Conservation Reserve Program

CP33 - Habitat Buffers for Upland Birds

Bird Monitoring and Evaluation Plan

2006 - 2008 Final Report

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2006–2008 Final Report

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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 at multiple spatial scales.

The FSA adopted the monitoring protocol developed by the SEQSG and encouraged states with CP33 allocation to participate in coordinated monitoring. The CP33 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, enrolled prior to December 31, 2005. CP33 contracts within the sample were paired with a similarly cropped non-buffered control field located 1-3 km from each selected CP33 field. Fourteen of the 20 priority states elected to participate in monitoring. Breeding season point-transect monitoring was conducted in 11 states in 2006 and 14 states in 2007 and 2008 on at least 40 paired CP33/control fields in each state. Monitoring continued in the fall of 2006-2008 with bobwhite covey call surveys in 13 states. Vegetation surveys were also conducted in each participating state during the 2007 and/or 2008 growing season to evaluate vegetation establishment, vegetation structure, buffer width, non-compliant disturbance, and mid-contract management on CP33 buffers. Comparative abundances of breeding season bobwhite and other priority bird species, and fall bobwhite coveys on CP33 and control fields were estimated annually from 2006-2008 using a 3-tiered approach (across bobwhite range (overall), within each Bird Conservation Region (BCR), and within each state).

Final analysis based on the 3-year data set altered most of the previously reported preliminary estimates of density and effect size for species of interest; however the same pattern of response was generally observed for each species in each region. Over the first 3 years of monitoring, breeding season bobwhite densities were more than 70% (2006 = 74%, 2007 = 70%, 2008 = 73%) greater on CP33 fields than control fields. However, the effect of CP33 in the landscape varied substantially among regions and years, with the greatest breeding season effect observed in the Eastern Tallgrass Prairie (BCR 22) and Southeastern Coastal Plain (BCR 27). Unlike the breeding season, the magnitude of effect on fall covey densities increased from 2006-2008. Fall bobwhite covey densities were 50%, 70%, and 110%

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

Bobwhite Quail

Eastern Meadowlark

Indigo Bunting

greater in 2006, 2007, and 2008, respectively on CP33 fields than control fields. Again, covey response varied by region and year, with the greatest response observed in the Central Hardwoods (BCR 24), the Mississippi Alluvial Valley (BCR 26), and Southeastern Coastal Plain. However covey densities in all BCR's in all years were substantively greater on CP33 than control fields.

We observed an overall increasing effect for dickcissel (*Spiza americana*) from 2006-2008. Similarly, we observed an increase in effect size for field sparrow (*Spizella pusilla*) from 2006-2007, however, this was followed by a decrease in densities on both control and CP33 fields from 2007-2008. Indigo bunting (*Passerina cyanea*) exhibited a generally greater density on CP33 fields than control, but the magnitude of effect declined from 2006-2008. Eastern meadowlark (*Sturnella magna*) exhibited stochastic variation in response, with an overall reversal from greater densities on control fields in 2006 to greater densities on CP33 fields in 2007, and nearly identical densities in 2008. Painted bunting (*Passerina ciris*) exhibited 133% greater densities on CP33 than control fields in 2006, but no difference in 2007 and 2008. 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 in 2006 and 2008, but no response in 2007.

The CP33 monitoring program affords a rare opportunity to evaluate populations of grassland avifauna at a large geographic scale, and has shown that the establishment of CP33 upland habitat buffers in agricultural landscapes provides essential habitat and produces a positive and immediate response by populations of bobwhite and several priority songbird species. Moreover, the observed response validates an underlying assumption of the Northern Bobwhite Conservation Initiative (NBCI), that a relatively small (5-15%) change in primary land use in agricultural landscapes can affect measurable and substantive population response. 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 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 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.

The Northern Bobwhite Conservation Initiative (NBCI; Dimmick et al. 2002) provides a framework for bobwhite population recovery, and suggests that restoration of densities to levels observed in the baseline year of 1980 could be achieved through alteration of primary land use on 6.2% of farm, forest, and rangeland acreage. In response to population recovery goals set by the NBCI, the Southeast Quail Study Group, now the National Bobwhite Technical Committee, 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 designed to provide bobwhite and grassland bird habitat are compatible 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. Economic incentives that encourage establishment of diverse native herbaceous buffers around cropped fields can provide habitat for bobwhite and other early-successional songbirds 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 (Figure 1a).

