006 and 99% greater in 2007 on CP33 fields compared to control fields, representing a program-wide increase in effect in the second year of monitoring. This increasing effect was prevalent in the Central Mixed-grass Prairie (19-CMP), Eastern Tallgrass Prairie (22-ETP) and in 7 out of 11 states (64%), but not in the Central Hardwoods (24-CH), Southeastern Coastal Plain (27-SCP), or in 3 out of 11 states (27%). Similar to the breeding season, the program-wide trend in relative effect size for overall fall covey densities nearly doubled from 2006 to

Dickcissel
Photo courtesy of Jim Rathert, Missouri Department of Conservation.

Bobwhite Quail

Eastern Meadowlark

Indigo Bunting

Executive Summary

2007, with a strong response in the 27-SCP and 24-CH, and a decline in effect in the 22-ETP.

We observed a program-wide increasing effect for dickcissel (*Spiza americana*), field sparrow (*Spizella pusilla*), and eastern meadowlark (*Sturnella magna*), the latter of which exhibited an overall reversal from greater densities on control fields in 2006 to greater densities on CP33 fields in 2007. Program-wide there was nearly a 2-fold greater dickcissel density on CP33 than control fields in 2007. This represents a more than 3-fold increase in effect size compared to 2006. Field sparrow densities were more than 3 times greater on CP33 than control fields in 2007, and effect size nearly doubled from 2006. Indigo bunting (*Passerina cyanea*) exhibited a decrease in effect in 2007; however, densities on CP33 fields were nearly identical and the decrease in effect was due to an increase on control fields. Painted bunting (*Passerina ciris*) exhibited 65% greater densities on CP33 than control fields. Though sample size was low eastern kingbird (*Tyrranus tyrannus*) and grasshopper sparrow (*Ammodramus savannarum*) exhibited virtually no response to CP33, whereas vesper sparrow (*Pooecetes gramineus*), which exhibits similar vegetation preference as grasshopper sparrow, displayed a positive response to CP33.

The CP33 monitoring program affords a rare opportunity to evaluate populations of grassland avifauna at a large geographic scale, and has revealed that the addition of CP33 upland habitat buffers in an otherwise agricultural landscape provides critical habitat and invokes a positive and rapid response by populations of bobwhite and several priority songbird species. Presuming increases in abundance represent net population increases rather than redistribution of existing populations from the surrounding landscape, CP33 may have the capacity to affect large-scale population changes in many declining species.

Painted Bunting

Eastern Kingbird

Grasshopper Sparrow

Vesper Sparrow. Photo by George Jameson.

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Introduction

Historical conversion of many native grasslands to agricultural production, exacerbated today by factors such as clean-farming, urbanization, reforestation, and fire-exclusion have contributed to precipitous declines in populations of northern bobwhite and other grassland-obligate and successional-shrub bird species in North America. Results from the North American Breeding Bird Survey (BBS) suggest 46% of grassland species and 40% of successional-scrub species have exhibited significant population declines since 1980 (Sauer et al. 2008). Among these, some of the most severe declines include populations of northern bobwhite (3.9%), grasshopper sparrow (3.3%), eastern meadowlark (3.1%), and field sparrow (2.3%) (Sauer et al. 2008). Habitat loss in these anthropogenically altered landscapes has resulted in the dependence of many early-successional species on suboptimal habitat for various parts of their life cycle.

In response to population recovery goals set by the Northern Bobwhite Conservation Initiative (NBCI; Dimmick et al. 2002), the Southeast Quail Study Group has emphasized the development of methods to increase bobwhite populations in agricultural landscapes. To realistically attain the population recovery goals, it is essential that management practices coexist with agricultural production in working landscapes. Conservation buffers provide a programmatic tool for creation of permanent habitat in productive landscapes where removal of whole fields from crop production is not economically feasible. The implementation of subsidized mixed native warm-season grass, forb, and legume buffers around cropped fields may be one method to increase bobwhite and other early-successional songbird habitats with minimal or positive economic impact on producers (Barbour et al 2007). In 2004, following recommendation by the SEQSG, the USDA-Farm Service Agency (FSA) implemented the Habitat Buffers for Upland Birds (CP33) practice as part of the Continuous Conservation Reserve Program (CRP). In a pilot program, the FSA allocated 250,000 CP33 acres to 35 states to be actively managed over a period of 10 years.

As the majority of CRP practices were initially established to decrease soil erosion and increase water quality, the FSA raised concern about the paucity of information regarding effects of CRP practices on wildlife populations. To address these concerns, the FSA charged the SEQSG with the development of a CP33 monitoring program to estimate bobwhite and priority songbird population response to implementation of CP33 at state, regional (within Bird Conservation Regions (BCR)), and national levels over a 3-year sampling period. Subsequently, the "CP33-Habitat Buffers for Upland Birds Monitoring Protocol" was created and the monitoring program commenced during the 2006 breeding season (Burger et al.2006).

Methods

Survey Methods

Monitoring began in 2006 and continued in 2007 to evaluate effects of CP33 buffers on bobwhite and priority songbird populations and fulfill the first two years of the FSA monitoring requirement. Breeding season point-transect surveys were conducted on 900 fields (CP33=457; Control=443) in 11 states (6 BCRs) in 2006 and on 1164 fields (CP33=589; Control=575) in 14 states (9 BCRs) in 2007 (Figures 1 and 2, Table 1). Priority songbird species were selected by Southeast Partners in Flight, based on specific conservation concern in each BCR (Table 2). Fall covey surveys were conducted on 1038 fields (CP33=521; Control=517) in 13 states in 2006 and on 1021 fields (CP33=513; Control=508) in 13 states in 2007 (Table 1). Control fields were similarly cropped and located >1 km and <3 km from randomly selected CP33 fields in each state. The unbalanced design (within–year differences in number of CP33 and control fields) occurred because of the combined effects of lack of availability of control fields in CP33 landscapes and enrollment of control fields in CP33. Up to 4 repeated surveys were conducted according to the "CP33-Habitat Buffers for Upland Birds Monitoring Protocol" (Burger et al. 2006) at 1 point in each CP33 and control field during the breeding season and generally 1 survey was conducted at each point during the fall. During both breeding season and fall monitoring effort was made to simultaneously survey paired CP33 and control fields to ensure similar weather conditions.

Breeding season point-transect surveys of calling/observed male bobwhites and priority songbird species were conducted May-July 2006 and 2007 at one survey point in each CP33 and paired control field. Surveys were conducted between sunrise and three hours following sunrise during a 10-min count period, and detections were recorded into one of 5 pre-determined distance intervals (25, 50, 100, 250, and 500 m). Fall counts of calling bobwhite coveys were conducted September-November 2006 and 2007 (based on geographic location) at the established breeding season survey points on paired CP33 and control fields. Covey call surveys were conducted from 45 min before sunrise to 5 min before sunrise or until

Figure 1. National distribution of monitored CP33 contracts in 14 states in 2007.

Figure 2. Geographic location of Bird Conservation Regions included in the 2007 breeding and fall CP33 monitoring program. BCRs include Prairie Potholes (11-PP), Central Mixed Grass Prairie (19-CMP), Eastern Tallgrass Prairie (22-ETP), Prairie-Hardwood Transition (23-PHT), Central Hardwoods (24-CH), Western Gulf Coast Plain (25-WGCP), Mississippi Alluvial Valley (26-MAV), Southeastern Coastal Plain (27-SCP), and Piedmont (29-PIED).

covey calls had ceased. Covey locations and time of calling were recorded on datasheets featuring known-scale aerial photos of the survey location. Distance was later measured from georeferenced NAIP imagery in ARCGIS to generate an exact radial distance from the point to the estimated location of the calling covey (Figure 3). To derive measures of density that incorporated variable calling rates, number of adjacent calling coveys and weather characteristics (6-hr change in barometric pressure (1 am – 7 am; in/Hg), percent cloud cover, and wind speed (km/hr)) were recorded during each covey survey (Wellendorf et al. 2004).

Vegetation sampling was conducted during the 2007 growing season (May-August) on all monitored CP33 buffers in each state, including Kansas. Vegetation sampling methods were variable by state; however the majority of states followed the standardized vegetation sampling protocol outlined in the "CP33-Habitat Buffers for Upland Birds Monitoring Protocol" (Burger et al. 2006). Vegetation transects included 10 equally-spaced sampling points systematically distributed along midpoints of each buffer. Multiple layering of buffer vegetation required independent estimation of percent cover within each vegetation category (native warm season grass, exotic, forb, legume, woody, bare ground, litter) within a 1-m2 Daubenmire-type frame (Daubenmire 1959) for each vegetation transect point within the buffer. Buffer width was also recorded at each sampling point for comparison to contract width. Other metrics included verification of buffer establishment, percent of entire buffer in native, exotic, and shrub/woody cover, and percent and description of non-compliant activities.

Data Analysis

Analysis of 2007 breeding season and fall covey data was conducted using a 3-tiered approach, with results generated program-wide (across bobwhite range), regionally (within each BCR), and within each state. If sample size allowed, we used distance sampling to generate density estimates (males/ha) for each priority species in each region/state to assess annual effect in 2007 and to assess overall effect using 2006-2007 combined data. Distance sampling allows for the robust estimation of density by incorporating the probability of detecting an individual at a given radial distance (m) from the survey point (Buckland et al. 2001). When sample size was limited, we estimated relative abundances (mean number of males/point) for priority species in each region/state. Simple and relative effect sizes and 95% bootstrap confidence intervals (B=1000) were calculated for state, BCR, and program-wide density estimates. Significance of response was determined by 95% confidence intervals on simple effect sizes.

2007 Breeding Season

Experts in the distance sampling field have promoted the use of model averaging to account for model uncertainty when generating density estimates in program DISTANCE 5.0 (Thomas et al. 2006). We therefore re-analyzed all 2006 data and analyzed all 2007 data incorporating model averaging when necessary to generate robust estimates of density. Although model-averaging produces density estimates with broader confidence intervals than best-model approximation, it more fully accounts for known sources of variation. Breeding season data were analyzed independently for each priority species using up to 5 distance intervals, matching those in which data were recorded. We accounted for outliers in the data (which cause difficulties in model-fitting) by right-truncating observations where the probability of detection $g(w) < 0.1$ (Buckland et al. 2001).

For program-wide and BCR-level breeding season analysis, we used conventional distance sampling (CDS) in DISTANCE 5.0 to estimate density by stratum (CP33 and control) for each species, based on either a global (i.e., no difference in detectability by stratum) or stratified (i.e., difference in detectability for CP33

and control) detection function. Model selection via Akaike's Information Criteria (AIC; Akaike 1974) was used to evaluate the fit of four key-function models with series expansion terms for the detection function (uniform +cosine, uniform+simple polynomial, half-normal+hermite polynomial, hazard rate+cosine) (Buckland et al. 2001). When no models were competing ($\Delta AIC > 2.0$) we based model selection on the minimum AIC value, goodness of fit of the model, and probability density function plots generated for each model. When models were competing ($\Delta AIC < 2.0$ for 2+ models) and demonstrated variable density estimates we accounted for model uncertainty using model averaging in a nonparametric bootstrap (B=1000). Point estimates of density were used for single model analyses, while averaged bootstrap estimates of density were used for analyses that incorporated model averaging (reflects increased variability associated with model uncertainty). Nonparametric bootstrap (B=1000) was also used in all single-model and model-averaged analyses to generate variance and 95% confidence intervals around density estimates.

In 2006 and 2007, the Mississippi Alluvial Valley (26-MAV; k(CP33)=48, k(control)=49), Piedmont (29-PIED; k(CP33)=7, k(control)=7), Prairie Hardwood Transition (23-PHT; k(CP33)=3, k(control)=3), Prairie Potholes (11-PP; k(CP33)=11, k(control)=9), and West Gulf Coastal Plain (25-WGCP; k(CP33)=4, k(control)=1) did not have adequate sample sizes to generate BCR-specific detection functions or density estimates for species of interest, but were included in state-level and program-wide analyses. Multiple Covariate Distance Sampling (MCDS) in DISTANCE 5.0. (half-normal+hermite polynomial, hazard rate+cosine key functions) was also used to evaluate 2006-2007 combined data, using year as a factor-level covariate for program-wide and BCR-level analyses.

Limited sample size within states reduced the ability to generate state-level detection functions for each species, therefore we used MCDS and AIC model selection to fit a global model for the detection function, and estimate separate average state-level detection functions using states as factor-level covariates. We used these averaged state-level detection functions to generate within-state density estimates for species of interest for CP33 and control groups. We used nonparametric bootstrap (B=1000) to generate variance and 95% confidence intervals around density estimates. MCDS was also used to evaluate 2006-2007 combined state-level data, using both state and year as factor-level covariates.

We estimated relative abundances using a Poisson regression (with a log-link function) in SAS Proc GLIMMIX (SAS Institute 2006) for species of interest without adequate sample sizes to generate density

CP33 buffer planted to native warm-season grasses during the first growing season after planting.

estimates. Pairwise random effects were included based on paired CP33 and control fields. Replicate surveys and year were treated as repeated random effects. Confidence intervals (95%) were generated for all relative abundance data after exponential back-transformation of means for each CP33 and control strata.

2007 Fall Covey Counts

We used CDS methods (outlined above) in DISTANCE 5.0 to estimate program-wide and BCR-level covey densities by incorporating a detection function based on the probability of detecting a covey at a given radial distance (m) from the survey point (Buckland et al. 2001). The 26-MAV (k(CP33)=48, k(control)=49), 29-PIED (k(CP33)=7, k(control)=7), 25-WGCP (k(CP33)=5, k(control)=4), and 23-PHT (k(CP33)=3, k(control)=3) BCRs did not have adequate sample sizes to generate BCR-specific detection functions or density estimates in 2007, but were included in program-wide and state-level analyses. We accounted for outliers in the data (which cause difficulties in model-fitting) by right-truncating the 10% of observations with largest detection distances prior to analysis (Buckland et al. 2001). Analysis was conducted on ungrouped data (i.e., using exact distances).

We used AIC to evaluate the fit of four key-function models with series expansions (uniform +cosine, uniform+simple polynomial, half-normal+hermite polynomial, hazard rate+cosine) to determine if global (pooled CP33 and control) or stratified (separate CP33 and control) detection functions best fit the data. Similar to the breeding season analysis, we based model selection on both the minimum AIC value and on evaluation of the fit of the detection probability and probability density plots generated for each model. When models were competing ($\Delta AIC < 2.0$ for 2+ models) and demonstrated variable density estimates we accounted for model uncertainty using model averaging in a nonparametric bootstrap (B=1000). Point estimates of density were used for single model analyses, whereas averaged bootstrap estimates of density were used for analyses that incorporated model averaging (reflects increased variability based on model uncertainty). Nonparametric bootstrap (B=1000) was also used in all single-model or model-averaged analyses to generate variance and 95% confidence intervals around density estimates. Multiple Covariate Distance Sampling (MCDS) in program DISTANCE 5.0. (half-normal+hermite polynomial, hazard rate+cosine key functions) was used to evaluate 2006-2007 combined covey data, using year as a factor-level covariate for program-wide and BCR-level analyses.

Similar to the breeding season analysis, there were not adequate sample sizes to generate state-specific detection functions based solely on within-state data. We used MCDS in program Distance to estimate multiple level detection functions to generate state-specific density estimates. We used MCDS to fit a global model for the detection function, and used this fitted model to estimate separate average state-level detection functions using states as factor-level covariates. We used these averaged state-level detection functions to generate within-state density estimates for CP33 and control strata. We used nonparametric bootstrap (B=1000) to generate variance and 95% confidence intervals around density estimates. MCDS was also used to evaluate 2006-2007 combined state-level data, using both state and year as factor-level covariates.

Incorporating Wellendorf et al.'s adjustments.- With apriori knowledge that extraneous factors in the environment will influence calling rate (i.e., availability) of bobwhite coveys, we also incorporated the adjustments suggested by Wellendorf et al. (2004). We used a logistic regression equation that incorporates the number of adjacent calling coveys, 6-hr change in barometric pressure (1am-7am; in/Hg), % cloud

cover, and wind speed (km/hr) during each survey to estimate a calling probability. We interpreted the posterior probability from the logistic regression as a point-specific calling probability. We then divided the number of coveys detected at a point by the point-specific calling probability to generate an adjusted point-specific estimate of total coveys. We then used the program-wide, BCR-level, or MCDS generated state level detection functions and the distance-based density estimation equation (Buckland et al. 2001), ran a nonparametric bootstrap (B=1000) and generated an average adjusted density estimate and 95% confidence intervals.

CP33 Fall Covey Count

State:_____ **County:**_____ **Contract:**_____ **Type:**_____

Date:_____ **Landowner name:**_____

Observer:_____

DIRECTIONS: Arrive at the point approximately 45 minutes before sunrise and begin listening for calling coveys in all directions. Mark COVEY location(s) on the map using a small "." where you best estimate the covey location. DO NOT place an "X" or draw a circle to mark the location. Make sure the "." is clearly legible and note the location (e.g., Covey 1) on the map. Note the time that each covey BEGAN calling in the spaces provided. Continue listening for calling coveys until all covey calling has ceased, approximately 5 minutes before sunrise. After the count, write the total number of coveys heard on the appropriate space below.

Total number of COVEYS heard:_____

Covey #1 Time:_____ **Covey #4 Time:**_____ Cloud cover (%):_____

Covey #2 Time:_____ **Covey #5 Time:**_____ Bar. Press. (in/Hg) 1:00am:_____

Covey #3 Time:_____ **Covey #6 Time:**_____ Bar. Press. (in/Hg) 7:00am:_____

Figure 3. Example of a data recording sheet for fall bobwhite covey surveys in which estimated covey locations were marked on georeferenced NAIP imagery. The outer red circle represents a 500 m radius around the point. Exact distance measurements were later recorded in Arc GIS.

Results

2006 and 2007 Breeding Season Bobwhite

We observed an overall increasing effect of CP33 in 2007. Program-wide breeding season bobwhite density increased on CP33 and decreased on control fields in 2007 compared to 2006 (Figures 4 and 32). Program-wide effect size (DCP33-DControl) for bobwhite increased from 0.06 males/ha in 2006 to 0.10 males/ha in 2007 (Appendix A). Relative effect size ((DCP33-DControl)/ DControl) increased from 50% in 2006 to 99% in 2007 (Appendix A). The 27-SCP (includes sites in GA, KY, MS, NC, SC, and TN) was the only BCR to experience declines in bobwhite density and effect size from 2006 to 2007 (Figure 5). Bobwhite density in the 27-SCP was 4 times greater (217%) on CP33 than control fields in 2006, but were only 61% greater in 2007 (Appendix A). The greatest observed response in 2007 occurred in the 22-ETP (includes sites in IA, IL, IN, MO, NE, OH), which had little response in 2006 (21%) and 6 times greater density (301%) on CP33 compared to control fields in 2007 (Figure 5, Appendix A). Bobwhite density increased on both CP33 and control field in the 24-CH (includes sites in IN, KY, MO, and TN) in 2007, but effect size declined by 0.05 males/ha from 2006 to 2007 (Figure 5, Appendix A). Bobwhite density was 70% greater on CP33 than control fields in 2006, but only 8% greater in 2007 in the 24-CH. Bobwhite density decreased on both CP33 and control fields in 2007 compared to 2006 in the 19-CMP, which included sites only in TX in 2006, and sites in both TX and NE in 2007. Bobwhite density was 22% greater on control than CP33 fields in 2006 and 18% greater on CP33 than control fields in 2007 (Figure 5, Appendix A). Limited sample size in the 26-MAV allowed only for the estimation of density based on pooled data from the first 2 years of the study. Bobwhite density was 0.05 males/ha greater on CP33 than control fields from 2006-2007, with an 89% relative effect size (Figure 5, Appendix A).

As in 2006, state-level bobwhite densities and effect sizes in 2007 were largely variable. Greater bobwhite densities were observed on CP33 than control fields in 9 out of 11 states (82%) that conducted monitoring in 2006 (Figure 6), whereas 13 out of 14

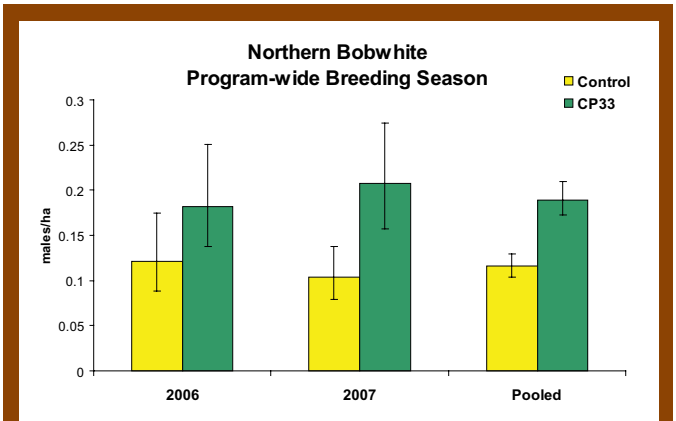

Figure 4. Program-wide year-specific and pooled breeding season northern bobwhite density (males/ha) on all surveyed CP33 and control fields. Error bars represent 95% bootstrap confidence intervals (B=1000).

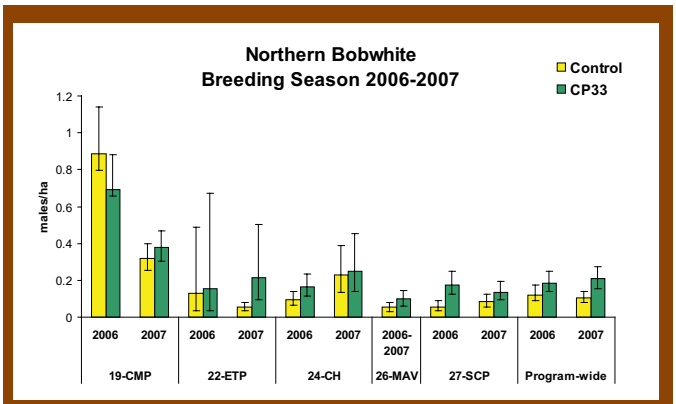

Figure 5. BCR-level and program-wide year-specific breeding season northern bobwhite density (males/ha) on surveyed CP33 and control fields. Small sample size allowed only for a pooled 2-year density estimate for the 26-MAV, and precluded density estimation for 11-PP, 23-PHT, 25-WGCP, and 29-PIED; however data from all BCRs are included in the program-wide density estimate. Error bars represent 95% bootstrap confidence intervals (B=1000).

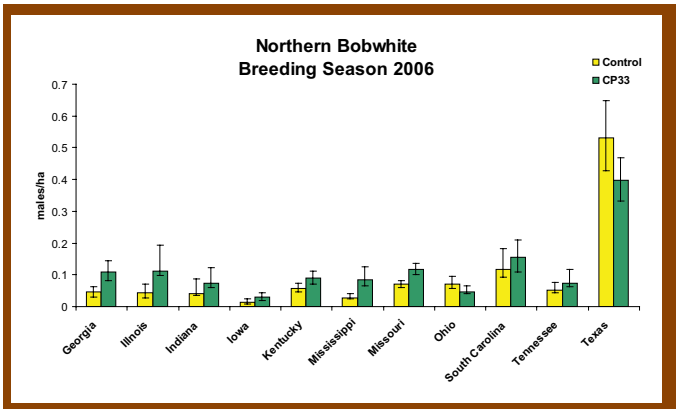

Figure 6. State-level northern bobwhite density (males/ha) on surveyed CP33 and control fields during the 2006 breeding season. All error bars represent 95% bootstrap confidence intervals (B=1000).

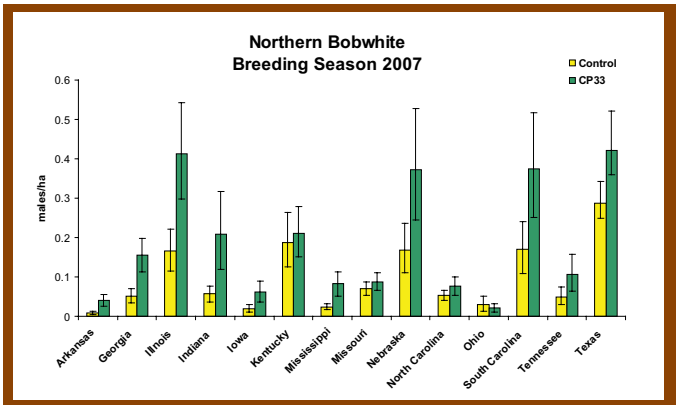

Figure 7. State-level northern bobwhite density (males/ha) on surveyed CP33 and control fields during the 2007 breeding season. Note: AR, NC, and NE did not initiate breeding season surveys until 2007. All error bars represent 95% bootstrap confidence intervals (B=1000).

states (93%) exhibited greater densities on CP33 fields than control fields in 2007 (Figure 7). State-level bobwhite densities ranged from 0.03 [IA] to 0.40 [TX] males/ha on CP33 fields, and from 0.02 [IA] to 0.53 [TX] males/ha on control fields in 2006 (Figure 6, Appendix A). State-level bobwhite densities ranged from 0.02 [OH] to 0.42 [TX] males/ha on CP33 fields, and from 0.01 [AR] to 0.29 [TX] males/ha on control fields in 2007 (Figure 7, Appendix A). Simple effect sizes ranged from -0.13 [TX] to 0.068 [IL] male/ha in 2006 (Appendix A). Bobwhite densities were significantly greater on CP33 than control fields in GA, IL, KY, MS, and MO in 2006. Relative effect sizes in 2006 state-level analysis ranged from -33% [OH] to 209% [MS] (Appendix A). Simple effect sizes ranged from -0.01 [OH] to 0.25 [IL] males/ha in 2007 (Appendix A). Bobwhite densities were significantly greater on CP33 than control fields in AR, GA, IL, IN, MS, SC, and TX in 2007. Relative effect sizes ranged from -32% [OH] to 367% [AR] in 2007 (Appendix A). For the 11 states conducting breeding season monitoring in both 2006 and 2007, bobwhite densities increased on both control and CP33 fields in 6 states (GA, IL, IN, IA, KY, SC). Bobwhite densities increased on CP33 fields and decreased on control fields in TN and TX, whereas bobwhite density increased on control fields and decreased on CP33 fields in MO from 2006-2007. Bobwhite densities decreased on both control and CP33 fields in MS and OH from 2006-2007.

Dickcissel

Dickcissel also exhibited increasing program-wide response to CP33 from 2006 to 2007 (Figures 8 and 32). Program-wide simple effect size was 0.10 males/ha in 2006 and 0.34 males/ha in 2007 (Appendix A). Dickcissel density was 32% greater on CP33 than control fields in 2006 and 93% greater on CP33 fields in 2007 (Appendix A). Dickcissel density decreased on both control and CP33 fields in the 27-SCP in 2007 compared to 2006, but continued to have a positive, though non-significant effect size (86%) on CP33 fields relative to control fields (Figure 9, Appendix A). GA and SC were not included in the 27-SCP analysis as they are effectively out of the dickcissel range. Dickcissel density increased on both control and CP33 fields in the 22-ETP in 2007, but relative effect size decreased from 83% in 2006 to 60% in 2007 (Figure 9, Appendix A). There was a sharp increase in relative effect size in the 24-CH from 2006 to 2007, increasing from 44% in 2006 to 124% in 2007 on CP33 fields relative to control fields (Figure 9, Appendix A). The 19-CMP exhibited a reversal of effect in dickcissel density similar to that observed in bobwhites (above). Dickcissel density was 22% greater on control than CP33 fields in 2006, and 268% greater on CP33 than control fields in the 19-CMP in (Figure 9, Appendix A). Limited sample size in the 26-MAV allowed only for the estimation of density based on pooled data from the first 2 years of the study. Dickcissel density was 0.50 males/ha greater on CP33 than control fields in the 26-MAV from 2006-2007, with a 59% relative effect size (Figure 9, Appendix A).

State-level dickcissel densities ranged from 0.10 [TN] to 0.37 [MO] males/ha on CP33 fields, and from

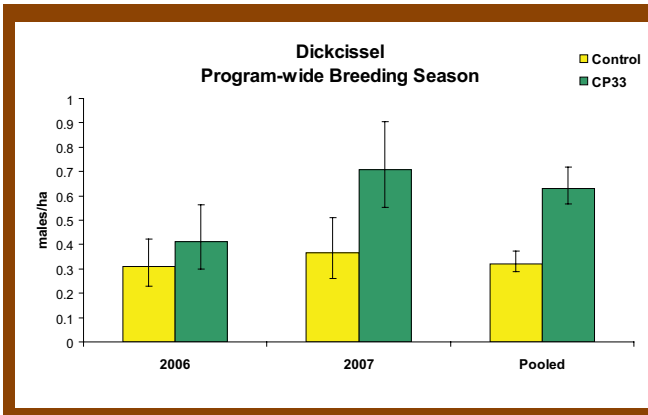

Figure 8. Program-wide year-specific and pooled breeding season dickcissel density (males/ha) on all surveyed CP33 and control fields. Error bars represent 95% bootstrap confidence intervals (B=1000). Note: Survey sites in GA, NC, and SC were excluded from analyses as sites in these states are effectively out of the dickcissel range.

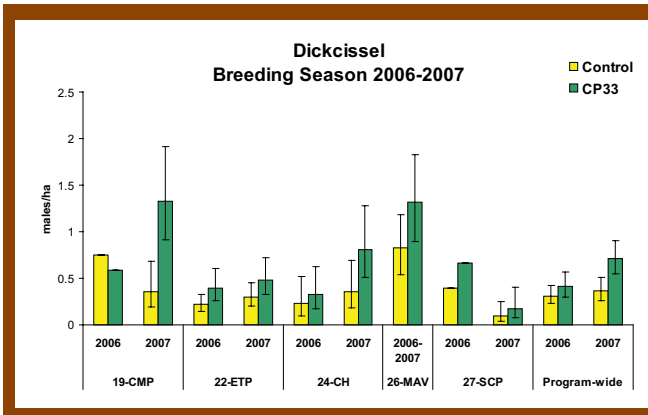

Figure 9. BCR-level and program-wide year-specific breeding season dickcissel density (males/ha) on surveyed CP33 and control fields. Small sample size allowed only for a pooled 2-year density estimate for the 26-MAV, and precluded density estimation for 11-PP, 23-PHT, and 25-WGCP; however data from all BCRs are included in the program-wide density estimate. Survey sites in GA, NC, and SC were excluded from analyses as sites in these states are effectively out of the dickcissel range. Error bars represent 95% bootstrap confidence intervals (B=1000) and were excluded from 2006 19-CMP and 27-SCP due to large variability.

0.04 [IN] to 0.21 [TX] males/ha on control fields in 2006 (Figure 10, Appendix A). State-level dickcissel densities ranged from 0.25 [IN] to 3.55 [NE] males/ha on CP33 fields, and from 0.01 [IN] to 1.71 [NE] males/ha on control fields in 2007 (Figure 11, Appendix A). Simple effect size was greatest in IL (0.29 males/ha) and least in TX (-0.16 males/ha), while relative effect size was greatest in IL (544%) and least in TN (-45%) in 2006 (Appendix A). In 2007, simple effect size for dickcissel was greatest in NE (1.85 males/ha) and least in MO (0.08 males/ha), while relative effect size was greatest in IN (1970%) and least in MO (13%) (Appendix A). With the exception of MO, densities in all states at the minimum were twice greater on CP33 fields than on control fields in 2007 (Figure 11, Appendix A).

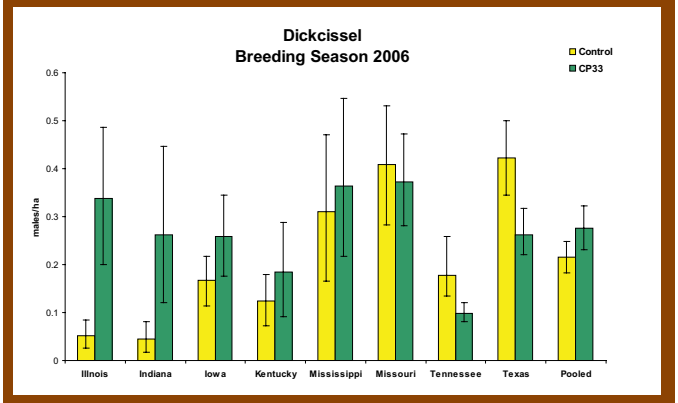

Figure 10. State-level dickcissel density (males/ha) on surveyed CP33 and control fields during the 2006 breeding season. All error bars represent 95% bootstrap confidence intervals (B=1000). Note: Survey sites in GA and SC were excluded from analyses as sites in these states are effectively out of the dickcissel range.

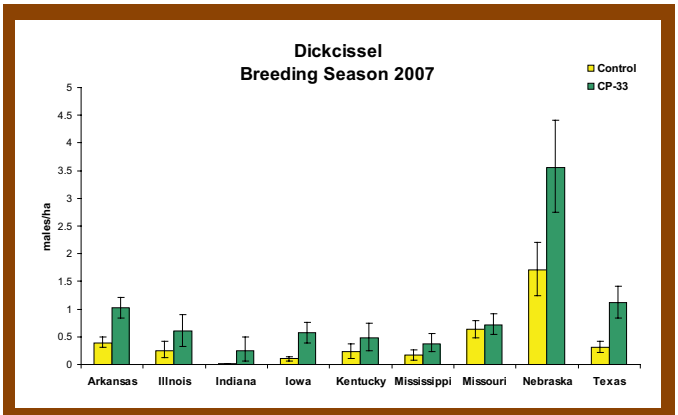

Figure 11. State-level dickcissel density (males/ha) on surveyed CP33 and control fields during the 2007 breeding season. All error bars represent 95% bootstrap confidence intervals (B=1000). Note: Survey sites in GA, NC and SC were excluded from analyses as sites in these states are effectively out of the dickcissel range. Note also that AR and NE did not initiate breeding season surveys until 2007. Note also the change in scale from Figure 10 to reflect the addition of NE.

Field Sparrow

Field sparrow also demonstrated an increasing response to CP33 during the second year of the study (Figures 12 and 32). Field sparrow density increased on CP33 and decreased on control fields from 2006 to 2007 (Figure 12, Appendix A). Program-wide effect size nearly doubled from 2006 to 2007, increasing from 0.21 males/ha (82%) in 2006 to 0.40 males/ha (205%) in 2007 (Appendix A). Field sparrow density in the 27-SCP decreased on both CP33 and control fields, but relative effect size was nearly identical over the 2 years of the study (Figure 13, Appendix A). Field sparrow response in the 22-ETP was minimal in 2006, but very large in 2007 (Figure 13, Table 2). Effect size more than doubled from 2006 to 2007 with relative effect sizes increasing from 94% in 2006 to 271% in 2007 (Appendix A). Field sparrow density in the 24-CH exhibited an increase on both control and CP33 fields from 2006 to 2007; however although simple effect size increased by ~0.02 males/ha, relative effect size decreased by 7% from 2006 to 2007 (Figure 13, Appendix A). The 19-CMP was out of the effective range for field sparrows and was not included in density estimation. Analysis of data pooled across both years of the study revealed that field sparrow density was low in the 26-MAV, with minimal simple and relative effect sizes (0.01 males/ha; 26%) (Figure 13, Appendix A).

State-level field sparrow densities ranged from 0.14 [MO] to 1.15 [IL] males/ha on CP33 fields, and from 0.05 [IA] to 0.46 [TN] males/ha on control fields in 2006 (Figure 14, Appendix A). State-level field sparrow densities ranged from 0.09 [IA] to 1.09 [IL] males/ha on CP33 fields, and from 0.05 [MS] to 0.35 [TN] males/ha on control fields in 2007 (Figure 15, Appendix A). There were only 7 field sparrow detections on control fields in IA in 2007, therefore density estimates could not be generated for this stratum. State-level simple effect size was greatest in IL (1.01 males/ha; 716% relative effect size) and least in MS (0.01 males/ha; 3% relative effect size) in 2006 (Appendix A). State-level simple effect size was greatest in IL (0.87 males/ha; 392% relative effect size) and least in MO (0.03 males/ha; 31% relative effect size) in 2007 (Appendix A). Field sparrow densities in 8 out of 12 states were minimally two times greater on CP33 fields than on control fields in 2007 (Figure 15, Appendix A).

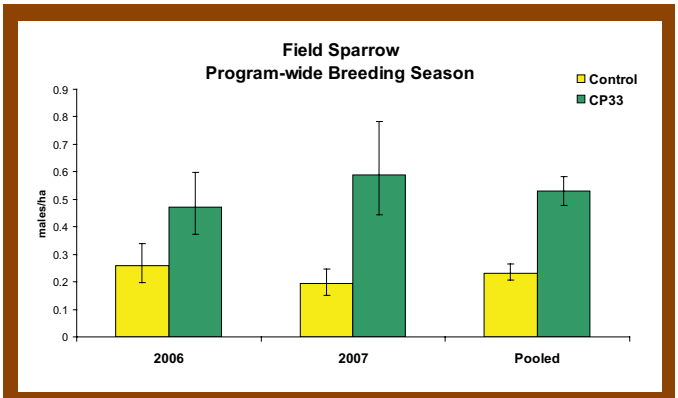

Figure 12. Program-wide year-specific and pooled breeding season field sparrow density (males/ha) on all surveyed CP33 and control fields. Error bars represent 95% bootstrap confidence intervals (B=1000). Note: Survey sites in TX were excluded from analyses as sites in this state are effectively out of the field sparrow range.

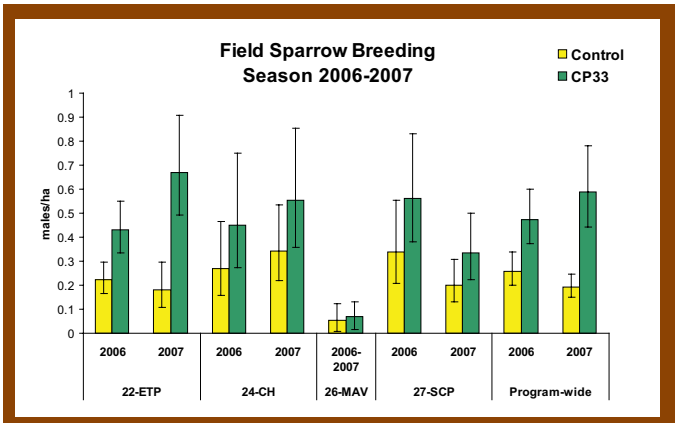

Figure 13. BCR-level and program-wide year-specific breeding season field sparrow density (males/ha) on surveyed CP33 and control fields. Small sample size allowed only for a pooled 2-year density estimate for the 26-MAV, and precluded density estimation for 11-PP, 23-PHT, 25-WGCP, and 29-PIED; however data from all BCRs are included in the program-wide density estimate. 19-CMP was not evaluated as the majority of survey sites in the 19-CMP are in TX which is effectively out of the field sparrow range. Error bars represent 95% bootstrap confidence intervals (B=1000).

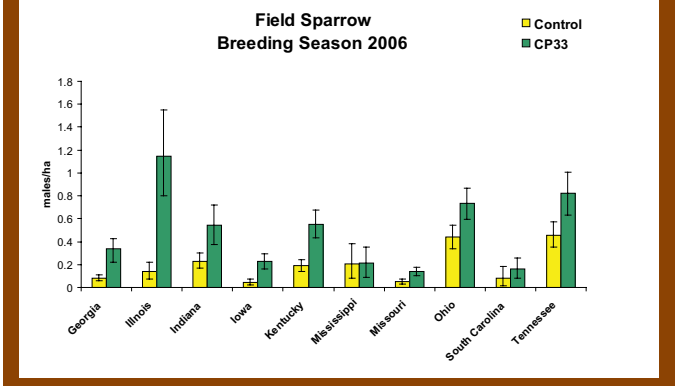

Figure 14. State-level field sparrow density (males/ha) on surveyed CP33 and control fields during the 2006 breeding season. All error bars represent 95% bootstrap confidence intervals (B=1000). Note: Survey sites in TX were excluded from analyses as sites in this state are effectively out of the field sparrow range.

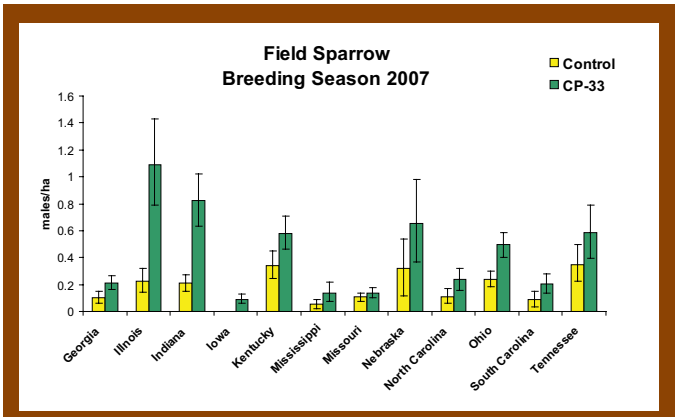

Figure 15. State-level field sparrow density (males/ha) on surveyed CP33 and control fields during the 2007 breeding season. All error bars represent 95% bootstrap confidence intervals (B=1000). Note: Survey sites in TX were excluded from analyses as sites in this state are effectively out of the field sparrow range. Note also that small sample size in IA precluded estimation of density for IA-control. Note also that AR, NC, and NE did not initiate breeding season surveys until 2007.

Indigo Bunting

Program-wide indigo bunting density was similar on CP33 fields across years, but increased on control fields from 2006 to 2007, resulting in a decreased simple and relative effect size (70% to 36%) (Figures 16 and 32, Appendix A). Indigo bunting density in the 27-SCP decreased on both CP33 and control fields across years; however relative effect sizes were similar in both years (Figure 17, Appendix A). Indigo bunting density in the 22-ETP was largely variable on CP33 fields, and exhibited an increase in effect size from 2006 to 2007 (Figure 17, Appendix A). However because indigo bunting density on control fields increased in 2007 compared to 2006, relative effect size decreased (Appendix A). Density in the 24-CH increased on both CP33 and control fields; however simple effect size decreased by 0.18 males/ha (13% relative effect size decrease) from 2006 to 2007 (Figure 17, Appendix A). The 19-CMP was out of the effective range for field sparrow and was not included in density estimation. Indigo bunting density in the 26-MAV was lowest compared to other BCR's on both control and CP33 fields, with minimal simple and relative effect sizes (0.10 males/ha; 14%) across 2006-2007 (Figure 17, Appendix A).