The FSA required that states receiving a CP33 acreage allocation implement a monitoring program to measure wildlife benefits. FSA requested that the SEQSG develop a monitoring protocol to estimate bobwhite and priority songbird population response to implementation of CP33 across the bobwhite range, and at regional (within Bird Conservation Regions (BCR)) and state levels. Subsequently, the "CP33-Habitat Buffers for Upland Birds Monitoring Protocol" (Burger et al.2006) was developed and a coordinated monitoring program was implemented beginning in the 2006 breeding season.

Methods

Survey Methods

Monitoring began in 2006 and continued through 2008 to evaluate effects of CP33 buffers on bobwhite and priority songbird populations. Breeding season point-transect surveys were conducted on 904 fields (CP33=458; Control=446) in 11 states (6 BCR's) in 2006, on 1151 fields (CP33=581; Control=570) in 14 states (9 BCR's) in 2007, and on 1124 fields (CP33=564; Control=560) in 14 states in 2008 (Figures 1b 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 1011 fields (CP33=507; Control=504) in 2006, 1005 fields (CP33=505; Control=500) in 2007, and 980 fields (CP33=494; Control=486) in 2008 in 13 states annually (Table 1). Control fields were similarly cropped and located 1-3 km from randomly selected CP33 fields in each state. The unbalanced design (among–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 into 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 and fall seasons, paired CP33 and control fields were simultaneously surveyed to ensure similar weather conditions.

Breeding season point-transect surveys of male bobwhites and priority songbird species were conducted May-July 2006-2008 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 2006-2008 (based on geographic location) at the established 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 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

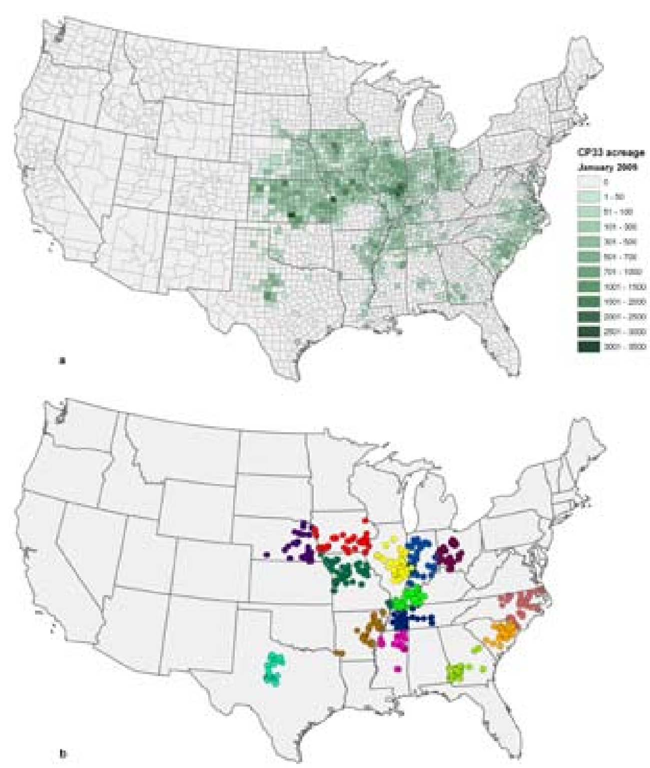


Figure 1. National distribution of CP33 contracts as of January 2009 (Figure 1a), and national distribution of CP33 survey points in 14 states in 2006-2008 (Figure 1b)

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 and/or 2008 growing season (May-August) on all monitored CP33 buffers in each state, including Kansas (Table 1). 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-m^2 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.

Figure 2. Geographic location of Bird Conservation Regions included in the 2006–2008 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).

Data Analysis

Analysis of 2006-2008 breeding season and fall covey data was conducted using a 3-tiered approach, with results generated nationally (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 or coveys/ha) for each species in each region/state to assess annual effect from 2006-2008. 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). Survey points in the Prairie Potholes (BCR 11), Prairie-Hardwood Transition (BCR 23), West Gulf Coastal Plain (BCR 25), and Piedmont (BCR 29) BCR's did not have adequate sample sizes to generate BCR-specific detection functions or density estimates, but were included in overall and state-level analyses.

2006–2008 Breeding Season

Breeding season data were analyzed independently for each priority species using up to 5 distance intervals, matching those in which data were recorded. Using conventional distance sampling (CDS) or multiple-covariate distance sampling (MCDS) in program DISTANCE (Thomas et al. 2006) distances to detected individuals were used to estimate annual stratum-specific (CP33 vs. control) detection functions and subsequently density at multiple scales (overall, regional, and state-level). Since habitat type and vegetation structure may influence the probability of detection of an individual, one of the primary objectives was to evaluate potential differences in detectability on CP33 buffered vs. non-buffered control fields using stratification. The need for stratification by habitat type (CP33 vs. control) and year was evaluated by comparing a pooled detection function (assuming equal detectability across CP33 and control strata for all years) to a fully stratified detection function (assuming independent detection functions for each treatment type within each year), and to a stratified-by-type detection function in which a separate detection function was estimated for each CP33 and control strata (assuming equal detectability across years within each treatment stratum). Because of limited sample size in state-level analyses (generally <75-100 observations per strata per year) it was not possible to test a fully-stratified detection function; therefore pooled, pooled with year as a covariate, stratified-by-type, and stratified-by-type with year as a covariate were compared instead for each species using MCDS where appropriate. Right truncation was applied to all data sets when the detection probability $g(w) < 0.1$.

Model selection via Akaike's Information Criteria (AIC; Akaike 1973) was used to evaluate 3 key function models (uniform, half-normal, hazard rate) within each stratification type and was also used to select the best model of the detection function at each scale (global, fully stratified, stratified by type). When no models competed (ΔAIC>2.0), model selection was based on the minimum AIC value, goodness of fit of the model, and probability density function plots generated for each model (Buckland et al. 2001). If stratified and global detection function models competed (ΔAIC<2.0) and both stratification schemes exhibit quality fit, the one with the lowest AIC was selected (Buckland et al. 2001). Once a model was selected addition of series adjustments to the key function model (half-normal–cosine or hermite polynomial, hazard rate–cosine, uniform–simple polynomial or cosine) was evaluated using AIC (Buckland 1992). If key function models within the selected level of stratification competed (ΔAIC<2.0) and models demonstrated variable density estimates, model uncertainty was accounted for 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. Species-specific density estimates at each spatial scale were compared using simple effect sizes (CP33 density–control) and relative effect sizes (simple effect size/control density). Confidence intervals (95%) were calculated for effect sizes and significance of difference between control and CP33 density was determined by an effect size confidence interval crossing zero.