State-level indigo bunting densities ranged from 0.19 [GA] to 1.41 [KY] males/ha on CP33 fields, and from 0.10 [IA] to 0.98 [KY] males/ha on control fields in 2006 (Figure 18, Appendix A). State-level indigo bunting densities ranged from 0.09 [IA] to 2.16 [KY] males/ha on CP33 fields, and from 0.04 [MS] to 1.79 [KY] males/ha on control fields in 2007 (Figure 19, Appendix A). Low sample size in NE in 2007 precluded estimation of density. State-level simple and relative effect sizes were greatest in OH (0.54 males/ha; 147%) and least in MO (-0.19 males/ha; -32%) in 2006 (Appendix A). The trend continued for OH in 2007 with the greatest effect size compared to other states in the study (0.98 males/ha); however indigo buntings in GA exhibited the least response to CP33 in 2007 (0.02 males/ha effect size) (Appendix A). OH continued to exhibit the greatest relative effect size (223%), whereas MO exhibited the least relative effect (5%) in 2007 (Appendix A).

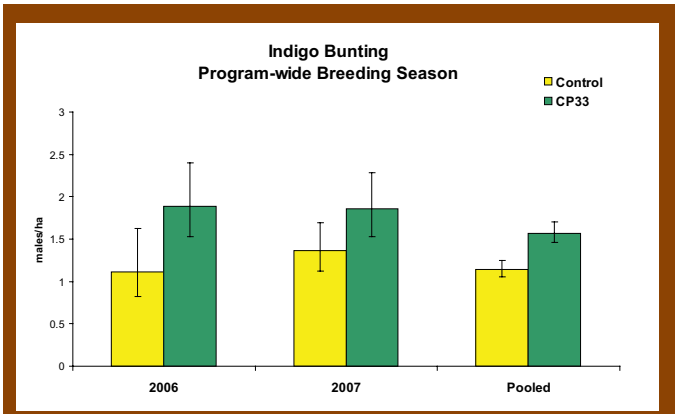

Figure 16. Program-wide year-specific and pooled breeding season indigo bunting density (males/ha) on all surveyed CP33 and control fields. Error bars represent 95% bootstrap confidence intervals (B=1000). Note: Survey sites in TX were excluded from analyses as sites in this state are effectively out of the indigo bunting range.

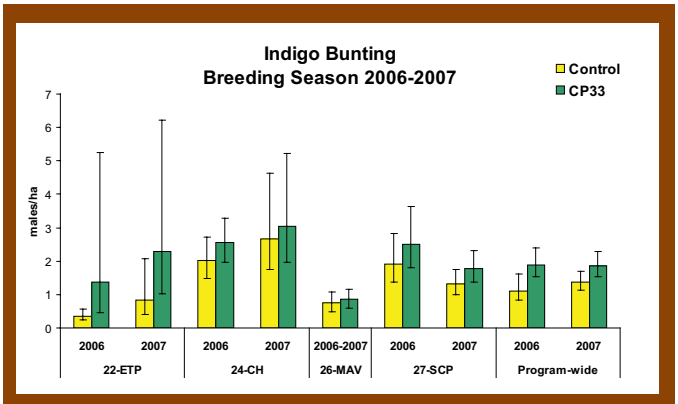

Figure 17. BCR-level and program-wide year-specific breeding season indigo bunting density (males/ha) on surveyed CP33 and control fields. Small sample size allowed only for a pooled 2-year density estimate for the 26-MAV, and precluded density estimation for 11-PP, 23-PHT, 25-WGCP, and 29-PIED; however data from all BCRs are included in the program-wide density estimate. 19-CMP was not evaluated as the majority of survey sites in the 19-CMP are in TX which is effectively out of the indigo bunting range. Error bars represent 95% bootstrap confidence intervals (B=1000).

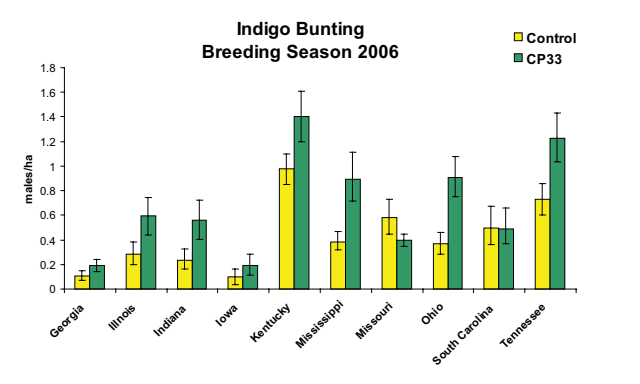

Figure 18. State-level indigo bunting density (males/ha) on surveyed CP33 and control fields during the 2006 breeding season. All error bars represent 95% bootstrap confidence intervals (B=1000). Note: Survey sites in TX were excluded from analyses as sites in this state are effectively out of the indigo bunting range.

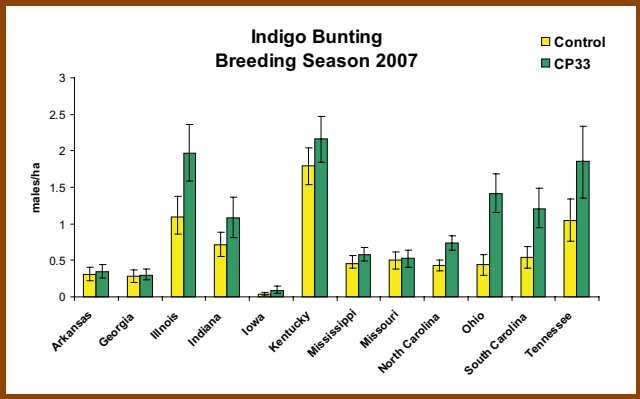

Figure 19. State-level indigo bunting density (males/ha) on surveyed CP33 and control fields during the 2007 breeding season. All error bars represent 95% bootstrap confidence intervals (B=1000). Note: Survey sites in TX were excluded from analyses as sites in this state are effectively out of the indigo bunting range. Low sample size in NE precluded density estimation. AR and NC did not initiate breeding season surveys until 2007.

Eastern Meadowlark

Eastern meadowlark density on CP33 and control fields varied widely from 2006 to 2007 (Figures 20 and 32). Program-wide estimates of eastern meadowlark density were 20% greater on control than CP33 fields in 2006, but 39% greater on CP33 than control fields in 2007 (Figure 20, Appendix A). Eastern meadowlark density in the 22-ETP exhibited a large reversal of effect over the 2 years of the study, with 50% greater meadowlark density on control fields in 2006, and 70% greater density on CP33 fields in 2007 (Figure 21, Appendix A). This reversal of effect, however, was not demonstrated in all BCRs. Eastern meadowlark density in the 27-SCP increased on both CP33 and control fields in 2007 compared to 2006, however there was a consistent relative effect size of 11% in both years of the study (Figure 21, Appendix A). Meadowlark density decreased on both CP33 and control fields in the 19-CMP in 2007 compared to 2006, while density continued to be greater on control fields than on CP33 fields (Figure 21, Appendix A). Conversely, meadowlark density increased on both CP33 and control fields in the 24-CH in 2007, exhibited a nearly 3-fold simple effect size (0.037-2006, 0.090-2007), but exhibited very similar relative effect sizes (82%-2006, 85%-2007) (Figure 21, Appendix A). Meadowlark density in the 26-MAV was similar to those of 27-SCP on both control and CP33 fields, with minimal simple and relative effect sizes (0.01 males/ha; 11%) across 2006-2007 (Figure 21, Appendix A).

State-level eastern meadowlark densities ranged from 0.05 [OH] to 0.24 [TX] males/ha on CP33 fields, and from 0.05 [IN] to 0.32 [TX] males/ha on control fields in 2006 (Figure 22, Appendix A). State-level eastern meadowlark densities ranged from 0.03 [IA] to 0.65 [IL] males/ha on CP33 fields, and from 0.03 [MS] to 0.47 [NE] males/ha on control fields in 2007 (Figure 23, Appendix A). State-level densities of eastern meadowlarks were consistently greater on control than CP33 fields in 2006, with the exception of IN and TN (Figure 22). However, meadowlarks responded better to CP33 in 2007, with 55% of states exhibiting greater densities on CP33 than control fields (Figure 23, Appendix A). Meadowlarks in IL and MO exhibited the greatest response to CP33 in 2007, with relative effect sizes of 725% and 234%, respectively (Appendix A).

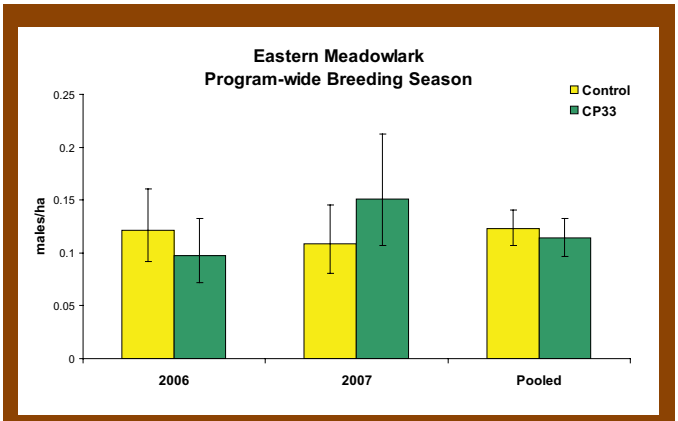

Figure 20. Program-wide year-specific and pooled breeding season eastern meadowlark density (males/ha) on all surveyed CP33 and control fields. Error bars represent 95% bootstrap confidence intervals (B=1000).

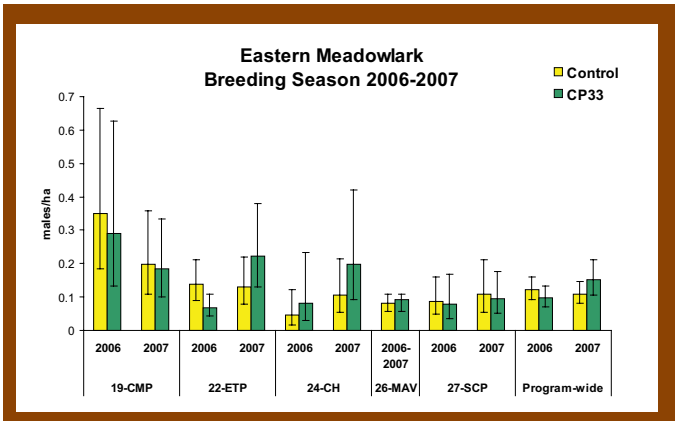

Figure 21. BCR-level and program-wide year-specific breeding season eastern meadowlark density (males/ha) on surveyed CP33 and control fields. Small sample size allowed only for a pooled 2-year density estimate for the 26-MAV, and precluded density estimation for 11-PP, 23-PHT, 25-WGCP, and 29-PIED; however data from all BCRs are included in the program-wide density estimate. Error bars represent 95% bootstrap confidence intervals (B=1000).

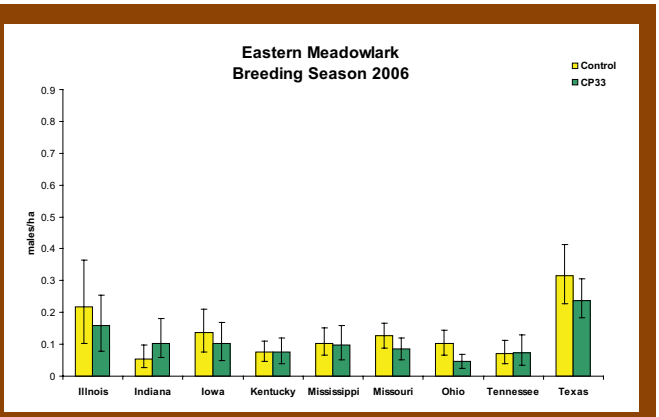

Figure 22. State-level eastern meadowlark density (males/ha) on surveyed CP33 and control fields during the 2006 breeding season. All error bars represent 95% bootstrap confidence intervals (B=1000).

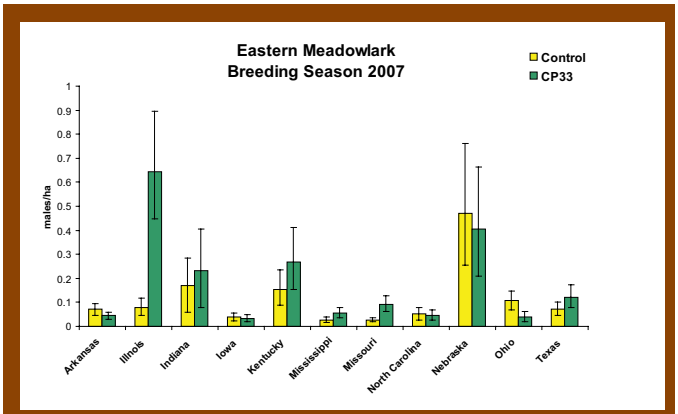

Figure 23. State-level eastern meadowlark density (males/ha) on surveyed CP33 and control fields during the 2007 breeding season. All error bars represent 95% bootstrap confidence intervals (B=1000). Note: AR, NC and NE did not initiate breeding season surveys until 2007.

Other Species

Limited sample size allowed only for density estimation of data pooled over both years for eastern kingbird, grasshopper sparrow, vesper sparrow, and painted bunting. Pooled data for eastern kingbird allowed for density estimation at the program-wide and BCR-level. Eastern kingbirds exhibited minimal differences in density on CP33 and control fields program-wide, and in the 27-SCP (Figures 24 and 32, Appendix A); however, they exhibited 25% and 43% greater densities on CP33 than control fields in the 22-ETP and 24-CH, respectively (Figure 24, Appendix A). Low sample size and lack of convergence precluded analysis of kingbird densities in the 26-MAV and 19-CMP, and at the state-level. State-level eastern kingbird relative abundance ranged from 0.004 [OH] to 0.56 [SC] mean number of males/point on CP33 fields, and from 0.05 [OH] to 0.41 [GA] males/point on control fields in 2006 (Figure 25, Appendix A). State-level eastern kingbird relative abundance ranged from 0.005 [TX] to 0.84 [NE] males/point on CP33 fields, and from 0.001 [TX] to 0.42 [NE] males/point on control fields in 2007 (Figure 26, Appendix A); however, abundance of eastern kingbird on TX survey sites is expected to be low as the sites are on the far western portion of the eastern kingbird range. Kingbird relative abundance was greater on CP33 than control fields in 50% of the states in 2006 (Figure 25), and in 64% of states in 2007 (Figure 26). However, large variability due to low sample size did not indicate any significant differences between abundances on CP33 and control fields in any states in both years of the study.

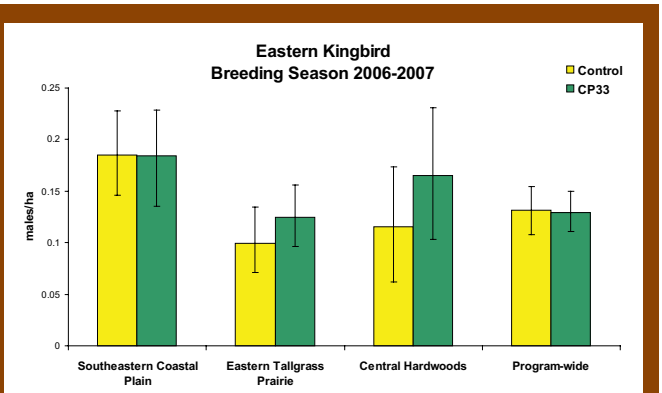

Figure 24. BCR-level and program-wide breeding season eastern kingbird density (males/ha) on surveyed CP33 and control fields. Small sample size allowed only for a pooled 2-year density estimate for all BCR-level and program-wide data sets, and precluded density estimation for 11-PP, 23-PHT, 25-WGCP, and 29-PIED; however data from all BCRs are included in the program-wide density estimate. Error bars represent 95% bootstrap confidence intervals (B=1000).

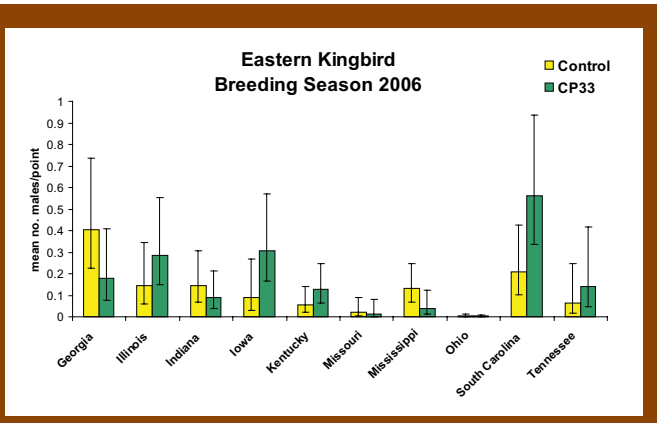

Figure 25. State-level eastern kingbird relative abundance (mean # males/point) (± 95% CI) on surveyed CP33 and control fields during the 2006 breeding season. Note: Low sample size precluded estimation of relative abundance in TX.

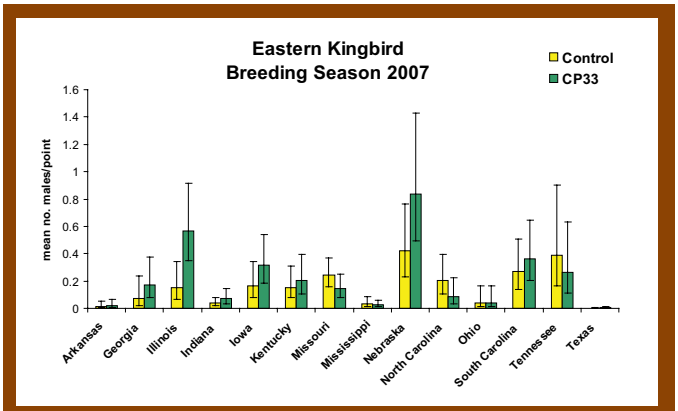

Figure 26. State-level eastern kingbird relative abundance (mean # males/point) (± 95% CI) on surveyed CP33 and control fields during the 2007 breeding season. Note: TX survey sites are located on the far western portion of the eastern kingbird range. AR, NC, and NE did not initiate breeding season surveys until 2007.

Pooled data for grasshopper sparrow allowed for program-wide and BCR-level density estimation. SC and GA were excluded from program-wide, BCR-level, and state-level analyses as sites had no grasshopper sparrow detections and are effectively out of the grasshopper sparrow range. Like kingbirds, there was virtually no program-wide response by grasshopper sparrows (Figures 27 and 32) and in the 22-ETP and 24-CH; however there was a substantively greater, though insignificant, grasshopper sparrow density on CP33 than control fields in the 19-CMP (66% relative effect size) (Figure 27, Appendix A). Lack of convergence, likely due to small sample size, precluded analysis of relative abundance for the 26-MAV. Low sample size prohibited generation of grasshopper sparrow density estimates for the 27-SCP; however relative abundance estimates suggest very similar abundances on CP33 and control fields. State-level grasshopper sparrow relative abundance ranged from 0.003 [MS] to 0.23 [IA] males/point on CP33 fields, and from 0.008 [KY] to 0.28 [IN] males/point on control fields in 2006 (Figure 28, Appendix A). TN was also excluded from 2006 state-level analysis due to limited sample size. Of the 8 states evaluated in 2006, 62% exhibited greater grasshopper sparrow relative abundance on control than CP33 fields (Figure 28). However, IA and KY both exhibited large relative effect sizes in favor of CP33 (138% and 400%, respectively), though 95%confidence intervals were overlapping (Figure 28, Appendix A). State-level grasshopper sparrow relative abundance

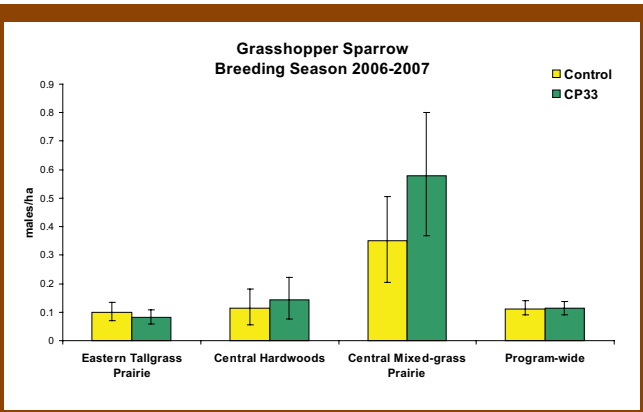

Figure 27. BCR-level and program-wide breeding season grasshopper sparrow density (males/ha) on surveyed CP33 and control fields. Small sample size allowed only for a pooled 2-year density estimate for all BCR-level and program-wide data sets, and precluded density estimation for 11-PP, 23-PHT, 25-WGCP, 26-MAV, 27-SCP and 29-PIED; however data from all BCRs are included in the program-wide density estimate. Error bars represent 95% bootstrap confidence intervals (B=1000).