2006–2008 Fall Covey Counts

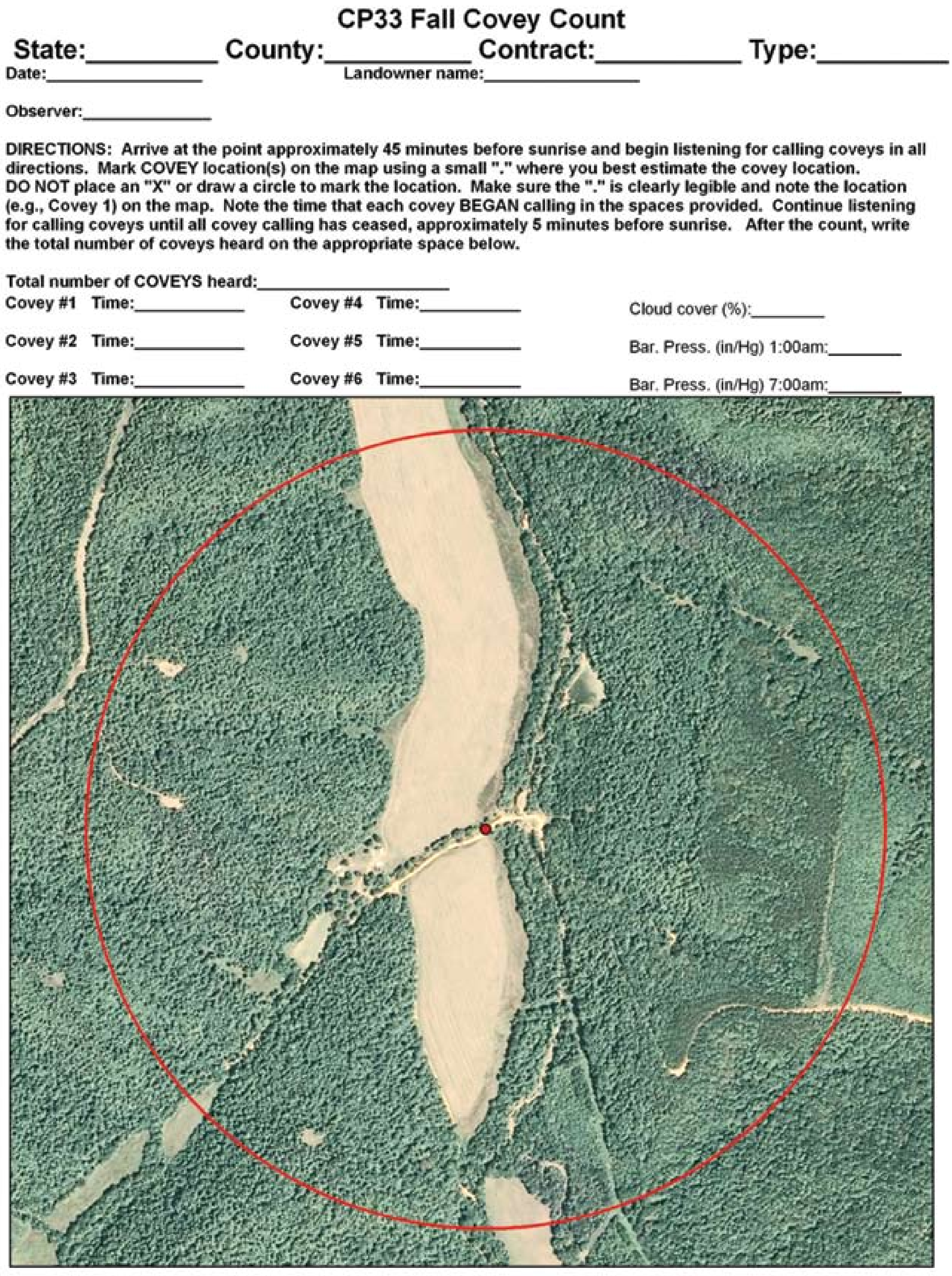
We used CDS and MCDS methods (outlined above) in DISTANCE 5.0 to estimate overall, BCR- and state-level bobwhite covey densities each year. If

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

sample size allowed, 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) in all BCR's and states (except the Central Mixed-grass Prairie (BCR 19)/Texas sites).

Evaluation of stratification regimes and fit of key function models for each spatial scale was identical to breeding season analyses (described above). 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 function and probability density plots generated for each model. Because flushing of coveys was not required by the field protocol, covey density was the only estimable parameter in this data set; therefore extrapolation of covey density to bird density is limited. Densities of coveys at each spatial scale were compared using simple and relative effect sizes. Confidence intervals (95%) were calculated for effect sizes and significance of difference between covey density in control and CP33 strata was determined by an effect size confidence interval crossing zero.

Incorporating Wellendorf et al.'s adjustments.- With a *priori* knowledge that extraneous factors in the environment will influence calling rate (i.e., availability for detection) 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 national, BCR-level, or 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.

2006–2008 Breeding Seasons

Bobwhite

Overall breeding season bobwhite density was consistently greater on CP33 than control fields each year from 2006-2008 (Figures 4 and 25). Overall bobwhite density on control fields was approximately 0.12 males/ha (~0.5 males/10 acres) each year, whereas density on CP33 fields was approximately 0.20 males/ha (~0.8 males/10 acres) (Appendix A). When the 3-year data set was analyzed, overall effect size (D_{CP33}-$D_{Control}$) for bobwhite remained approximately 0.08 males/ha in each year, with relative effect size ((D_{CP33}-$D_{Control}$)/ $D_{Control}$) between 70-74% annually (Appendix A).