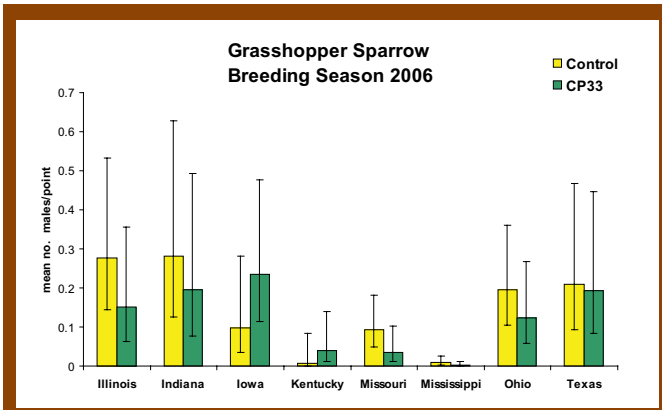

Figure 28. State-level grasshopper sparrow relative abundance (mean # males/point) (± 95% CI) on surveyed CP33 and control fields during the 2006 breeding season. Note: Low sample size precluded estimation of relative abundance in TN. GA and SC were excluded from analysis as survey sites in these states are effectively out of the grasshopper sparrow range.

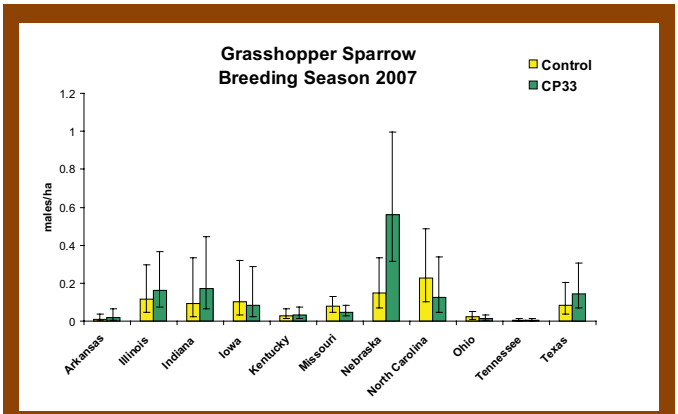

Figure 29. State-level grasshopper sparrow relative abundance (mean # males/point) (± 95% CI) on surveyed CP33 and control fields during the 2007 breeding season. Note: Low sample size precluded estimation of relative abundance in MS. GA and SC were excluded from analysis as survey sites in these states are effectively out of the grasshopper sparrow range.

ranged from 0.002 [TN] to 0.56 [NE] mean males/point on CP33 fields, and from 0.002 [TN] to 0.23 [NC] mean males/point on control fields in 2007 (Figure 29, Appendix A). MS was excluded from the 2007 state-level analysis due to limited sample size, while TN was included in 2007. Of the 11 states evaluated in 2007, 54% exhibited greater grasshopper sparrow relative abundance on CP33 than control fields (Figure 29). NE exhibited nearly 4 times greater grasshopper sparrow abundance on CP33 fields compared to control fields (273% relative effect size) (Appendix A).

Vesper sparrow were only detected in 4 states (IA, IL, IN, OH), and due to small sample size data from 2006 and 2007 were pooled to generate density estimates. Over the first 2 years of the study, vesper sparrow exhibited a 26% greater density on CP33 than control fields (Figures 30 and 32, Appendix A). Painted buntings were also only detected in 4 states (AR, MS, SC, TX), and like the vesper sparrow analysis, data were combined over the first 2 years of the study to generate a 2006-2007 density estimate. Painted bunting showed a strong, but not significant response to CP33 with a 65% greater density overall on CP33 fields compared to control fields (Figures 31 and 32, Appendix A). Henslow's sparrow and loggerheaded shrike were present during the surveys, but were again not abundant enough to conduct distance or relative abundance analysis.

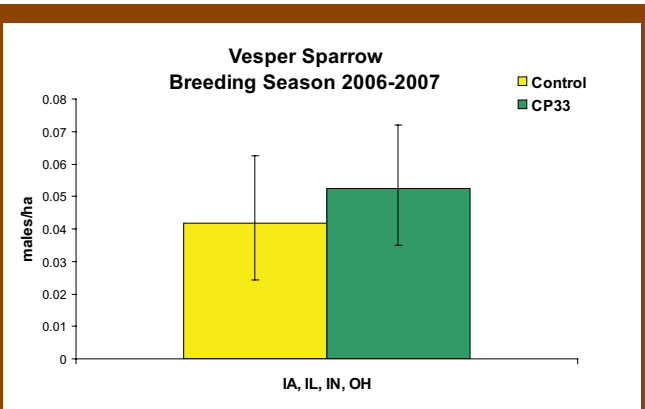

Figure 30. Breeding season vesper sparrow density (males/ha) on surveyed CP33 and control fields. Small sample size allowed only for a pooled 2-year density estimate in the 4 states in which vesper sparrow were detected (IA, IL, IN, OH). Error bars represent 95% bootstrap confidence intervals (B=1000).

2006 and 2007 Fall Bobwhite Covey Surveys

We observed substantively greater density of bobwhite coveys on CP33 compared to control fields in 2007. Simple (DCP33-DControl) and relative ((DCP33-DControl)/ DControl) effect size for non-adjusted covey density nearly doubled from 2006

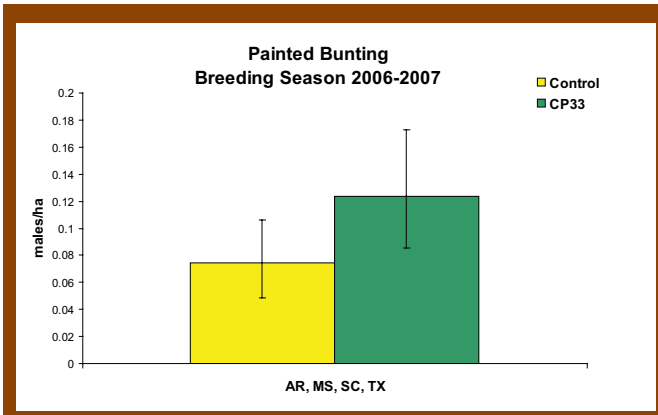

Figure 31. Breeding season painted bunting density (males/ha) on surveyed CP33 and control fields. Small sample size allowed only for a pooled 2-year density estimate in the 4 states in which painted bunting were detected (AR, MS, SC, TX). Error bars represent 95% bootstrap confidence intervals (B=1000).

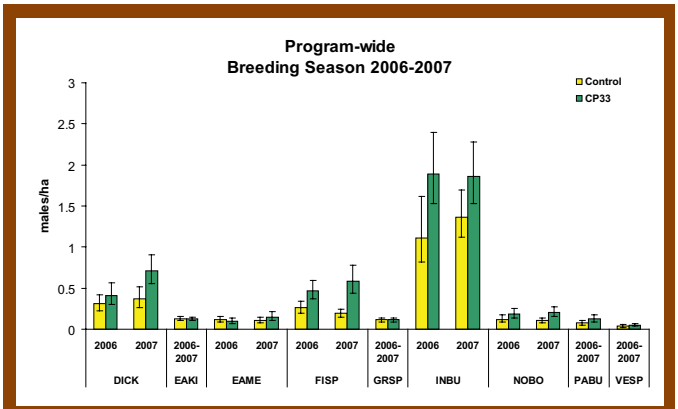

Figure 32. Program-wide density estimates (males/ha) of species of interest on surveyed CP33 and control fields during the 2006 and 2007 breeding season. EAKI, GRSP, PABU, and VESP data are pooled due to limited sample size. PABU analysis includes only AR, MS, SC, and TX; VESP analysis includes only IA, IL, IN, and OH. Error bars represent 95% bootstrap confidence intervals (B=1000).

(0.016 coveys/ha; 58%) to 2007 (0.029 coveys/ha; 96%), representing a program-wide increasing magnitude of effect (Figure 33, Appendix B). Program-wide covey density remained fairly consistent on control fields over the first 2 years of monitoring, with densities of 0.029 coveys/ha (1 covey/86.37 ac) in 2006 and 0.031 coveys/ha (1 covey/81 ac) in 2007 (Figure 33, Appendix B). Covey density increased on CP33 fields by 0.014 coveys/ha over the first 2 years of monitoring (increasing from 0.045 coveys/ha (1 covey/54.79 ac) in 2006 to 0.060 coveys/ha (1 covey/ 41.49 ac) in 2007) program wide (Figure 33, Appendix B). When covey detections were adjusted for 6-hr change in barometric pressure, cloud cover, wind speed, and number of adjacent calling coveys (Wellendorf et al. 2004) we observed nearly double the density estimate on both CP33 and control fields, but a slight decrease in relative effect sizes in both years (2006-43%; 2007-70%) (Figure 34, Appendix B).

We observed an increasing effect on covey density from 2006 to 2007 in the 27-SCP. Simple and relative effect sizes for non-adjusted covey densities more than doubled from an increase of 0.021 coveys/ha (130%) in 2006 on CP33 compared to control fields to and increase of 0.050 coveys/ha (235%) in 2007 (Figure 35, Appendix B). Covey density increased by 0.027 coveys/ha on CP33 fields, but, like the program-wide estimate, was fairly consistent from 2006 to 2007 (Figure 35, Appendix B). When Wellendorf et al.'s (2004) adjustment variables were incorporated into the density estimates we observed nearly double the estimate of density on both CP33 and control fields,

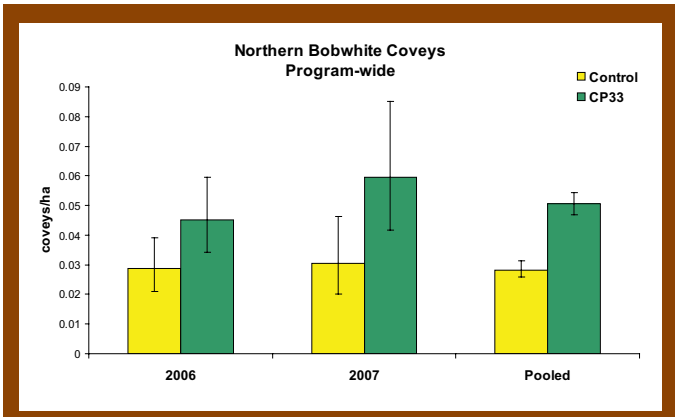

Figure 33. Program-wide year-specific and pooled non-adjusted northern bobwhite covey density estimates (coveys/ha) on all surveyed CP33 and control fields. Error bars represent 95% bootstrap confidence intervals (B=1000).

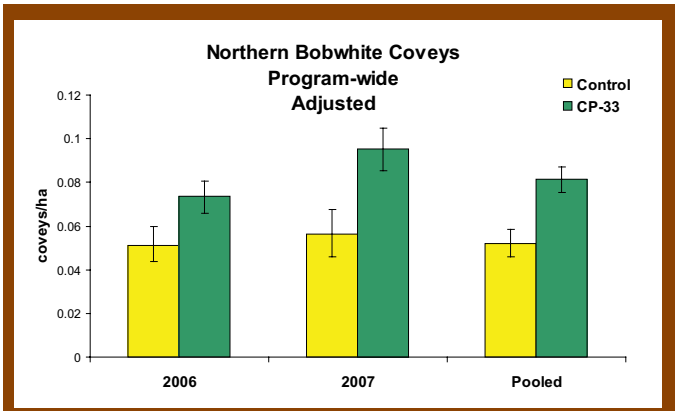

Figure 34. Program-wide year-specific and pooled northern bobwhite covey density estimates (coveys/ha) on all surveyed CP33 and control fields adjusted for number of adjacent calling coveys, % cloud cover, wind speed, and 6-hr change in barometric pressure (Wellendorf et al. 2004). Error bars represent 95% bootstrap confidence intervals (B=1000).

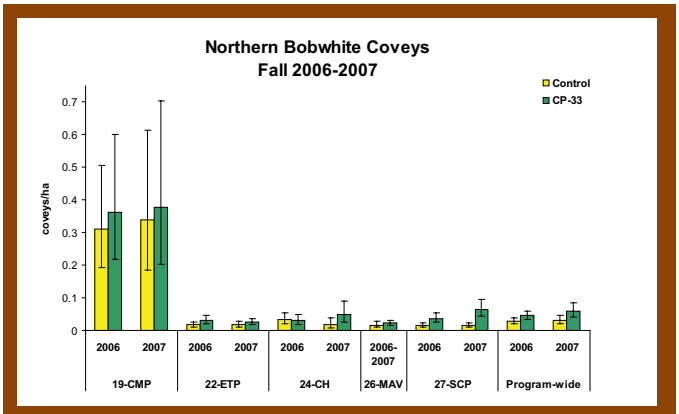

Figure 35. BCR-level and program-wide year-specific non-adjusted northern bobwhite covey density (coveys/ha) on surveyed CP33 and control fields. Small sample size allowed only for a pooled 2-year density estimate for the 26-MAV, and precluded density estimation for 11-PP, 23-PHT, 25-WGCP, and 29-PIED; however data from all BCRs are included in the program-wide density estimate. Error bars represent 95% bootstrap confidence intervals (B=1000).

but decrease in relative effect size in 2006 (58%) and an increase in relative effect size in 2007 (296%) compared to that observed in the non-adjusted density estimate (Figure 36, Appendix B). However, similar to the trend observed in the program-wide estimate, we observed an increasing effect size on CP33 fields compared to control fields over the first 2 years of the monitoring program.

Non-adjusted covey densities in the 22-ETP increased slightly (~7%) on control fields, but exhibited a 16% decrease on CP33 fields from 2006 to 2007 (Figure 34, Appendix B). Unlike program-wide and 27-SCP estimates, simple and relative effect size for the 22-ETP decreased from 0.013 coveys/ha (74%) in 2006 to 0.007 coveys/ha (40%) (Appendix B). Covey density estimates on both CP33 and control fields in the 22-ETP were lower than estimates for all other BCR's evaluated (27-SCP, 24-CH, 19-CMP), but higher than the pooled 2-year density estimate for the 26-MAV (Figure 35). Although incorporation of Wellendorf et al.'s (2004) adjustments nearly doubled density estimates on both CP33 and control fields in each year, we observed much lower relative effect sizes in the 22-ETP in both 2006 (49%) and 2007 (2%) (Figure 36, Appendix B).

Bobwhite coveys in the 24-CH exhibited a reversal of effect from 2006 to 2007 in both non-adjusted and adjusted density estimates. Simple and relative effect size reflected 0.003 covey/ha (8%) greater density on control than CP33 fields in 2006 (Figure 35, Appendix B). Though highly variable, that effect shifted in 2007 to 0.030 (161%) greater coveys/ha on CP33 fields than control fields (Figure 35, Appendix B). Covey densities in the 24-CH decreased by 0.015 coveys/ha on control fields, but increased by 0.018 on CP33 fields from 2006 to 2007 (Appendix B). The 24-CH was the only BCR to exhibit a reversal of effect from 2006 to 2007 for fall covey densities. Density estimates in the 24-CH were 1.5 to 2 times greater following incorporation of Wellendorf et al.'s (2004) adjustments when compared to non-adjusted density estimates. Adjusted density estimates followed the same trend in reversal of effect over the first 2 years of the study (Figure 36, Appendix B). Relative effect sizes for adjusted densities were very similar to those of non-adjusted density estimates (-6% in 2006; 169% in 2007) (Appendix B).

Covey density increased slightly on both CP33 and control fields in the 19-CMP from 2006 to 2007;

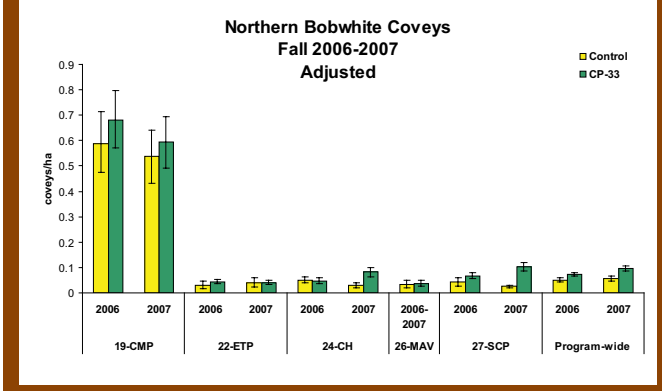

Figure 36. BCR-level and program-wide year-specific northern bobwhite covey density estimates (coveys/ha) on surveyed CP33 and control fields adjusted for number of adjacent calling coveys, % cloud cover, wind speed, and 6-hr change in barometric pressure (Wellendorf et al. 2004). Small sample size allowed only for a pooled 2-year density estimate for the 26-MAV, and precluded density estimation for 11-PP, 23-PHT, 25-WGCP, and 29-PIED; however data from all BCRs are included in the program-wide density estimate. Error bars represent 95% bootstrap confidence intervals (B=1000).

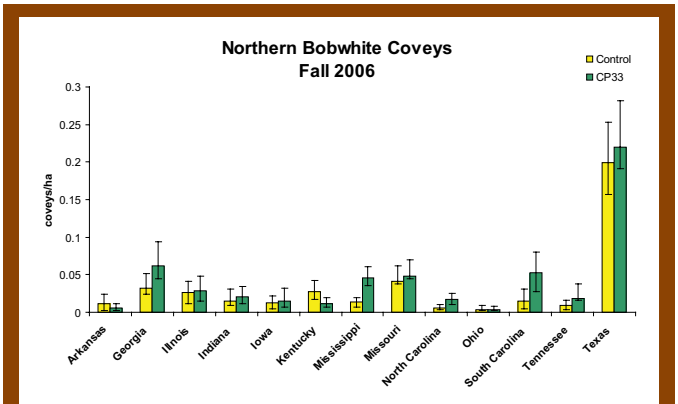

Figure 37. State-level non-adjusted northern bobwhite covey density (coveys/ha) on surveyed CP33 and control fields during fall 2006. Error bars represent 95% bootstrap confidence intervals (B=1000).

however relative effect size decreased from 16% to 12% (Figure 35, Appendix B). Although the 19-CMP generally produces 3 to 4 times greater densities on both CP33 and control fields than the 26-MAV, 22-ETP, 24-CH, and 27-SCP, variability is consistently larger in 19-CMP densities estimates due to the limited sample of fields surveyed. Incorporation of Wellendorf et al.'s (2004) adjustments produced a slight decrease in density estimates on both CP33 and control fields from 2006 to 2007 (Figure 36, Appendix B), but the decrease in relative effect size from 16% to 10% was consistent with those generated by non-adjusted density estimates.

Low sample size precluded year-specific density estimates for the 26-MAV, however we calculated density based on pooled data from 2006 to 2007. Pooled non-adjusted density estimates were 0.016 coveys/ha for control fields and 0.024 coveys/ha for CP33 fields (Figure 35, Appendix B). Coveys exhibited 57% greater non-adjusted density on CP33 than control fields in the 26-MAV from 2006-2007 (Appendix B). Density estimates in the 26-MAV were 2 times greater for control fields and 1.5 times greater for CP33 fields following incorporation of Wellendorf et al.'s (2004) adjustments (Figure 36, Appendix B); however relative effect size was much smaller (11%) for adjusted estimates of density compared to non-adjusted relative effect size (57%).

State-level non-adjusted covey densities ranged from 0.004 [OH] to 0.22 [TX] coveys/ha on CP33 fields, and from 0.004 [OH] to 0.20 [TX] coveys/ha on control fields in 2006 (Figure 37, Appendix B). Covey densities were significantly greater on CP33 than control fields in MS (250% relative effect size (RES)), NC (189% RES)), SC (259% RES), TN (110% RES); however GA also exhibited a strong but insignificant response to CP33 (91% RES) (Figure 37, Appendix B). Of the 13 states evaluated in 2006, 77% exhibited greater covey densities on CP33 compared to control fields (Figure 37). State-level non-adjusted covey densities ranged from 0.003 [OH] to 0.25 [TX] coveys/ha on CP33 fields, and from 0.005 [TN] to 0.25 [TX] coveys/ha on control fields in 2007 (Figure 38, Appendix B). Like in 2006, 77% of the 13 states evaluated exhibited greater covey densities on CP33 than control fields (Figure 38). However, covey densities were significantly greater on CP33 fields in 8 states (compared to 4 states in 2006), including TN (464% RES), KY (437% RES), NC (387% RES), GA (375% RES), SC (343% RES), IN (244% RES), IA (224% RES), IL (166% RES) (Figure 38, Appendix B). Similar to the BCR-level analyses, incorporation of Wellendorf et al.'s

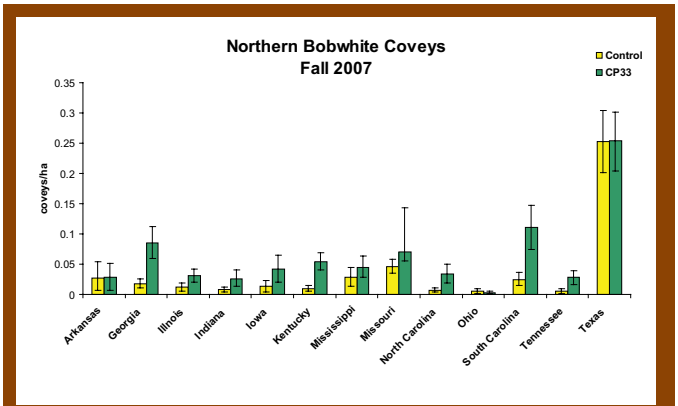

Figure 38. State-level non-adjusted northern bobwhite covey density (coveys/ha) on surveyed CP33 and control fields during fall 2007. Error bars represent 95% bootstrap confidence intervals (B=1000).

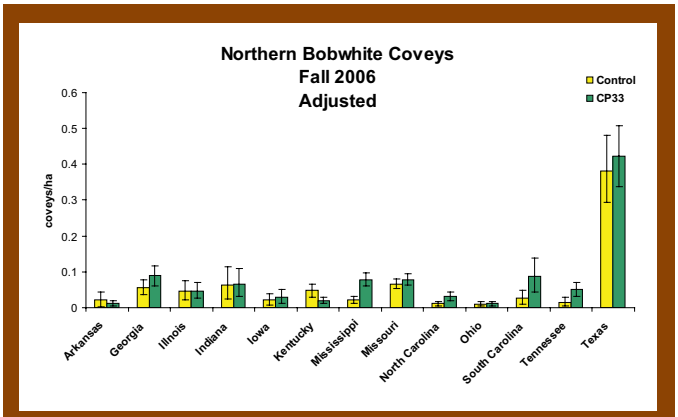

Figure 39. State-level northern bobwhite covey density (coveys/ha) on surveyed CP33 and control fields during fall 2006 adjusted for number of adjacent calling coveys, % cloud cover, wind speed, and 6-hr change in barometric pressure (Wellendorf et al. 2004). Error bars represent 95% bootstrap confidence intervals (B=1000).

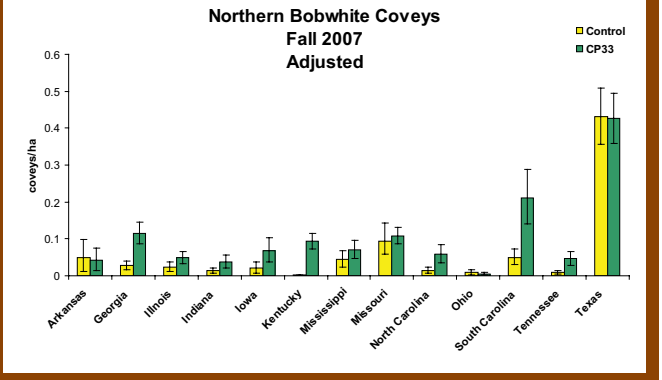

Figure 40. State-level northern bobwhite covey density (coveys/ha) on surveyed CP33 and control fields during fall 2007 adjusted for number of adjacent calling coveys, % cloud cover, wind speed, and 6-hr change in barometric pressure (Wellendorf et al. 2004). Error bars represent 95% bootstrap confidence intervals (B=1000).

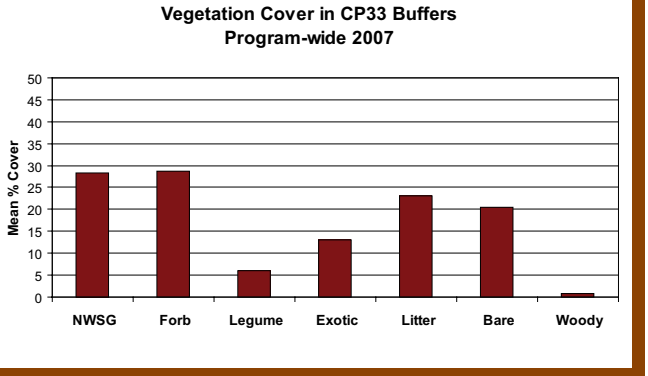

Figure 41. Percent cover of native warm-season grasses (NWSG), forbs, legumes, exotics, litter, bare ground, and woody plants within CP33 upland habitat buffers averaged over 14 states.

(2004) adjustments for calling rate generally doubled state-level estimates of density in 2006 and 2007, but reflected similar trends in relative effect size (Figures 39 and 40, Appendix B).

2007 Vegetation Surveys

Vegetation surveys were conducted following variable protocols in 15 states in 2007. Mean contract width established by the conservation plan in the CRP contract over all surveyed CP33 contracts was 76.84 ft (23.97 m) (Table 3). Mean buffer width at 10 systematically placed points along each CP33 field was 86.55 ft (26.38 m) (Table 5). Contract cover was >60% established in all states by 2007 (Table 3). Cover was established through natural regeneration on >75% of fields in AR, GA, KS, KY, NC, and SC. Contract cover was established through planting of NWSG on >75% of fields in IA, IL, IN, NE, and OH (Table 3). There was minimal presence of trees and shrubs in CP33 buffers (0.96% shrubs, 2.15% trees) (Table 3). Percent noncompliance in 12 of the 15 states was relatively small (7.57%, Table 4). Predominant noncompliance activities included mowing, road/turnrow/driven, equipment disturbance/parking/hay storage, planted to crops and herbicide drift (Table 4). Vegetation transect surveys at 10 systematically placed points along each CP33 field demonstrated that mean percentage cover was less than 30% for all cover variables (NWSG, forb, legume, exotic, litter, bare, woody) (Figure 41, Table 5). Percent NWSG and percent forb cover were greater than all other cover variables, however represented nearly identical cover (~28%) (Table 5). Common exotics present in CP33 buffers included bahiagrass (Paspalum notatum), Bermudagrass (Cynodon dactylon), tall fescue (Schedonorus phoenix), Johnsongrass (Sorghum halepense), and brome (Bromus spp.) (Table 4).

Interpretation

Upland habitat buffers are just one of many available USDA conservation practices; however, the CP33 practice is unique in that its central focus is increasing abundance and diversity of grassland avifauna in the agricultural landscape. As in 2006, we observed measurable and substantive differences in breeding season densities of bobwhite and priority songbirds and in fall bobwhite covey densities between CP33 and control fields. However, the magnitude of effect varied among species, states, and BCRs. We observed a strong overall increase in effect from 2006-2007 in bobwhite, dickcissel, and field sparrow, and an unexpected reversal of effect in eastern meadowlark. However, we observed a decrease in effect in indigo bunting during the second year of the study.

Based on relative effect sizes, overall breeding season bobwhite densities on CP33 fields were double those on control fields in 2007. At the BCR-level this increasing effect size was prevalent in the 19-CMP and 22-ETP, but not in the 24-CH or 27-SCP. Many studies have demonstrated that bobwhite abundances are inextricably linked to regional and annual precipitation (see Hernandez et al. 2005 and citations within). Declines in effect size in the 27-SCP in 2007 may be attributed to the severe southeastern drought that was experienced during the summer of 2007. However, it is important to note that most state-level relative effect sizes in the 27-SCP increased, and the BCR-level effect was negatively influenced by the addition of NC and a decrease in effect in KY in 2007. Another interesting annual shift occurred in the ETP, which exhibited relatively little response in 2006 and a 6-fold greater density on CP33 fields in 2007. Vegetation in the buffers may have taken longer to establish in the midwestern states due to shorter growing seasons and cooler temperatures, thus bobwhite may have exhibited a greater response in 2007 as the buffers became fully established after 2 growing seasons. This strong increase in response to CP33 was mirrored by the majority of state-level density estimates in the 22-ETP, with the exception of OH and MO. The 19-CMP again produced the greatest densities on both control and CP33 fields, and a strong reversal of effect from 2006 to 2007. This reversal of effect is in part due to the addition of NE, which exhibited a strong response to CP33; however state-level density estimates for TX also indicate a shift in response toward CP33 in 2007.

The program-wide trend in relative effect size for overall covey densities was nearly identical to that observed in the breeding season from 2006 to 2007. Like the breeding season, relative effect sizes nearly doubled from 2006 to 2007 program-wide. This indicates that individuals are using CP33 buffers both for breeding season nesting and brood-rearing habitat, but also for protective and thermoregulatory needs in the fall. There were, however, measurable changes in response at the BCR-level over both years between breeding season and fall. Although breeding season densities and effect size declined in 2007 in the 27-SCP, relative effect size of fall coveys nearly tripled from 2006 to 2007. Covey densities on control fields in the 27-SCP were relatively constant from 2006-2007, but nearly doubled on CP33 fields. Though the southeastern drought of 2007 may have adversely affected breeding season density on both control and CP33 fields, bobwhite responded strongly to CP33 in the fall of that same year. Physiological stress leading into the fall may have necessitated individuals to rely more on the thermoregulatory and protective benefits provided by the buffer cover. State-level densities also reflected a very strong response to CP33 in all 27-SCP states except MS, which exhibited a sharp decline in covey density in 2007.

Complicating the large response by breeding season bobwhite in the 22-ETP in 2007, we observed a slight decreasing relative effect size for bobwhite coveys in 2007 compared to 2006. Geographic location likely slowed the growth of CP33 buffers in the 22-ETP, hence quality breeding season habitat was not produced until 2007. Roseberry and Klimstra (1984) demonstrated that non-breeding bobwhites showed a relatively uniform spatial distribution in intensively cultivated areas (such as IL), but that nesting bobwhites shifted to a non-uniform distribution and used areas containing grass-litter and annual forbs, such as fallow fields, herbaceous roadsides and fencerows. Bobwhites in 2007 appeared to echo this behavior, with heavy use of CP33 during the breeding season, but limited use during the fall. One possible explanation for this is a lack of shrub/woody cover provided by the CP33 buffers, which is a particularly important vegetative component for bobwhite in the fall in the northern portion of their range (Roseberry and Klimstra 1984). Bobwhite may disperse from CP33 buffers during winter months in the northern portion of their range in search of available woody/shrub cover. However, it is important to note that most state-level relative effect sizes in the 22-ETP increased, and the BCR-level effect was likely negatively influenced by a further decrease in effect in OH.

Although bobwhite in the 24-CH exhibited increases in breeding season density on both control and CP33 fields, but a decline in relative effect size in 2007, fall coveys responded very strongly to CP33 in 2007. This may be in part to the very strong response in KY and IN in 2007, which have a large proportion of their sites in the 24-CH. KY exhibited a more than 5-fold increase in covey density on CP33 compared to control fields in 2007. This and the results in the 22-ETP may support previous suggestions that fall populations of bobwhite are more responsive to field border practices than breeding populations (Puckett et al. 2000, Smith 2004, Palmer et al. 2005). The 19-CMP exhibited a slight decline in effect in 2007; however like in fall 2006 there continued to be greater covey densities on CP33 than control fields.

In the 2006 Annual Report we presented a scenario that translated field-level effect sizes into programmatic contributions to national bobwhite populations. The scenario was purely a speculative illustration of potential effects as we acknowledge that there are many factors affecting bobwhite populations in our survey that are yet unknown. In 2006 we suggested that our estimated effect size for adjusted covey densities (0.026 coveys/ha) would translate to 598,671 additional birds, or 3.5 birds/ac CP33 enrolled, assuming a mean October covey size of 12 birds, a September 2007 report of 168,743 acres enrolled in CP33, and a hypothetical 40 ac square field buffered with a 60' buffer (6.9 acres of buffer). Continuing to assume an effective survey radius of 500 m or 78.5 ha (194 ac) our 2007 estimate of effect size for adjusted covey densities (0.03931 coveys/ha) translates to an average 3.07 coveys more in the 194 ac region surveyed around CP33 enrolled fields than around control fields. Given a mean October covey size of 12 birds, this would translate to 37.04 more birds in the 194 ac radius around CP33 fields than control fields. The FSA national database reports that as of September 2008, 199,117.4 acres were enrolled in CP33. However, although the total number of contracts is known, the number of fields enrolled in CP33 and the average number of buffer acres/field is unknown. From our stratified sample of contracts we will be able to use a cluster sampling approach to estimate the total and mean number of fields/contract and the mean acreage/buffered field. We have not yet pursued that analysis. However, for illustrative purposes, a hypothetical 40 ac square field buffered with a 60' buffer would have 6.9 acres of buffer. The 2008 national enrollment of 199,117.4 acres could accommodate 28,857.59 such hypothetical 40 ac fields with 60' buffers. Assuming 37.04 additional birds

in the fall population/CP33 field and no overlap of 194 ac regions around CP33 fields (unrealistic given aggregated distribution of CP33) this would translate to 1,068,743 additional birds, or 5.37 birds/ac CP33 enrolled.

It must be noted that ideally during the fall covey surveys, coveys would be located and number of individuals within each covey counted. However, this is a very difficult and labor intensive task, and also subjects the birds to unnecessary disturbance. Although counting the number of calling coveys alone can provide useful estimates of covey abundance, without flushing coveys it is impossible to ascertain the number of individuals in a covey (e.g., is it two coveys with 3 birds each or one covey of 6 birds). This may limit our ability to extrapolate information relative to population size.

Although bobwhite populations are experiencing one of the most severe declines of all grassland bird species, in reality it is an entire suite of species that are dependent on grasslands or early successional habitat for all or part of their life cycle. Some early-successional species responded dramatically to CP33, whereas others showed virtually no or consistently negative response. Like bobwhite, we observed a program-wide increasing effect in dickcissel, field sparrow, and eastern meadowlark, the latter of which exhibited an overall reversal from greater densities in control fields in 2006 to greater densities in CP33 fields in 2007. There was nearly a 2-fold greater program-wide dickcissel density on CP33 than control fields in 2007, with a greater than 3-fold increase in effect size. Field sparrow densities were more than 3 times greater on CP33 than control fields in 2007, and effect size nearly doubled. Clearly dickcissel and field sparrow are exhibiting heavy use of CP33 fields as refugia in an otherwise inhospitable agricultural landscape. Indigo buntings, which are considered scrub-successional, exhibited a decrease in effect in 2007; however, densities on CP33 fields were nearly identical and the decrease in effect was due to an increase on control fields. Indigo buntings may not exhibit consistent response to CP33 because they are not entirely reliant on grassland habitats for all of their life cycle. Nonetheless, they were more abundant on CP33 than control fields, even though the difference was not as strong in 2007 as in 2006. Other less numerous species also showed preferences for CP33 including painted bunting and vesper sparrow. These five species, which cover a range of habitat preferences from grassland obligate to grass-shrub species, all exhibit a distinct preference for crop fields bordered by CP33 compared to edge-to-edge cropping methods. This positive response may be the result of increased and variable nesting or foraging cover provided by, or the changing insect community or seed base associated with CP33 buffers.

Though sample size was low eastern kingbird exhibited virtually no response to CP33. Similar to indigo bunting, eastern kingbird is considered a shrub species that is frequently observed along woodlot edges (MacKenzie and Sealy 1981), however BBS categorizes eastern kingbird as mid-story or canopy nesting (Sauer et al. 2008). Because of this affinity for mid-story trees for nesting, kingbird densities may be more dependent on the woodland community adjacent to survey sites instead of on CP33 buffers. Grasshopper sparrow exhibited virtually no response to CP33, which is discouraging in that grasshopper sparrow populations are experiencing sharp range-wide declines (3.3% annually; Sauer et al. 2008). However, this result is not unexpected, because grasshopper sparrows tend to be area-sensitive (Herkert 1994, Vickery et al. 1994, Johnson and Igl 2001, Bakker et al. 2002), and thus show preferences for large tracts of continuous grassland. However, grasshopper sparrows have also been shown to be dependent on vegetation characteristics instead of area (Winter and Faaborg 1999). Herkert (1994) estimated the area requirement for an individual

grasshopper sparrow to be 30 ha. Using Herkert's estimated area requirement, this means that grasshopper sparrow would have a 50% probability of occurrence on grassland fragments of approximately 74 acre tracts of continuous grassland. Vickery et al. (1994) reported an estimated area requirement for grasshopper sparrows to be 100 ha (247 ac) which is much larger than Herkert's (1994) estimation. The majority of CP33 buffers do not provide the minimum area requirement to attract/support grasshopper sparrow, unless the surrounding landscape matrix provides the additional grassland area required. It is important to note that we believe that CP33 is not necessarily causing a reduction in grasshopper sparrow populations, but instead this species is not showing a preference for this type of habitat. Also note that Henslow's sparrows were also a priority species of interest that did not have enough detections to conduct analysis, but they have been shown to be area sensitive as well, with an estimated area requirement of 55 ha (136 ac) (Herkert 1994; Winter and Faaborg 1999), and therefore would most likely demonstrate a similar response to CP33 as grasshopper sparrows. Vesper sparrow, another priority species, has also been shown to exhibit area sensitivity, with an estimated area requirement of 20 ha (50 ac) (Vickery et al. 1994), but, in contrast to grasshopper sparrow, displayed a positive response to CP33.

With the exception of grasshopper sparrow and eastern kingbird populations of northern bobwhite and other priority songbird species increase, to varying degrees, in response to the establishment of CP33 buffers. As vegetative cover increased and diversified in CP33 buffers in 2007, density of several species also exhibited a concomitant increasing effect size. Buffer vegetation characteristics represented a relatively even distribution of NWSG, forbs, legumes, litter and bare ground, which provide habitat for bobwhite and grassland-obligate bird species. Presence of noncompliance was also fairly low, and the mean actual buffer width was larger than the mean contract width overall. These factors indicate that landowners are actively engaged in the implementation and management of the CP33 practice. Mid-contract management (MCM) had also been initiated in ~7% of CP33 contracts in 2007. We expect that % MCM will increase substantially in late summer 2008 as most buffers were established in 2006 and will be reaching their required MCM stage at this time.

The CP33 monitoring program affords a rare opportunity to evaluate wildlife populations at a large geographic scale, and has shown that the addition of CP33 upland habitat buffers in an otherwise agricultural landscape provides critical habitat and invokes a positive and rapid response by populations of bobwhite and several priority songbird species. Though variable by region, species and year, overall response to CP33 is consistent, and in most instances, increasing as buffer vegetation develops. Presuming increases in abundance represent net population increases rather than redistribution of existing populations from the surrounding landscape, CP33 may have the capacity to affect large-scale population changes in many declining species.

Acknowledgements

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Table 1. Distribution of CP33 monitoring during 2006 and 2007 breeding season and fall bobwhite covey surveys.

Breeding Season, Vegetation Sampling and Fall Covey Counts	CP33 monitoring (SEQSG protocol)	CP33 monitoring (other protocol)
2006 Breeding Season	GA, IA, IL, IN, KY, MO, MS, OH, SC, TN, TX	
2006 Vegetation Sampling	GA, MS	
2006 Fall Covey Counts	AR, GA, IA, IL, IN, KY, MO, MS, NC, OH, SC, TN, TX	KS, OK
2007 Breeding Season	AR, GA, IA, IL, IN, KY MO, MS, NC, NE, OH, SC, TN, TX	
2007 Vegetation Sampling	AR, GA, IA, IL, IN, KS, KY MO, MS, NC, NE, OH, SC, TN, TX	
2007 Fall Covey Counts	AR, GA, IA, IL, IN, KY MO, MS, NC, NE, OH, SC, TN, TX	KS, OK

Table 2. Species (by alpha-code) of interest selected for each Bird Conservation Region (BCR) for CP33 contract monitoring in 2007.

Bird Conservation Region	Species
11- Prairie Potholes	
19-Central Mixed-grass Prairie	BEVI, DICK, EAKI, EAME, FISP, GRSP, INBU, NOBO, PABU, STFL, UPSA
22-Eastern Tallgrass Prairie	DICK, EAKI, EAME, FISP, GRSP, INBU, NOBO, VESP, UPSA
23-Prairie Hardwood Transition	DICK, EAKI, EAME, FISP, INBU, NOBO, VESP
24-Central Hardwoods	DICK, EAKI, EAME, FISP, INBU, NOBO
25-Western Gulf Coast Plain	DICK, EAKI, EAME, INBU, NOBO, PABU
26-Mississippi Alluvial Valley	DICK, EAKI, EAME, FISP, GRSP, INBU, NOBO, PABU
27-Southeast Coastal Plain	DICK, EAKI, EAME, FISP, GRSP, INBU, NOBO, PABU
29-Piedmont	EAKI, EAME, FISP, INBU, NOBO

Table 3. Average designated contract width, method and percentage of cover establishment, and types of exotic species present on surveyed CP33 upland habitat buffers in 15 states in 2007.

		Contract Cover[1]			Established?		
State	Mean Contract Width (ft)	NR	NG	Both	Yes	No	Exotics Present
Arkansas	70.83	82%	12%	6%	67%	33%	Bahia, Bermuda, Fescue, Johnson
Georgia	63.00	97%	3%		90%	10%	Bahia, Bermuda, Rye, Other
Illinois	85.21		100%		88%	12%	Brome, Cheat, Fescue, Foxtail
Indiana	69.26	22%	78%		85%	15%	Bluegrass, Brome, C. Thistle, Fescue, Johnson. Orchard, Timothy, Reed Canary
Iowa	N/A	16%	84%		100%		Foxtail
Kansas	79.58	94%	6%		62%	38%	Bermuda, Brome, Fescue, Sand Bur, Other
Kentucky	52.09	98%	2%		88%	12%	Bahia, Fescue, Other
Mississippi	88.16	53%	47%		73%	23%	Bahia, Bermuda, Fescue, Johnson
Missouri	N/A	N/A	N/A		N/A	N/A	N/A
Nebraska	77.22		100%		71%	29%	Brome, Other
North Carolina	75.95	100%			95%	5%	Ailanthus, Bermuda, Crabgrass, Fescue, Honeysuckle, Johnson, Kudzu, Rye
Ohio	67.00	2%	98%		98%	2%	Brome, C. Thistle, Fescue, Dandelion, Johnson
							Reed Canary, Teasel
South Carolina	95.44	100%			100%		Bahia, Bermuda, F. Pusley, Rye, Vasey, Other
Tennessee	N/A	N/A	N/A		100%		Bermuda, Bluegrass, C. Thistle, Crabgrass, Fescue, Johnson, Orchard, Rye, Sericia, Fescue, Johnson, Orchard, Rye, Sericia
Texas	120.00	N/A	N/A		70%	30%	Bermuda, Johnson, Oats, Wheat
Program-wide	78.64						

[1]NR=Natural Regeneration; NG=Native Grass Mix; Both=NR and NG

Table 4. Average percent shrubs, trees, and non-compliance (NC), type of non-compliance activities (in order of prevalence), percent mid-contract management (MCM) and type of mid-contract management activities on surveyed CP33 upland habitat buffers in 15 states in 2007.