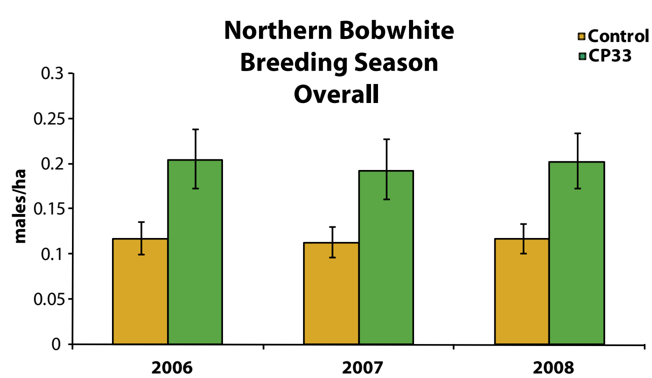


Figure 4. Overall breeding season northern bobwhite density (males/ha) on all surveyed CP33 and control fields from 2006-2008. Error bars represent 95% confidence intervals.

BCR-level bobwhite densities were variable by year and region. The Southeastern Coastal Plain (BCR 27) (includes sites in GA, KY, MS, NC, SC, and TN) experienced a decrease in bobwhite density on CP33 fields and increase on control fields from 2006 to 2007, and a sharp increase on both CP33 and control fields from 2007 to 2008 (Figure 5). Note that sites from NC were not included in the BCR 27 estimate until 2007, which may have affected the 2007 and 2008 density estimate. Effect sizes in BCR 27 in 2007 and 2008 (0.08 males/ha) were nearly half that of 2006 (0.14 males/ha), whereas relative effect size was 244% in 2006, and

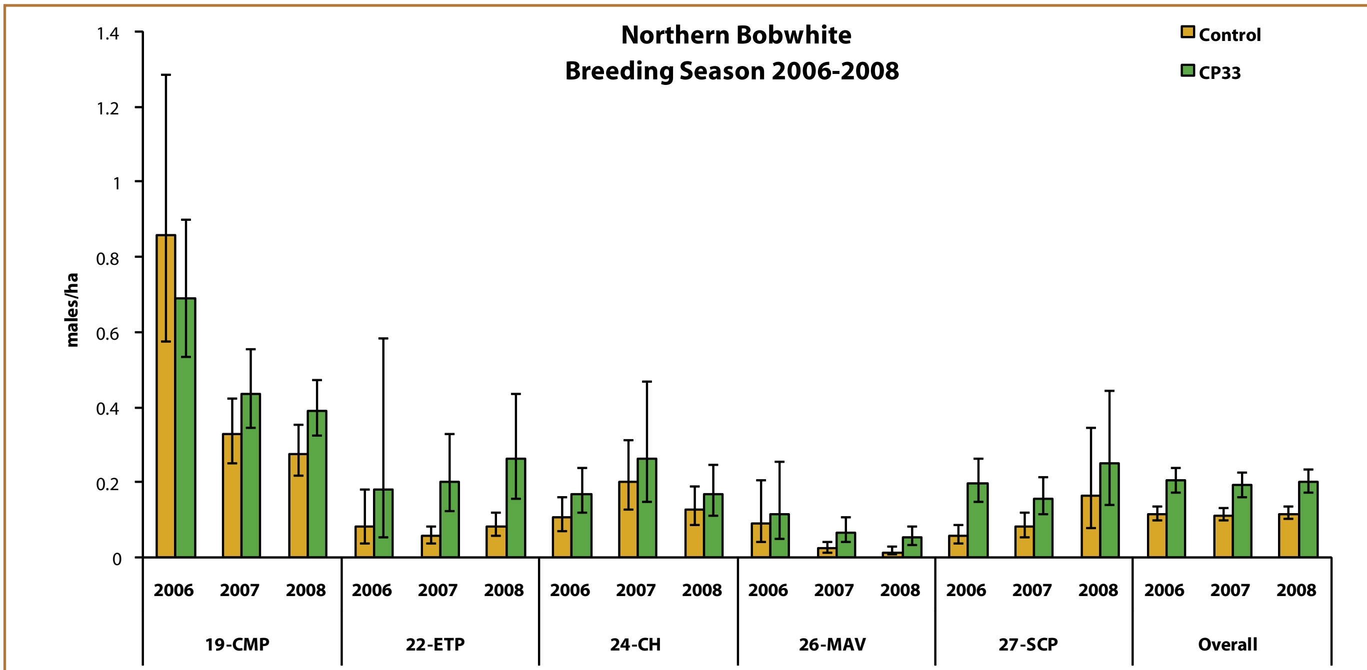


*Figure 5. BCR-level and overall breeding season northern bobwhite density (males/ha) on surveyed CP33 and control fields from 2006-2008. *2006 density estimates for 19-CMP were excluded as sites were only in TX in that year. Small sample size precluded density estimation for BCR's 11, 23, 25, and 29; however data from all BCR's are included in the overall density estimate. Error bars represent 95% confidence intervals.*

decreased to 97% in 2007, and 51% in 2008 (Appendix A). However, although relative effect size decreased annually, bobwhite density was greatest on CP33 fields in 2008 (0.25 males/ha). With the exception of 2007, the decrease in annual effect size observed can be attributed to an increase in density on control fields in the landscape in 2008 (0.17 males/ha). The Eastern Tallgrass Prairie (BCR 22) (includes sites in IA, IL, IN, MO, NE, OH) exhibited an increasing effect size from 2006-2008 for breeding season bobwhite (Figure 5). Although highly variable in 2006, effect size increased from 0.10 to 0.18 males/ha from 2006-2008, with relative effect size of 112%, 256%, 212% in 2006, 2007, and 2008, respectively (Appendix A). Bobwhite density increased on both CP33 and control fields in 2007, then decreased in 2008 in the Central Hardwoods (BCR 24) (includes sites in IN, KY, MO, and TN) (Figure 5). Effect size in BCR 24 was similar in 2006 and 2007 (0.06 males/ha) but decreased to 0.04 males/ha in 2008 (Appendix A). Relative effect size in BCR 24 was 59% in 2006, but decreased to ~31% in both 2007 and 2008 (Appendix A). Bobwhite density decreased slightly on both CP33 and control fields in 2007 and 2008 in the Central Mixed-grass Prairie (BCR 19; includes sites in NE and TX in 2007-2008) (Figure 5). However, effect size (0.11 males/ha) was identical in both years (Appendix A). Relative effect size was greater in 2008 (41%) than 2007 (34%) (Appendix A). We have excluded results from BCR 19 in 2006 as sites in that year only occurred in TX and were not representative of the entire BCR. Previously limited sample size allowed only for estimation of pooled density estimates for the Mississippi Alluvial Valley (BCR 26); however the addition of year 3 data allowed for a year-specific density estimate for CP33 and control strata based on a pooled detection function with year as a covariate. Though densities in BCR 26 were generally lower than all other BCR's on both control and CP33 fields, effect size increased from 2006-2008 (Figure 5). Relative effect sizes were 24%, 177%, and 265% in 2006, 2007, and 2008, respectively; however the greatest bobwhite density observed on CP33 occurred in 2006 (0.11 males/ha) (Appendix A). Note that sites from AR were not included in the BCR 26 estimate until 2007, which may have affected the 2007 and 2008 density estimate.

State-level bobwhite densities and effect sizes were largely variable in all 3 years. Greater bobwhite densities were observed on CP33 than control fields