State	% Shrub	% Tree	% NC	Noncompliance Type	% MCM	MCM Type
Arkansas	1.03	0.26	2.56	Mow	10.90	Disk
Georgia	1.00	1.08	7.50	Road/turnrow/driven , planted to crops, mow, equipment disturbance, planted to pine, food plot, equipment/parking/ debris/hay	11.13	Disk, Herbicide, Disk and Burn
Illinois	0.73	8.71	10.07	Mow, road/turnrow/driven, planted to crops, not contract width,	0.00	N/A
Indiana	0.77	2.03	10.91	Herbicide drift, mow, road/driven/turnrow , equipment disturbance	0.00	N/A
Iowa	0.13	0.00	N/A	Mow, road/turnrow/driven	12.37	N/A
Kansas	0.53	0.25	2.76	Road/turnrow/driven, mow, equipment parking/debris/hay, underwater	0.22	N/A
Kentucky	1.00	6.00	15.25	Mow, road/turnrow/driven, equipment parking/debris/hay, lanted to crops, not contract width	0.50	N/A
Mississippi	0.00	1.38	7.00	Road/turnrow/driven, planted to crops, mow, equipment disturbance, herbicide drift	0.00	N/A
Missouri	N/A	N/A	N/A	N/A	N/A	N/A
Nebraska	0.46	0.78	7.39	Road/turnrow/driven, herbicide drift, mow Equipment parking/debris/hay, planted to crops	0.00	N/A
North Carolina	2.39	3.34	8.73	Road/turnrow/driven, mowed, planted to crops, plowed Herbicide drift, food plot	13.15	Disk
Ohio	0.10	0.60	N/A		N/A	
South Carolina	2.89	0.97	4.86	Road/turnrow/driven, planted to crops, food plot, mow Equipment parking/debris/ hay, herbicide drift	30.49	Disk
Tennessee	0.00	0.00	6.28	Mow, equipment parking/debris/hay, road/turnrow/driven, planted to crops, herbicide drift	N/A	N/A
Texas	2.44	4.69	7.46	Mowed, road/turnrow/driven	0.00	N/A
Program-wide	0.96	2.15	7.57		6.56	

Table 5. Average buffer width, percent native warm-season grass (NWSG), forb, legume, exotic vegetation, litter, bare ground, and woody across 10 transect points systematically distributed on each surveyed CP33 upland habitat buffers in 15 states in 2007.

State	Mean Buffer Width (ft)	% NWSG	% Forb	% Legume	% Exotic	% Litter	% Bare	% Woody
Arkansas	98.82	34.40	24.34	3.18	9.28	11.02	16.15	1.03
Georgia	87.98	8.21	35.34	2.44	15.04	23.58	13.28	0.39
Illinois	82.33	36.82	15.49	5.06	13.44	13.89	15.66	0.16
Indiana	67.44	21.38	30.15	8.58	12.33	18.63	11.83	1.01
Iowa	111.01	36.68	20.61	3.89	15.91	47.97	N/A	0.32
Kansas	106.80	32.50	20.23	3.47	10.28	20.55	19.21	0.17
Kentucky	80.16	29.88	21.36	14.53	17.08	27.32	6.42	1.44
Mississippi	79.07	62.89	42.36	14.68	11.99	22.20	49.86	0.14
Missouri	N/A	N/A	24.05	N/A	20.18	37.15	31.21	0.87
Nebraska	77.42	24.67	34.26	11.91	16.00	29.41	21.21	1.20
North Carolina	74.95	8.28	41.02	3.33	15.37	12.42	14.82	2.87
Ohio	62.34	29.10	28.30	0.85	8.40	26.20	13.70	0.60
South Carolina	92.40	21.63	33.39	2.96	7.03	15.09	18.34	1.36
Tennessee	74.80	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Texas	116.12	21.15	30.39	3.72	9.85	18.39	35.61	0.48
Program-wide	86.55	28.28	28.66	6.05	13.01	23.13	20.56	0.86

During winter, native grasses in CP33 buffers provide roosting, foraging, and escape habitat for grassland birds.

Appendix A. BCR and state-level density (males/ha) or relative abundance (mean no. males/point) estimates, standard error, 95% bootstrap confidence intervals (B=1000), simple effect size, 95% confidence intervals for effect size, and relative effect size for species of interest on surveyed CP33 fields and control fields during the 2006 and 2007 breeding season.

Density (# males/ha)										
Northern Bobwhite		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
19-CMP	2006	0.887280	0.180600	0.797-1.14	0.691020	0.091853	0.656-0.881	-0.196260	(-0.593-0.201)	-0.221193
	2007	0.319150	0.036339	0.255-0.400	0.377690	0.041800	0.304-0.470	0.058540	(-0.050-0.168)	0.183425
	2006-2007	0.432340	0.034917	0.371-0.519	0.501440	0.036398	0.431-0.604	0.069100	(-0.030-0.168)	0.159828
22-ETP	2006	0.127090	0.098190	0.033-0.487	0.153680	0.134055	0.035-0.674	0.026590	(-0.299-0.352)	0.209222
	2007	0.053965	0.011478	0.036-0.082	0.216380	0.097869	0.093-0.505	0.162415	(-0.031-0.356)	3.009636
	2006-2007	0.059401	0.005548	0.049-0.069	0.118290	0.012834	0.099-0.141	0.058889	(0.031-0.086)	0.991381
24-CH	2006	0.097090	0.018515	0.067-0.141	0.165150	0.029132	0.117-0.234	0.068060	(0.0004-0.136)	0.700999
	2007	0.229630	0.062413	0.135-0.389	0.250170	0.077403	0.137-0.455	0.020540	(-0.174-0.215)	0.089448
	2006-2007	0.125200	0.020275	0.094-0.158	0.164800	0.026718	0.122-0.212	0.039600	(-0.026-0.105)	0.316294
26-MAV	2006-2007	0.052682	0.013900	0.028-0.081	0.099397	0.021371	0.059-0.144	0.046715	(-0.003-0.097)	0.886736
27-SCP	2006	0.055513	0.014444	0.034-0.092	0.175790	0.031238	0.124-0.249	0.120277	(0.053-0.188)	2.166646
	2007	0.083570	0.017491	0.056-0.126	0.135010	0.024626	0.095-0.193	0.051440	(-0.008-0.111)	0.615532
	2006-2007	0.070470	0.007660	0.058-0.034	0.174490	0.015902	0.148-0.200	0.104020	(0.069-0.139)	1.476089
Program-wide	2006	0.121140	0.011541	0.088-0.174	0.181750	0.014925	0.138-0.250	0.060610	(0.024-0.098)	0.500330
	2007	0.104190	0.014951	0.079-0.138	0.207500	0.029880	0.157-0.275	0.103310	(0.038-0.169)	0.991554
	2006-2007	0.115820	0.006199	0.104-0.129	0.189220	0.009766	0.172-0.210	0.073400	(0.051-0.096)	0.633742

Appendix A (continued) . BCR and state-level density (males/ha) or relative abundance (mean no. males/point) estimates, standard error, 95% bootstrap confidence intervals (B=1000), simple effect size, 95% confidence intervals for effect size, and relative effect size for species of interest on surveyed CP33 fields and control fields during the 2006 and 2007 breeding season.

Density (# males/ha)										
Northern Bobwhite		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
AR	2007	0.008589	0.004410	0.004-0.014	0.040119	0.013538	0.025-0.056	0.031531	(0.004-0.059)	3.671246
GA	2006	0.046133	0.009580	0.031-0.063	0.108600	0.020023	0.082-0.145	0.062467	(0.019-0.106)	1.354063
	2007	0.051638	0.013413	0.035-0.070	0.154800	0.030739	0.113-0.198	0.103162	(0.037-0.169)	1.997792
IL	2006	0.043913	0.010370	0.047-0.111	0.111820	0.022650	0.097-0.194	0.067907	(0.019-0.117)	1.546399
	2007	0.166600	0.038125	0.116-0.220	0.411950	0.080416	0.299-0.542	0.245350	(0.071-0.420)	1.472689
IN	2006	0.041987	0.008861	0.037-0.088	0.073853	0.014651	0.060-0.123	0.031866	(-0.002-0.065)	0.758949
	2007	0.057062	0.013864	0.037-0.077	0.208190	0.065123	0.118-0.317	0.151128	(0.021-0.282)	2.648488
IA	2006	0.014571	0.005238	0.019-0.043	0.030840	0.008633	0.019-0.043	0.016269	(-0.004-0.036)	1.116533
	2007	0.018836	0.007903	0.010-0.029	0.062147	0.021155	0.035-0.089	0.043311	(-0.001-0.088)	2.299374
KY	2006	0.058492	0.008326	0.045-0.073	0.089300	0.011627	0.070-0.111	0.030808	(0.003-0.059)	0.526705
	2007	0.187660	0.044582	0.125-0.263	0.210490	0.041382	0.150-0.279	0.022830	(-0.096-0.1420)	0.121656
MS	2006	0.027548	0.004106	0.025-0.040	0.085138	0.015163	0.066-0.126	0.057590	(0.027-0.089)	2.090533
	2007	0.023886	0.006619	0.016-0.032	0.082120	0.020126	0.052-0.114	0.058234	(0.017-0.100)	2.437997
MO	2006	0.069807	0.006382	0.061-0.081	0.116130	0.010782	0.101-0.136	0.046323	(0.022-0.071)	0.663587
	2007	0.070760	0.009368	0.054-0.088	0.087279	0.011923	0.065-0.110	0.016519	(-0.013-0.046)	0.233451
NE	2007	0.169050	0.043846	0.111-0.237	0.372250	0.094405	0.244-0.527	0.203200	(-0.001-0.407)	1.202011
NC	2007	0.052216	0.009283	0.040-0.065	0.075914	0.015975	0.054-0.101	0.023698	(-0.013-0.060)	0.453846
OH	2006	0.069900	0.010617	0.057-0.096	0.046495	0.006858	0.042-0.064	-0.023405	(-0.048-0.001)	-0.334835
	2007	0.030555	0.011437	0.012-0.050	0.020629	0.007105	0.010-0.032	-0.009926	(-0.036-0.016)	-0.324857
SC	2006	0.115980	0.028557	0.092-0.181	0.154300	0.029218	0.104-0.211	0.038320	(-0.042-0.118)	0.330402
	2007	0.170840	0.048738	0.108-0.241	0.375340	0.092154	0.250-0.518	0.204500	(0.0002-0.409)	1.197026
TN	2006	0.051786	0.008792	0.043-0.076	0.072516	0.012314	0.064-0.117	0.020730	(-0.009-0.050)	0.400301
	2007	0.049795	0.014721	0.029-0.075	0.106240	0.026799	0.064-0.157	0.056445	(-0.003-0.116)	1.133548
TX	2006	0.532220	0.067814	0.428-0.648	0.398900	0.041371	0.332-0.468	-0.133320	(-0.289-0.022)	-0.250498
	2007	0.287840	0.029417	0.250-0.342	0.421400	0.045381	0.361-0.521	0.133560	(0.028-0.240)	0.464008

Appendix A (continued) . BCR and state-level density (males/ha) or relative abundance (mean no. males/point) estimates, standard error, 95% bootstrap confidence intervals (B=1000), simple effect size, 95% confidence intervals for effect size, and relative effect size for species of interest on surveyed CP33 fields and control fields during the 2006 and 2007 breeding season.

Density (# males/ha)										
Dickcissel		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
19-CMP	2006	0.752630	1.028243	0.096-5.871	0.586290	0.635714	0.100-3.432	-0.166340	(-2.536-2.203)	-0.221012
	2007	0.359570	0.119054	0.190-0.680	1.322700	0.249064	0.913-1.916	0.963130	(0.422-1.504)	2.678561
	2006-2007	0.398660	0.066016	0.324-0.564	1.290500	0.192660	1.106-1.640	0.891840	(0.493-1.291)	2.237094
22-ETP	2006	0.216540	0.044347	0.145-0.323	0.397050	0.084889	0.262-0.602	0.180510	(-0.007-0.368)	0.833610
	2007	0.301380	0.061331	0.203-0.448	0.483220	0.100461	0.322-0.724	0.181840	(-0.049-0.413)	0.603358
	2006-2007	0.270140	0.030303	0.223-0.319	0.466930	0.053410	0.391-0.548	0.196790	(0.076-0.317)	0.728474
24-CH	2006	0.228490	0.099028	0.100-0.522	0.329950	0.109741	0.173-0.629	0.101460	(-0.188-0.391)	0.444046
	2007	0.360570	0.122341	0.187-0.697	0.806220	0.188091	0.510-1.275	0.445650	(0.005-0.885)	1.235960
	2006-2007	0.324940	0.063107	0.211-0.439	0.628820	0.103740	0.436-0.842	0.303880	(0.066-0.542)	0.935188
26-MAV	2006-2007	0.827810	0.155830	0.543-1.187	1.320100	0.219070	0.892-1.822	0.492290	(-0.035-1.019)	0.594690
27-SCP	2006	0.398040	0.620863	0.044-3.595	0.661710	1.245868	0.058-7.588	0.263670	(-2.465-2.992)	0.662421
	2007	0.092645	0.048676	0.035-0.247	0.172610	0.077312	0.074-0.403	0.079965	(-0.099-0.259)	0.863133
	2006-2007	0.185340	0.041829	0.112-0.275	0.308530	0.072497	0.173-0.457	0.123190	(-0.041-0.287)	0.664670
Program-wide	2006	0.311070	0.048994	0.229-0.423	0.411950	0.066571	0.301-0.565	0.100880	(-0.061-0.263)	0.324300
	2007	0.365560	0.063059	0.261-0.512	0.706860	0.089630	0.552-0.906	0.341300	(0.127-0.556)	0.933636
	2006-2007	0.320900	0.024179	0.287-0.372	0.629020	0.044498	0.565-0.720	0.308120	(0.209-0.407)	0.960175
Arkansas	2007	0.395230	0.078607	0.303-0.501	1.021800	0.143110	0.838-1.21	0.626570	(0.307-0.947)	1.585330
Illinois	2006	0.052348	0.017834	0.026-0.085	0.337310	0.087074	0.200-0.370	0.284962	(0.111-0.459)	5.443608
	2007	0.255250	0.101920	0.120-0.413	0.601260	0.187430	0.333-0.896	0.346010	(-0.072-0.764)	1.355573

Appendix A (continued) . BCR and state-level density (males/ha) or relative abundance (mean no. males/point) estimates, standard error, 95% bootstrap confidence intervals (B=1000), simple effect size, 95% confidence intervals for effect size, and relative effect size for species of interest on surveyed CP33 fields and control fields during the 2006 and 2007 breeding season.

Density (# males/ha)										
Dickcissel		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
Indiana	2006	0.044815	0.017109	0.017-0.081	0.261680	0.088247	0.120-0.298	0.216865	(0.041-0.393)	4.839116
	2007	0.012157	0.009062	0.003-0.021	0.251710	0.142760	0.061-0.503	0.239553	(-0.041-0.520)	19.704944
Iowa	2006	0.167030	0.035110	0.113-0.217	0.258710	0.049491	0.176-0.309	0.091680	(-0.027-0.211)	0.548883
	2007	0.101150	0.025371	0.061-0.141	0.569210	0.116330	0.382-0.756	0.468060	(0.235-0.701)	4.627385
Kentucky	2006	0.124060	0.054898	0.072-0.180	0.184710	0.030602	0.091-0.287	0.060650	(-0.063-0.184)	0.488876
	2007	0.228120	0.090855	0.111-0.366	0.477250	0.158680	0.245-0.742	0.249130	(-0.109-0.608)	1.092101
Mississippi	2006	0.310640	0.088675	0.165-0.471	0.364290	0.087136	0.218-0.546	0.053650	(-0.190-0.297)	0.172708
	2007	0.165450	0.056679	0.081-0.258	0.379670	0.101290	0.229-0.559	0.214220	(-0.013-0.442)	1.294772
Missouri	2006	0.409310	0.070376	0.283-0.532	0.373250	0.060408	0.281-0.473	-0.036060	(-0.218-0.146)	-0.088099
	2007	0.631790	0.087668	0.480-0.792	0.711190	0.106690	0.536-0.909	0.079400	(-0.191-0.350)	0.125675
Nebraska	2007	1.708300	0.388390	1.237-2.209	3.553000	0.577840	2.749-4.409	1.844700	(0.480-3.209)	1.079845
Tennessee	2006	0.178220	0.036084	0.135-0.259	0.098774	0.016755	0.080-0.121	-0.079446	(-0.157--0.001)	-0.445775
Texas	2006	0.421760	0.070673	0.344-0.499	0.262420	0.045542	0.221-0.318	-0.159340	(-0.324-0.005)	-0.377798
	2007	0.315350	0.066447	0.223-0.414	1.113700	0.179440	0.835-1.418	0.798350	(0.423-1.173)	2.531632

Appendix A (continued) . BCR and state-level density (males/ha) or relative abundance (mean no. males/point) estimates, standard error, 95% bootstrap confidence intervals (B=1000), simple effect size, 95% confidence intervals for effect size, and relative effect size for species of interest on surveyed CP33 fields and control fields during the 2006 and 2007 breeding season.

Density (# males/ha)										
Field Sparrow		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
22-ETP	2006	0.221810	0.033249	0.166-0.297	0.430020	0.054097	0.336-0.550	0.208210	(0.084-0.333)	0.938686
	2007	0.180210	0.046710	0.109-0.298	0.668930	0.103952	0.494-0.906	0.488720	(0.265-0.712)	2.711947
	2006-2007	0.200250	0.019057	0.168-0.240	0.566520	0.039280	0.496-0.650	0.366270	(0.281-0.452)	1.829064
24-CH	2006	0.269670	0.075481	0.157-0.465	0.450990	0.117799	0.271-0.750	0.181320	(-0.093-0.456)	0.672377
	2007	0.343260	0.078023	0.220-0.536	0.552860	0.122845	0.358-0.854	0.209600	(-0.076-0.495)	0.610616
	2006-2007	0.313850	0.042479	0.238-0.392	0.510010	0.054150	0.410-0.623	0.196160	(0.061-0.331)	0.625012
26-MAV	2006-2007	0.054037	0.028080	0.007-0.122	0.068273	0.030649	0.014-0.130	0.014236	(-0.067-0.096)	0.263449
27-SCP	2006	0.340090	0.085805	0.209-0.555	0.562610	0.111959	0.382-0.829	0.222520	(-0.054-0.499)	0.654297
	2007	0.200220	0.044649	0.130-0.309	0.332840	0.069763	0.221-0.501	0.132620	(-0.030-0.295)	0.662371
	2006-2007	0.264060	0.033045	0.202-0.333	0.433680	0.041246	0.356-0.520	0.169620	(0.066-0.273)	0.642354
Program-wide	2006	0.259140	0.035399	0.198-0.339	0.471890	0.057571	0.372-0.599	0.212750	(0.080-0.3450	0.820985
	2007	0.192930	0.024656	0.150-0.248	0.588310	0.085599	0.443-0.782	0.395380	(0.221-0.570)	2.049344
	2006-2007	0.231250	0.015477	0.205-0.265	0.529630	0.026190	0.478-0.584	0.298380	(0.239-0.358)	1.290292
Georgia	2006	0.083475	0.019473	0.056-0.111	0.338270	0.082841	0.223-0.424	0.254795	(0.088-0.422)	3.052351
	2007	0.101090	0.033370	0.058-0.152	0.214250	0.041118	0.167-0.266	0.113160	(0.009-0.217)	1.119399
Illinois	2006	0.140740	0.059955	0.070-0.221	1.149600	0.287530	0.802-1.551	1.008860	(0.433-1.585)	7.168254
	2007	0.221790	0.073396	0.141-0.323	1.092100	0.236760	0.788-1.432	0.870310	(0.385-1.356)	3.924027
Indiana	2006	0.230280	0.052469	0.166-0.299	0.543080	0.114440	0.373-0.720	0.312800	(0.066-0.560)	1.358346
	2007	0.210220	0.043407	0.150-0.270	0.821450	0.130870	0.635-1.022	0.611230	(0.341-0.882)	2.907573

Appendix A (continued) . BCR and state-level density (males/ha) or relative abundance (mean no. males/point) estimates, standard error, 95% bootstrap confidence intervals (B=1000), simple effect size, 95% confidence intervals for effect size, and relative effect size for species of interest on surveyed CP33 fields and control fields during the 2006 and 2007 breeding season.