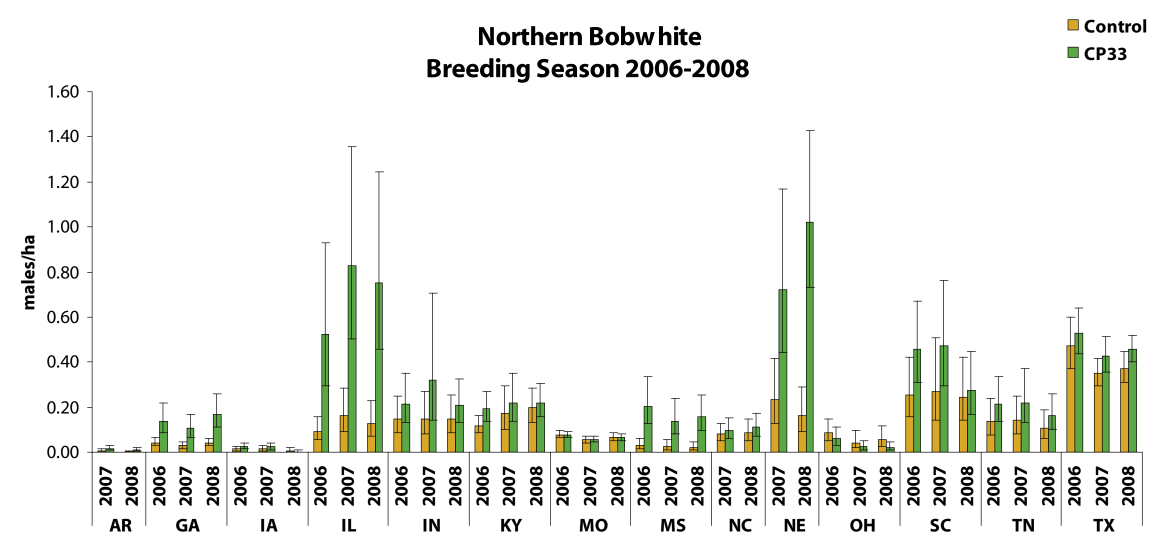


Figure 6. State-level breeding season northern bobwhite density (males/ha) on surveyed CP33 and control fields from 2006-2008. Note: AR, NC, and NE did not initiate breeding season surveys until 2007. All error bars represent 95% confidence intervals.

in 9 out of 11 states (82%) in 2006, 13 out of 14 states (93%) in 2007, and 11 out of 14 states (79%) in 2008 (Figure 6). State-level bobwhite densities ranged from 0.02 [IA] to 0.53 [TX] males/ha on CP33 fields, and from 0.01 [IA] to 0.47 [TX] males/ha on control fields in 2006 (Figure 6, Appendix A). State-level bobwhite densities ranged from 0.02 [AR] to 0.83 [IL] males/ha on CP33 fields, and from 0.01 [AR] to 0.35 [TX] males/ha on control fields in 2007 (Figure 6, Appendix A). State-level bobwhite densities ranged from 0.003 [IA] to 1.02 [IL] males/ha on CP33 fields, and from 0.003 [AR] to 0.37 [TX] males/ha on control fields in 2008 (Figure 6, Appendix A). Bobwhite densities were generally lowest in AR, IA, and OH, whereas densities were greatest in IL and NE (Figure 6). Simple effect sizes ranged from -0.03 [TX] to 0.43 [IL] male/ha in 2006, whereas relative effect sizes ranged from -31% [OH] to 552% [MS] (Appendix A). Simple effect sizes ranged from -0.02 [OH] to 0.67 [IL] males/ha in 2007, whereas relative effect sizes ranged from -39% [OH] to 459% [AR] (Appendix A). Simple effect sizes ranged from -0.03 [OH] to 0.86 [NE] males/ha in 2008, whereas relative effect sizes ranged from -67% [IA] to 611% [MS] (Appendix A).

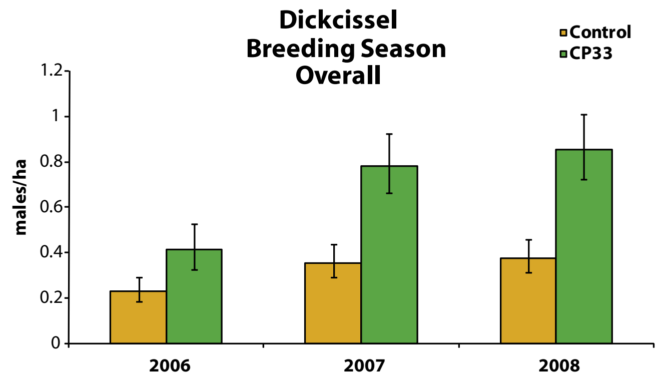


Figure 7. Overall breeding season dickcissel density (males/ha) on all surveyed CP33 and control fields from 2006-2008. Error bars represent 95% confidence intervals. Note: Survey sites in GA, NC, and SC were excluded from analyses as sites in these states are effectively out of the dickcissel range.