Density (# males/ha)										
Field Sparrow		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
Iowa	2006	0.047676	0.019102	0.022-0.076	0.228270	0.058383	0.162-0.295	0.180594	(0.060-0.301)	3.787944
	2007	n/a			0.091163	0.022450	0.059-0.126			
Kentucky	2006	0.188750	0.035830	0.142-0.243	0.551340	0.084849	0.432-0.675	0.362590	(0.182-0.543)	1.921007
	2007	0.341870	0.064795	0.245-0.447	0.582000	0.080387	0.466-0.706	0.240130	(0.038-0.443)	0.702401
Mississippi	2006	0.204800	0.098842	0.081-0.379	0.210690	0.090751	0.087-0.355	0.005890	(-0.257-0.269)	0.028760
	2007	0.052157	0.023943	0.022-0.091	0.139110	0.048248	0.074-0.217	0.086953	(-0.019-0.193)	1.667140
Missouri	2006	0.049835	0.011697	0.032-0.073	0.138590	0.019560	0.103-0.176	0.088755	(0.044-0.133)	1.780977
	2007	0.105930	0.018995	0.075-0.136	0.138520	0.021050	0.103-0.174	0.032590	(-0.023-0.088)	0.307656
Nebraska	2007	0.317230	0.153230	0.119-0.535	0.653070	0.206320	0.367-0.980	0.335840	(-0.168-0.840)	1.058664
North Carolina	2007	0.110640	0.037619	0.059-0.167	0.239530	0.054567	0.158-0.321	0.128890	(-0.001-0.259)	1.164949
Ohio	2006	0.440360	0.069096	0.337-0.547	0.734300	0.083477	0.594-0.868	0.293940	(0.082-0.506)	0.667499
	2007	0.239490	0.043386	0.185-0.297	0.498040	0.061969	0.405-0.588	0.258550	(0.110-0.407)	1.079586
South Carolina	2006	0.082908	0.071170	0.017-0.182	0.162210	0.071446	0.081-0.255	0.079302	(-0.118-0.277)	0.956506
	2007	0.086977	0.051608	0.037-0.149	0.203450	0.060251	0.133-0.282	0.116473	(-0.039-0.272)	1.339124
Tennessee	2006	0.458890	0.082777	0.356-0.572	0.822690	0.136100	0.631-1.007	0.363800	(0.052-0.676)	0.792783
	2007	0.347400	0.086664	0.224-0.494	0.588710	0.112540	0.395-0.791	0.241310	(-0.037-0.520)	0.694617

Appendix A (continued) . BCR and state-level density (males/ha) or relative abundance (mean no. males/point) estimates, standard error, 95% bootstrap confidence intervals (B=1000), simple effect size, 95% confidence intervals for effect size, and relative effect size for species of interest on surveyed CP33 fields and control fields during the 2006 and 2007 breeding season.

Density (# males/ha)										
Indigo Bunting		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
22-ETP	2006	0.354050	0.074366	0.247-0.566	1.369000	0.323000	0.462-5.250	1.014950	(0.365-1.665)	2.866685
	2007	0.841670	0.184100	0.400-2.063	2.291400	0.479570	1.018-6.231	1.449730	(0.443-2.457)	1.722445
	2006-2007	0.763420	0.058397	0.662-0.877	1.227300	0.070983	1.084-1.383	0.463880	(0.284-0.644)	0.607634
24-CH	2006	2.016500	0.259930	1.482-2.715	2.546300	0.281570	1.969-3.281	0.529800	(-0.221-1.281)	0.262732
	2007	2.675600	0.464140	1.743-4.633	3.029200	0.540560	1.974-5.233	0.353600	(-1.043-1.750)	0.132157
	2006-2007	1.929400	0.129640	1.680-2.207	2.410600	0.160410	2.082-2.725	0.481200	(0.077-0.885)	0.249404
26-MAV	2006-2007	0.753180	0.136250	0.476-1.082	0.857530	0.127850	0.604-1.146	0.104350	(-0.262-0.471)	0.138546
27-SCP	2006	1.903100	0.256250	1.366-2.835	2.491200	0.330060	1.803-3.640	0.588100	(-0.231-1.407)	0.309022
	2007	1.321800	0.194305	0.992-1.761	1.777600	0.241398	1.364-2.318	0.455800	(-0.152-1.063)	0.344833
	2006-2007	1.419300	0.080212	1.217-1.605	1.878300	0.096975	1.649-2.098	0.459000	(0.212-0.706)	0.323399
Program-wide	2006	1.110700	0.128120	0.823-1.621	1.891600	0.182560	1.527-2.398	0.780900	(0.344-1.218)	0.703070
	2007	1.367500	0.124350	1.118-1.690	1.857100	0.161950	1.530-2.279	0.489600	(0.089-0.890)	0.358026
	2006-2007	1.144600	0.043682	1.053-1.244	1.567800	0.051576	1.459-1.703	0.423200	(0.291-0.556)	0.369736
Arkansas	2007	0.313310	0.074259	0.223-0.404	0.345160	0.071467	0.257-0.446	0.031850	(-0.170-0.234)	0.101657
Georgia	2006	0.106050	0.025594	0.071-0.150	0.190050	0.035091	0.142-0.242	0.084000	(-0.001-0.169)	0.792079
	2007	0.276870	0.069793	0.195-0.367	0.300650	0.060267	0.229-0.379	0.023780	(-0.157-0.205)	0.085889
Illinois	2006	0.286000	0.062391	0.199-0.385	0.594060	0.101800	0.438-0.743	0.308060	(0.074-0.542)	1.077133
	2007	1.099000	0.204160	0.855-1.374	1.961500	0.297080	1.585-2.358	0.862500	(0.156-1.570)	0.784804

Appendix A (continued) . BCR and state-level density (males/ha) or relative abundance (mean no. males/point) estimates, standard error, 95% bootstrap confidence intervals (B=1000), simple effect size, 95% confidence intervals for effect size, and relative effect size for species of interest on surveyed CP33 fields and control fields during the 2006 and 2007 breeding season.

Density (# males/ha)										
Indigo Bunting		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
Indiana	2006	0.237340	0.044715	0.166-0.325	0.562740	0.085809	0.404-0.721	0.325400	(0.136-0.515)	1.371029
	2007	0.713550	0.109660	0.552-0.885	1.085800	0.173130	0.810-1.362	0.372250	(-0.029-0.774)	0.521687
Iowa	2006	0.097408	0.039539	0.039-0.162	0.190220	0.054827	0.113-0.282	0.092812	(-0.040-0.225)	0.952817
	2007	0.038335	0.018658	0.019-0.061	0.091832	0.038197	0.046-0.144	0.053497	(-0.030-0.137)	1.395513
Kentucky	2006	0.980350	0.086202	0.850-1.097	1.405600	0.127910	1.201-1.610	0.425250	(0.123-0.728)	0.433774
	2007	1.794000	0.175630	1.534-2.041	2.159000	0.204580	1.850-2.469	0.365000	(-0.163-0.893)	0.203456
Mississippi	2006	0.383080	0.045950	0.316-0.465	0.891190	0.110430	0.714-1.115	0.508110	(0.274-0.743)	1.326381
	2007	0.459850	0.058663	0.399-0.562	0.579900	0.070135	0.486-0.673	0.120050	(-0.059-0.299)	0.261063
Missouri	2006	0.584210	0.083741	0.449-0.727	0.396230	0.040362	0.345-0.450	-0.187980	(-0.370--0.006)	-0.321768
	2007	0.498590	0.067011	0.387-0.617	0.523600	0.067179	0.401-0.641	0.025010	(-0.161-0.211)	0.050161
North Carolina	2007	0.428510	0.052383	0.358-0.501	0.736480	0.074975	0.643-0.836	0.307970	(0.129-0.487)	0.718700
Ohio	2006	0.367910	0.049722	0.285-0.462	0.907440	0.096872	0.752-1.079	0.539530	(0.326-0.753)	1.466473
	2007	0.439340	0.090655	0.297-0.582	1.418500	0.162040	1.159-1.690	0.979160	(0.615-1.343)	2.228707
South Carolina	2006	0.496610	0.108170	0.358-0.670	0.490800	0.092121	0.370-0.662	-0.005810	(-0.284-0.273)	-0.011699
	2007	0.545870	0.118180	0.398-0.694	1.202100	0.208760	0.948-1.490	0.656230	(0.186-1.126)	1.202173
Tennessee	2006	0.732160	0.079833	0.601-0.856	1.229100	0.128180	1.038-1.435	0.496940	(0.201-0.793)	0.678731
	2007	1.047400	0.137800	0.760-1.344	1.856500	0.224910	1.358-2.341	0.809100	(0.292-1.326)	0.772484

Appendix A (continued) . BCR and state-level density (males/ha) or relative abundance (mean no. males/point) estimates, standard error, 95% bootstrap confidence intervals (B=1000), simple effect size, 95% confidence intervals for effect size, and relative effect size for species of interest on surveyed CP33 fields and control fields during the 2006 and 2007 breeding season.

Density (# males/ha)										
Eastern Meadowlark		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
19-CMP	2006	0.349220	0.116011	0.184-0.664	0.289390	0.117000	0.134-0.627	-0.059830	(-0.383-0.263)	-0.171325
	2007	0.197320	0.060814	0.109-0.359	0.183410	0.056545	0.101-0.333	-0.013910	(-0.177-0.149)	-0.070495
	2006-2007	0.248770	0.045849	0.201-0.314	0.221570	0.042110	0.101-0.298	-0.027200	(-0.149-0.095)	-0.109338
22-ETP	2006	0.137320	0.030842	0.089-0.213	0.068004	0.016586	0.042-0.109	-0.069316	(-0.138--0.001)	-0.504777
	2007	0.130720	0.035386	0.077-0.221	0.221680	0.061827	0.129-0.380	0.090960	(-0.049-0.231)	0.695838
	2006-2007	0.139250	0.015469	0.113-0.167	0.108370	0.017337	0.084-0.136	-0.030880	(-0.076-0.015)	-0.221759
24-CH	2006	0.045476	0.023793	0.017-0.122	0.082546	0.045689	0.029-0.233	0.037070	(-0.064-0.138)	0.815155
	2007	0.106630	0.038547	0.053-0.214	0.197060	0.077898	0.092-0.420	0.090430	(-0.080-0.261)	0.848073
	2006-2007	0.074959	0.016332	0.048-0.107	0.135640	0.029980	0.075-0.207	0.060681	(-0.006-0.128)	0.809523
26-MAV	2006-2007	0.082687	0.026018	0.057-0.109	0.091729	0.025961	0.057-0.109	0.009042	(-0.063-0.081)	0.109352
27-SCP	2006	0.087876	0.027250	0.048-0.160	0.078208	0.031674	0.036-0.169	-0.009668	(-0.092-0.072)	-0.110019
	2007	0.108110	0.037979	0.055-0.212	0.095842	0.030363	0.052-0.176	-0.012268	(-0.108-0.083)	-0.113477
	2006-2007	0.100780	0.015847	0.068-0.135	0.089518	0.017095	0.055-0.127	-0.011262	(-0.057-0.034)	-0.111748
Program-wide	2006	0.121320	0.017385	0.092-0.161	0.097371	0.015258	0.072-0.132	-0.023949	(-0.069-0.021)	-0.197404
	2007	0.108480	0.016380	0.081-0.146	0.150880	0.026645	0.107-0.213	0.042400	(-0.019-0.104)	0.390855
	2006-2007	0.122760	0.009445	0.107-0.141	0.113940	0.010374	0.096-0.133	-0.008820	(-0.036-0.019)	-0.071848
Arkansas	2007	0.070621	0.016772	0.046-0.095	0.045611	0.009125	0.031-0.060	-0.025010	(-0.062-0.012)	-0.354144
Illinois	2006	0.218050	0.070978	0.104-0.363	0.160140	0.054457	0.078-0.253	-0.057910	(-0.233-0.117)	-0.265581
	2007	0.078213	0.027748	0.046-0.117	0.644920	0.164030	0.447-0.894	0.566707	(0.241-0.893)	7.245688

Appendix A (continued) . BCR and state-level density (males/ha) or relative abundance (mean no. males/point) estimates, standard error, 95% bootstrap confidence intervals (B=1000), simple effect size, 95% confidence intervals for effect size, and relative effect size for species of interest on surveyed CP33 fields and control fields during the 2006 and 2007 breeding season.

Density (# males/ha)										
Eastern Meadowlark		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
Indiana	2006	0.054282	0.020208	0.026-0.098	0.102230	0.028040	0.058-0.181	0.047948	(-0.020-0.116)	0.883313
	2007	0.168950	0.078677	0.060-0.283	0.231430	0.113750	0.077-0.405	0.062480	(-0.209-0.334)	0.369814
Iowa	2006	0.137830	0.035984	0.077-0.211	0.102420	0.037325	0.049-0.168	-0.035410	(-0.137-0.066)	-0.256911
	2007	0.038578	0.012213	0.023-0.056	0.033807	0.012132	0.018-0.050	-0.004771	(-0.039-0.029)	-0.123672
Kentucky	2006	0.076816	0.018506	0.047-0.110	0.074838	0.023554	0.038-0.121	-0.001978	(-0.061-0.057)	-0.025750
	2007	0.154780	0.052921	0.088-0.234	0.268900	0.085722	0.152-0.411	0.114120	(-0.083-0.312)	0.737305
Mississippi	2006	0.102320	0.024443	0.067-0.151	0.097902	0.032549	0.050-0.158	-0.004418	(-0.084-0.075)	-0.043178
	2007	0.027118	0.009995	0.015-0.039	0.055036	0.016643	0.034-0.078	0.027918	(-0.010-0.066)	1.029501
Missouri	2006	0.127770	0.023832	0.089-0.165	0.085297	0.020948	0.050-0.120	-0.042473	(-0.105-0.020)	-0.332418
	2007	0.027378	0.005195	0.019-0.037	0.091528	0.022733	0.061-0.127	0.064150	(0.018-0.110)	2.343122
Nebraska	2007	0.472220	0.182430	0.253-0.760	0.403900	0.155430	0.208-0.664	-0.068320	(-0.538-0.401)	-0.144678
North Carolina	2007	0.052538	0.017841	0.027-0.079	0.046948	0.016032	0.026-0.070	-0.005590	(-0.053-0.041)	-0.106399
Ohio	2006	0.101720	0.022025	0.067-0.144	0.046156	0.013165	0.026-0.068	-0.055564	(-0.106--0.005)	-0.546245
	2007	0.106890	0.031879	0.068-0.146	0.037753	0.014427	0.018-0.061	-0.069137	(-0.128--0.001)	-0.646805
Tennessee	2006	0.069759	0.022003	0.040-0.112	0.072518	0.025519	0.035-0.130	0.002759	(-0.063-0.069)	0.039550
Texas	2006	0.315040	0.056940	0.227-0.412	0.238020	0.042880	0.184-0.306	-0.077020	(-0.217-0.063)	-0.244477
	2007	0.072156	0.017634	0.046-0.100	0.121820	0.029605	0.078-0.174	0.049664	(-0.018-0.117)	0.688286

Appendix A (continued) . BCR and state-level density (males/ha) or relative abundance (mean no. males/point) estimates, standard error, 95% bootstrap confidence intervals (B=1000), simple effect size, 95% confidence intervals for effect size, and relative effect size for species of interest on surveyed CP33 fields and control fields during the 2006 and 2007 breeding season.

Density (# males/ha)										
Eastern Kingbird		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
22-ETP	2006-2007	0.099603	0.020064	0.071-0.134	0.124590	0.023686	0.096-0.156	0.024987	(-0.036-0.086)	0.250866
24-CH	2006-2007	0.115590	0.036396	0.062-0.173	0.165130	0.043190	0.103-0.231	0.049540	(-0.061-0.160)	0.428584
27-SCP	2006-2007	0.184940	0.030368	0.146-0.228	0.184220	0.035366	0.136-0.229	-0.000720	(-0.092-0.091)	-0.003893
Program-wide	2006-2007	0.131350	0.019463	0.108-0.154	0.129020	0.016442	0.111-0.150	-0.002330	(-0.052-0.048)	-0.017739
Relative Abundance (mean # males/point)										
Arkansas	2007	0.016293	0.549993	0.011-0.034	0.021724	0.540833	0.014-0.044	0.005431	(-1.506-1.517)	0.333333
Georgia	2006	0.406264	0.119300	0.183-0.332	0.177741	0.725500	0.100-0.230	-0.228524	(-1.670-1.213)	-0.562500
	2007	0.072688	0.588830	0.051-0.167	0.169606	0.395278	0.093-0.208	0.096918	(-1.293-1.487)	1.333333
Illinois	2006	0.143541	0.062270	0.084-0.202	0.287082	0.092960	0.138-0.266	0.143541	(-0.076-0.363)	1.000000
	2007	0.152450	0.400625	0.085-0.190	0.566245	0.236864	0.215-0.348	0.413794	(-0.498-1.326)	2.714286
Indiana	2006	0.142816	0.055360	0.077-0.165	0.088703	0.038810	0.051-0.123	-0.054113	(-0.187-0.078)	-0.378898
	2007	0.037879	0.388570	0.020-0.044	0.071024	0.364070	0.037-0.075	0.033144	(-1.011-1.077)	0.875000
Iowa	2006	0.089468	0.048720	0.060-0.180	0.306747	0.094100	0.142-0.264	0.217279	(0.010-0.425)	2.428571
	2007	0.164973	0.364924	0.086-0.178	0.313328	0.272280	0.132-0.228	0.148355	(-0.744-1.041)	0.899270
Kentucky	2006	0.053430	0.025780	0.033-0.085	0.125554	0.043140	0.062-0.122	0.072123	(-0.026-0.171)	1.349855
	2007	0.152883	0.355101	0.077-0.155	0.206608	0.330258	0.099-0.190	0.053725	(-0.897-1.004)	0.351416
Mississippi	2006	0.131579	0.320595	0.062-0.117	0.038961	0.585325	0.027-0.085	-0.092618	(-1.401-1.215)	-0.703896
	2007	0.035798	0.431306	0.021-0.049	0.025570	0.447066	0.015-0.037	-0.010228	(-1.228-1.207)	-0.285714

Appendix A (continued) . BCR and state-level density (males/ha) or relative abundance (mean no. males/point) estimates, standard error, 95% bootstrap confidence intervals (B=1000), simple effect size, 95% confidence intervals for effect size, and relative effect size for species of interest on surveyed CP33 fields and control fields during the 2006 and 2007 breeding season.

Density (# males/ha)										
Eastern Kingbird		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
Missouri	2006	0.020585	0.732289	0.016-0.067	0.011453	0.981748	0.010-0.068	-0.009132	(-2.410-2.391)	-0.443629
	2007	0.240609	0.218799	0.084-0.130	0.142713	0.282747	0.061-0.106	-0.097896	(-0.799-0.603)	-0.406867
Nebraska	2007	0.422913	0.293606	0.189-0.343	0.837917	0.264851	0.347-0.593	0.415004	(-0.360-1.190)	0.981300
North Carolina	2007	0.204736	0.335283	0.099-0.192	0.082785	0.502000	0.052-0.140	-0.121951	(-1.305-1.061)	-0.595651
Ohio	2006	0.004558	0.494983	0.003-0.008	0.003672	0.500862	0.002-0.006	-0.000886	(-1.381-1.379)	-0.194432
	2007	0.042274	0.697458	0.032-0.125	0.041570	0.702132	0.031-0.124	-0.000705	(-1.941-1.939)	-0.016669
South Carolina	2006	0.207160	0.073810	0.107-0.219	0.561035	0.142100	0.225-0.376	0.353874	(0.040-0.668)	1.708213
	2007	0.266800	0.317377	0.126-0.240	0.362086	0.286237	0.159-0.283	0.095286	(-0.742-0.933)	0.357143
Tennessee	2006	0.062714	0.043490	0.047-0.185	0.139414	0.076800	0.093-0.276	0.076700	(-0.096-0.250)	1.223027
	2007	0.387134	0.423735	0.221-0.515	0.265531	0.436541	0.155-0.370	-0.121602	(-1.314-1.071)	-0.314109
Texas	2007	0.001157	0.667131	0.001-0.003	0.004629	0.595204	0.003-0.010	0.003472	(-1.749-1.756)	3.000000

Appendix A (continued) . BCR and state-level density (males/ha) or relative abundance (mean no. males/point) estimates, standard error, 95% bootstrap confidence intervals (B=1000), simple effect size, 95% confidence intervals for effect size, and relative effect size for species of interest on surveyed CP33 fields and control fields during the 2006 and 2007 breeding season.

Density (# males/ha)										
Grasshopper Sparrow		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
19-CMP	2006-2007	0.349920	0.115110	0.205-0.507	0.579170	0.198610	0.368-0.802	0.229250	(-0.221-0.679)	0.655150
22-ETP	2006-2007	0.099471	0.016730	0.070-0.133	0.082690	0.014550	0.059-0.108	-0.016781	(-0.060-0.027)	-0.168702
24-CH	2006-2007	0.113390	0.040035	0.055-0.181	0.142780	0.053676	0.076-0.223	0.029390	(-0.102-0.161)	0.259194
Program-wide	2006-2007	0.112110	0.014337	0.090-0.140	0.114010	0.015831	0.090-0.137	0.001900	(-0.040-0.044)	0.016948
Relative Abundance (mean # males/point)										
Arkansas	2007	0.009655	0.633090	0.007-0.025	0.019310	0.599639	0.014-0.046	0.009655	(-1.699-1.719)	1.000000
Illinois	2006	0.276505	0.089400	0.133-0.256	0.150821	0.064040	0.087-0.206	-0.125684	(-0.341-0.090)	-0.454545
	2007	0.116565	0.463796	0.071-0.181	0.163191	0.397447	0.091-0.201	0.046626	(-1.151-1.244)	0.400000
Indiana	2006	0.280562	0.113900	0.155-0.347	0.195723	0.091130	0.118-0.297	-0.084840	(-0.31-0.201)	-0.302391
	2007	0.092105	0.650046	0.067-0.242	0.171053	0.480568	0.105-0.272	0.078947	(-1.506-1.663)	0.857143
Iowa	2006	0.098685	0.051120	0.064-0.183	0.234377	0.082400	0.119-0.244	0.135692	(-0.054-0.326)	1.375000
	2007	0.099934	0.575968	0.069-0.218	0.084035	0.614059	0.060-0.204	-0.015898	(-1.666-1.634)	-0.159088
Kentucky	2006	0.007881	1.193274	0.007-0.075	0.039404	0.644454	0.028-0.101	0.031523	(-2.627-2.690)	4.000000
	2007	0.028661	0.407287	0.016-0.035	0.033104	0.403345	0.018-0.040	0.004443	(-1.119-1.128)	0.155015
Mississippi	2006	0.008514	0.565937	0.006-0.018	0.003402	0.596860	0.002-0.008	-0.005112	(-1.617-1.607)	-0.600434
Missouri	2006	0.094017	0.332900	0.045-0.087	0.034188	0.552052	0.023-0.067	-0.059829	(-1.323-1.204)	-0.636364
	2007	0.078949	0.259773	0.032-0.053	0.046735	0.291401	0.020-0.036	-0.032213	(-0.797-0.733)	-0.408028
Nebraska	2007	0.150086	0.395011	0.083-0.183	0.559364	0.284949	0.245-0.436	0.409279	(-0.545-1.364)	2.726971
North Carolina	2007	0.224877	0.391507	0.121-0.262	0.127316	0.498919	0.080-0.213	-0.097561	(-1.341-1.146)	-0.433842

Appendix A (continued) . BCR and state-level density (males/ha) or relative abundance (mean no. males/point) estimates, standard error, 95% bootstrap confidence intervals (B=1000), simple effect size, 95% confidence intervals for effect size, and relative effect size for species of interest on surveyed CP33 fields and control fields during the 2006 and 2007 breeding season.

Density (# males/ha)										
Grasshopper Sparrow		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
Ohio	2006	0.194444	0.060010	0.090-0.167	0.124242	0.047530	0.067-0.143	-0.070202	(-0.220-0.080)	-0.361039
	2007	0.023099	0.389070	0.012-0.027	0.014046	0.407283	0.008-0.017	-0.009053	(-1.113-1.095)	-0.391927
Tennessee	2007	0.002432	0.843615	0.002-0.011	0.002432	0.843615	0.002-0.011	0.000000	(-2.338-2.338)	0.000000
Texas	2006	0.209677	0.082240	0.116-0.257	0.193548	0.079020	0.110-0.252	-0.016129	(-0.240-0.207)	-0.076923
	2007	0.085092	0.441720	0.050-0.118	0.143952	0.381295	0.076-0.161	0.058861	(-1.085-1.203)	0.691735

Density (# males/ha)										
Vesper Sparrow		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
IA, IL, IN, OH	2006-2007	0.041715	0.010703	0.024-0.063	0.052382	0.011496	0.035-0.072	0.010667	(-0.020-0.042)	0.255711

Density (# males/ha)										
Painted Bunting		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
AR, MS, SC, TX	2006-2007	0.074755	0.017501	0.048-0.106	0.123310	0.027919	0.085-0.173	0.048555	(-0.016-0.113)	0.649522

Appendix B. BCR and state-level density estimates (coveys/ha), standard error, 95% bootstrap confidence intervals (B=1000), and simple effect size, 95% confidence intervals for effect size, and relative effect size for non-adjusted bobwhite coveys on surveyed CP33 and control fields during the fall of 2006 and 2007, and BCR and state-level density estimates, 95% bootstrap confidence intervals, and simple and relative effect size for bobwhite coveys adjusted for calling rate (includes: number of adjacent calling coveys, % cloud cover, wind speed, and 6-hr change in barometric pressure (Wellendorf et al. 2004).

Density (coveys/ha)										
		Control	SE	95% CI	CP33	SE	95% CI	Effect Size	95% CI (ES)	Relative ES
19-CMP	2006	0.311720	0.078148	0.192-0.507	0.362080	0.095155	0.218-0.602	0.050360	(-0.191-0.292)	0.161555
	2007	0.337900	0.104445	0.186-0.615	0.377850	0.122046	0.203-0.705	0.039950	(-0.275-0.355)	0.118230
	2006-2007	0.317240	0.036184	0.296-0.395	0.373950	0.037198	0.354-0.456	0.056710	(-0.045-0.158)	0.178761
22-ETP	2006	0.017136	0.003893	0.011-0.027	0.029763	0.006351	0.020-0.045	0.012627	(-0.002-0.027)	0.736870
	2007	0.018346	0.004498	0.011-0.030	0.025661	0.004550	0.018-0.036	0.007315	(-0.005-0.020)	0.398725
	2006-2007	0.017896	0.002154	0.014-0.020	0.026159	0.002670	0.021-0.029	0.008263	(0.002-0.015)	0.461723
24-CH	2006	0.033291	0.008076	0.021-0.053	0.030714	0.007467	0.019-0.049	-0.002577	(-0.024-0.019)	-0.077408
	2007	0.018643	0.007114	0.009-0.039	0.048583	0.015143	0.027-0.089	0.029940	(-0.003-0.063)	1.605965
	2006-2007	0.026776	0.003952	0.019-0.031	0.038296	0.005376	0.031-0.045	0.011520	(-0.002-0.0250	0.430236
26-MAV	2006-2007	0.015522	0.006283	0.011-0.027	0.024391	0.005498	0.016-0.032	0.008869	(-0.008-0.025)	0.571383
27-SCP	2006	0.016071	0.003143	0.011-0.024	0.036992	0.006818	0.026-0.053	0.020921	(0.006-0.036)	1.301786
	2007	0.014732	0.003206	0.010-0.023	0.064295	0.012936	0.043-0.095	0.049563	(0.023-0.076)	3.364309
	2006-2007	0.012787	0.001415	0.011-0.015	0.042848	0.003817	0.038-0.049	0.030061	(0.022-0.038)	2.350903
Program-wide	2006	0.028611	0.004606	0.021-0.039	0.045102	0.006404	0.034-0.060	0.016491	(0.001-0.032)	0.576387
	2007	0.030464	0.006580	0.020-0.046	0.059561	0.010888	0.042-0.085	0.029097	(0.004-0.054)	0.955127
	2006-2007	0.028261	0.001851	0.026-0.031	0.050670	0.002691	0.047-0.054	0.022409	(0.016-0.0290	0.792930

Appendix B (continued). BCR and state-level density estimates (coveys/ha), standard error, 95% bootstrap confidence intervals (B=1000), and simple effect size, 95% confidence intervals for effect size, and relative effect size for non-adjusted bobwhite coveys on surveyed CP33 and control fields during the fall of 2006 and 2007, and BCR and state-level density estimates, 95% bootstrap confidence intervals, and simple and relative effect size for bobwhite coveys adjusted for calling rate (includes: number of adjacent calling coveys, % cloud cover, wind speed, and 6-hr change in barometric pressure (Wellendorf et al. 2004).

Density (coveys/ha)										
		Control	SE	95% CI	CP33	SE	95% CI	Effect Size	95% CI (ES)	Relative ES
Arkansas	2006	0.011166	0.007928	0.002-0.024	0.005384	0.002220	0.002-0.011	-0.005783	(-0.022-0.010)	-0.517867
	2007	0.026925	0.021951	0.007-0.054	0.028018	0.014001	0.007-0.051	0.001093	(-0.050-0.052)	0.040594
	2006-2007	0.016486	0.008029	0.010-0.035	0.043204	0.016096	0.019-0.066	0.026718	(-0.009-0.062)	1.620648
Georgia	2006	0.032155	0.008116	0.024-0.052	0.061364	0.013337	0.045-0.094	0.029209	(-0.001-0.060)	0.908381
	2007	0.018066	0.005538	0.011-0.026	0.085792	0.018283	0.060-0.113	0.067726	(0.030-0.105)	3.748810
	2006-2007	0.022814	0.004373	0.015-0.027	0.078296	0.011693	0.058-0.089	0.055482	(0.031-0.080)	2.431928
Illinois	2006	0.026286	0.010383	0.011-0.041	0.028855	0.009311	0.015-0.048	0.002569	(-0.025-0.030)	0.097733
	2007	0.011534	0.004852	0.005-0.019	0.030663	0.007859	0.020-0.042	0.019129	(0.001-0.0370	1.658488
	2006-2007	0.016539	0.004688	0.010-0.023	0.021431	0.004162	0.012-0.024	0.004892	(-0.007-0.017)	0.295786
Indiana	2006	0.015354	0.006100	0.009-0.031	0.020612	0.006475	0.011-0.034	0.005258	(-0.012-0.023)	0.342451
	2007	0.007465	0.003214	0.003-0.013	0.025661	0.009015	0.013-0.040	0.018196	(-0.001-0.037)	2.437508
	2006-2007	0.009954	0.002757	0.005-0.012	0.014240	0.003187	0.010-0.019	0.004286	(-0.004-0.0130	0.430638

Appendix B (continued). BCR and state-level density estimates (coveys/ha), standard error, 95% bootstrap confidence intervals (B=1000), and simple effect size, 95% confidence intervals for effect size, and relative effect size for non-adjusted bobwhite coveys on surveyed CP33 and control fields during the fall of 2006 and 2007, and BCR and state-level density estimates, 95% bootstrap confidence intervals, and simple and relative effect size for bobwhite coveys adjusted for calling rate (includes: number of adjacent calling coveys, % cloud cover, wind speed, and 6-hr change in barometric pressure (Wellendorf et al. 2004).

Density (coveys/ha)										
State	**Year**	**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
Iowa	2006	0.012114	0.005405	0.004-0.022	0.014826	0.006482	0.007-0.032	0.002712	(-0.014-0.019)	0.223873
	2007	0.012913	0.007644	0.004-0.023	0.041857	0.016870	0.021-0.065	0.028944	(-0.007-0.065)	2.241462
	2006-2007	0.013794	0.004992	0.007-0.020	0.033008	0.009942	0.020-0.043	0.019214	(-0.003-0.0410	1.392924
Kentucky	2006	0.026928	0.006686	0.018-0.042	0.011461	0.002907	0.007-0.020	-0.015467	(-0.030--0.001)	-0.574384
	2007	0.010050	0.003301	0.005-0.016	0.053967	0.011578	0.041-0.069	0.043917	(0.020-0.068)	4.369851
	2006-2007	0.015695	0.003088	0.009-0.017	0.024331	0.004244	0.018-0.030	0.008636	(-0.002-0.019)	0.550239
Mississippi	2006	0.013241	0.003684	0.007-0.020	0.046299	0.008192	0.036-0.061	0.033058	(0.015-0.051)	2.496639
	2007	0.028098	0.010463	0.014-0.045	0.044209	0.012102	0.029-0.063	0.016111	(-0.015-0.048)	0.573386
	2006-2007	0.018951	0.004319	0.013-0.025	0.036892	0.005788	0.029-0.044	0.017941	(0.004-0.032)	0.946705
Missouri	2006	0.041281	0.005799	0.037-0.062	0.048303	0.006104	0.044-0.070	0.007022	(-0.010-0.024)	0.170102
	2007	0.046218	0.008127	0.035-0.058	0.070297	0.011802	0.055-0.088	0.024079	(-0.004-0.052)	0.520987
	2006-2007	0.046993	0.005273	0.036-0.050	0.034803	0.003481	0.029-0.039	-0.012190	(-0.025-0.0002)	-0.259400
North Carolina	2006	0.005926	0.001946	0.003-0.010	0.017100	0.004614	0.011-0.025	0.011174	(0.001-0.021)	1.885735
	2007	0.006962	0.003441	0.004-0.011	0.033922	0.011828	0.018-0.050	0.026960	(0.003-0.051)	3.872660
	2006-2007	0.007049	0.001980	0.005-0.010	0.016334	0.003694	0.012-0.021	0.009285	(0.001-0.018)	1.317110

Appendix B (continued). BCR and state-level density estimates (coveys/ha), standard error, 95% bootstrap confidence intervals (B=1000), and simple effect size, 95% confidence intervals for effect size, and relative effect size for non-adjusted bobwhite coveys on surveyed CP33 and control fields during the fall of 2006 and 2007, and BCR and state-level density estimates, 95% bootstrap confidence intervals, and simple and relative effect size for bobwhite coveys adjusted for calling rate (includes: number of adjacent calling coveys, % cloud cover, wind speed, and 6-hr change in barometric pressure (Wellendorf et al. 2004).

Density (coveys/ha)										
State	**Year**	**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
Ohio	2006	0.003791	0.001551	0.002-0.009	0.003707	0.001543	0.002-0.008	-0.000084	(-0.004-0.004)	-0.022156
	2007	0.005239	0.002868	0.002-0.009	0.002770	0.001507	0.001-0.005	-0.002469	(-0.009-0.004)	-0.471236
	2006-2007	0.004002	0.001182	0.001-0.004	0.001376	0.000350	0.001-0.004	-0.002626	(-0.005--0.0002)	-0.656063
South Carolina	2006	0.014594	0.007265	0.005-0.030	0.052367	0.015179	0.028-0.080	0.037773	(0.005-0.071)	2.588255
	2007	0.024983	0.008407	0.015-0.037	0.110680	0.029597	0.074-0.148	0.085697	(0.025-0.146)	3.430213
	2006-2007	0.020119	0.005600	0.012-0.027	0.096453	0.020325	0.072-0.121	0.076334	(0.035-0.118)	3.794125
Tennessee	2006	0.008632	0.004018	0.003-0.016	0.018136	0.005539	0.016-0.038	0.009505	(-0.004-0.023)	1.101141
	2007	0.004927	0.002481	0.002-0.009	0.027782	0.009367	0.017-0.039	0.022855	(0.004-0.042)	4.638382
	2006-2007	0.006570	0.002208	0.003-0.008	0.018920	0.004566	0.014-0.025	0.012351	(0.002-0.022)	1.879976
Texas	2006	0.199250	0.030597	0.157-0.253	0.219930	0.028016	0.191-0.281	0.020680	(-0.061-0.102)	0.103789
	2007	0.252880	0.041155	0.202-0.304	0.253760	0.037894	0.204-0.301	0.000880	(-0.109-0.111)	0.003480
	2006-2007	0.220770	0.025057	0.186-0.249	0.312560	0.031779	0.267-0.343	0.091790	(0.013-0.171)	0.415772

Appendix B (continued). BCR and state-level density estimates (coveys/ha), standard error, 95% bootstrap confidence intervals (B=1000), and simple effect size, 95% confidence intervals for effect size, and relative effect size for non-adjusted bobwhite coveys on surveyed CP33 and control fields during the fall of 2006 and 2007, and BCR and state-level density estimates, 95% bootstrap confidence intervals, and simple and relative effect size for bobwhite coveys adjusted for calling rate (includes: number of adjacent calling coveys, % cloud cover, wind speed, and 6-hr change in barometric pressure (Wellendorf et al. 2004).

Calling Rate Adjusted Density (# coveys/ha)							
State	**Year**	**Control**	**95% CI**	**CP33**	**95% CI**	**Effect Size**	**Relative ES**
19-CMP	2006	0.589022	0.475-0.715	0.680343	0.570-0.796	0.091321	0.155039
	2007	0.538182	0.432-0.6542	0.593073	0.490-0.695	0.054890	0.101992
	2006-2007	0.624647	0.538-0.717	0.720034	0.638-0.809	0.095387	0.152705
22-ETP	2006	0.029088	0.018-0.045	0.043366	0.036-0.052	0.014279	0.490890
	2007	0.039309	0.024-0.060	0.040204	0.033-0.048	0.000895	0.022774
	2006-2007	0.031122	0.007-0.009	0.038560	0.033-0.044	0.007437	0.238964
24-CH	2006	0.050943	0.040-0.062	0.047866	0.036-0.060	-0.003077	-0.060401
	2007	0.030380	0.021-0.040	0.081620	0.064-0.100	0.051239	1.686591
	2006-2007	0.039258	0.031-0.047	0.060303	0.050-0.070	0.021045	0.536062
26-MAV	2006-2007	0.033781	0.020-0.049	0.037332	0.026-0.048	0.003550	0.105103
27-SCP	2006	0.041784	0.028-0.061	0.066196	0.056-0.078	0.024412	0.584252
	2007	0.025727	0.021-0.031	0.101913	0.086-0.118	0.076187	2.961396
	2006-2007	0.025336	0.020-0.033	0.067872	0.061-0.076	0.042536	1.678884
Program-wide	2006	0.051247	0.044-0.060	0.073468	0.066-0.081	0.022221	0.433602
	2007	0.056152	0.046-0.067	0.095463	0.086-0.105	0.039310	0.700065
	2006-2007	0.051872	0.046-0.059	0.081438	0.076-0.087	0.029566	0.569981
Arkansas	2006	0.012401	0.005-0.021	0.020826	0.004-0.043	0.008424	0.679308
	2007	0.049291	0.013-0.099	0.041425	0.014-0.076	-0.007866	-0.159574
	2006-2007	0.037927	0.018-0.061	0.067868	0.036-0.103	0.029941	0.789421
Georgia	2006	0.089680	0.062-0.117	0.056701	0.037-0.078	-0.032979	-0.367739
	2007	0.027712	0.017-0.039	0.115329	0.088-0.145	0.087616	3.161660
	2006-2007	0.032242	0.024-0.041	0.098298	0.081-0.117	0.066055	2.048705
Illinois	2006	0.047336	0.027-0.070	0.047068	0.022-0.075	-0.000268	-0.005668
	2007	0.023909	0.011-0.038	0.048743	0.033-0.065	0.024834	1.038693
	2006-2007	0.030289	0.019-0.042	0.028510	0.021-0.037	-0.001779	-0.058741
Indiana	2006	0.066297	0.032-0.110	0.063309	0.024-0.114	-0.002988	-0.045073
	2007	0.013423	0.007-0.022	0.038037	0.021-0.057	0.024614	1.833658
	2006-2007	0.014479	0.009-0.021	0.020915	0.015-0.027	0.006437	0.444566
Iowa	2006	0.029644	0.012-0.051	0.021619	0.008-0.038	-0.008025	-0.270712
	2007	0.020927	0.007-0.038	0.068545	0.037-0.103	0.047618	2.275448
	2006-2007	0.023799	0.014-0.035	0.051613	0.034-0.071	0.027814	1.168729

Appendix B (continued). BCR and state-level density estimates (coveys/ha), standard error, 95% bootstrap confidence intervals (B=1000), and simple effect size, 95% confidence intervals for effect size, and relative effect size for non-adjusted bobwhite coveys on surveyed CP33 and control fields during the fall of 2006 and 2007, and BCR and state-level density estimates, 95% bootstrap confidence intervals, and simple and relative effect size for bobwhite coveys adjusted for calling rate (includes: number of adjacent calling coveys, % cloud cover, wind speed, and 6-hr change in barometric pressure (Wellendorf et al. 2004).

Calling Rate Adjusted Density (# coveys/ha)							
		Control	95% CI	CP33	95% CI	Effect Size	Relative ES
Kentucky	2006	0.020119	0.012-0.029	0.047689	0.030-0.066	0.027570	1.370369
	2007	0.001572	0.001-0.002	0.093620	0.072-0.115	0.092049	58.557845
	2006-2007	0.021996	0.016-0.028	0.039470	0.032-0.049	0.017474	0.794414
Mississippi	2006	0.077783	0.060-0.096	0.022294	0.013-0.033	-0.055489	-0.713384
	2007	0.044292	0.024-0.069	0.069572	0.046-0.096	0.025280	0.570744
	2006-2007	0.030131	0.021-0.040	0.057725	0.047-0.069	0.027594	0.915831
Missouri	2006	0.078528	0.063-0.095	0.066599	0.052-0.081	-0.011930	-0.151916
	2007	0.092851	0.058-0.142	0.108470	0.088-0.130	0.015619	0.168213
	2006-2007	0.072482	0.055-0.095	0.049438	0.043-0.056	-0.023044	-0.317931
North Carolina	2006	0.030653	0.019-0.044	0.011357	0.006-0.018	-0.019296	-0.629503
	2007	0.014919	0.007-0.023	0.059249	0.035-0.084	0.044330	2.971403
	2006-2007	0.013702	0.009-0.019	0.028963	0.022-0.037	0.015261	1.113800
Ohio	2006	0.011129	0.005-0.018	0.009669	0.004-0.016	-0.001460	-0.131203
	2007	0.009335	0.004-0.017	0.005089	0.002-0.009	-0.004246	-0.454833
	2006-2007	0.004767	0.003-0.007	0.002035	0.001-0.003	-0.002732	-0.573067
South Carolina	2006	0.087684	0.044-0.140	0.027214	0.009-0.050	-0.060471	-0.689640
	2007	0.049746	0.030-0.072	0.210077	0.140-0.289	0.160331	3.223012
	2006-2007	0.066754	0.028-0.125	0.172504	0.128-0.223	0.105750	1.584176
Tennessee	2006	0.049898	0.032-0.069	0.015576	0.005-0.030	-0.034322	-0.687848
	2007	0.008551	0.004-0.014	0.046721	0.028-0.066	0.038169	4.463578
	2006-2007	0.010102	0.005-0.015	0.036178	0.027-0.046	0.026076	2.581175
Texas	2006	0.423342	0.339-0.507	0.380269	0.293-0.480	-0.043073	-0.101744
	2007	0.431069	0.356-0.508	0.426379	0.358-0.495	-0.004690	-0.010879
	2006-2007	0.392995	0.339-0.451	0.542677	0.481-0.610	0.149681	0.380873