Dickcissel

Dickcissel exhibited increasing overall response to CP33 from 2006 to 2008 (Figures 7 and 25). Overall simple effect size was 0.18, 0.43, and 0.48 males/ha in 2006, 2007, and 2008 (Appendix A). Dickcissel density was 80%, 119%, and 127% greater on CP33 than control fields in 2006, 2007, and 2008 (Appendix A). Dickcissel density decreased on both control and CP33 fields in the Southeastern Coastal Plain (BCR 27) from 2006 to 2007, but increased slightly in 2008; however there was a consistent positive response to CP33 in BCR 27 in all 3 years (Figure 8, Appendix A). GA and SC were not included in BCR 27 analyses as they are effectively outside of the dickcissel range. Dickcissel density increased on both control and CP33 fields in the Eastern Tallgrass Prairie (BCR 22) from 2006-2008 (Figure 8); however, simple and relative effect sizes decreased from 2006-2007, followed by an increase in 2008, with densities nearly doubled on CP33 fields compared to control fields in 2006 and 2008 (Figure 8, Appendix A). There was a sharp increase in density on both CP33 and control fields from 2006 to 2007 in the Central Hardwoods (BCR 24), with a subsequent decrease in relative effect size; however, there density increased on CP33 fields and decreased on control fields in 2008, resulting in a 174% relative effect size (Figure 8, Appendix A). Dickcissel in the Central Mixed-grass Prairie (BCR 19) exhibited a slight but variable response to CP33 in 2006, followed by a sharp increase on CP33 fields in 2007, and a decrease on both CP33 and control fields in 2008 (Figure 8, Appendix A). Note that inference is limited in 2006 due to sites in BCR 19 only occurring in TX that year. Relative effect size in 2007 and 2008 was 295% and 236%, respectively, suggesting dickcissel densities were 4 times greater on CP33 fields than control fields in the latter 2 years (Figure 8, Appendix A). Given the limited number of samples in the Mississippi Alluvial Valley (BCR 26), dickcissel density was greater than most other BCR's

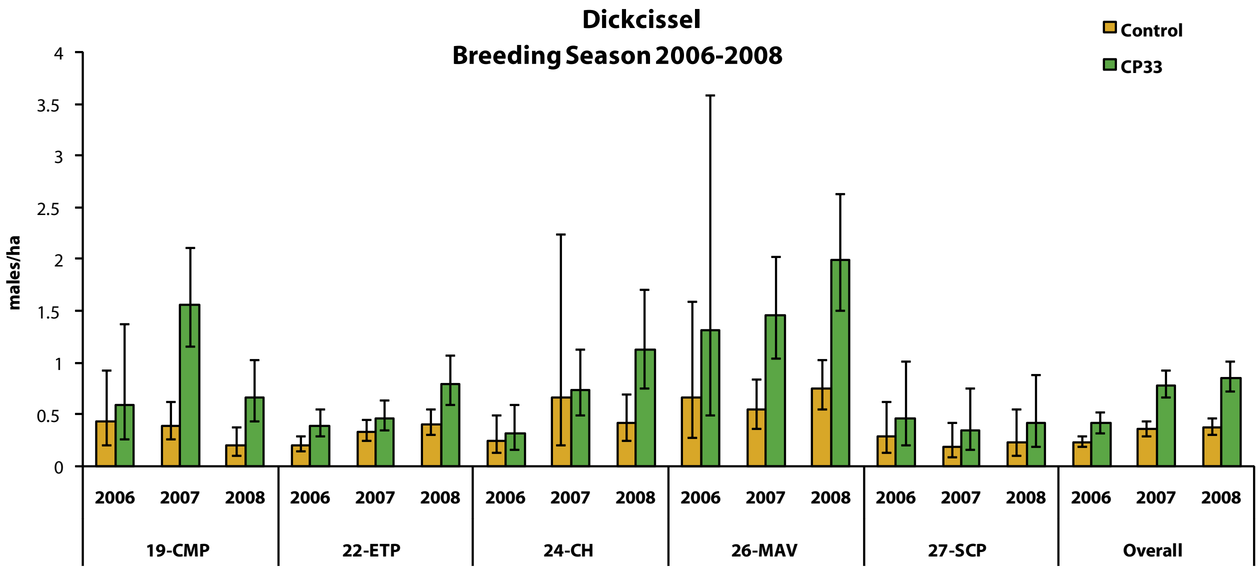


Figure 8. BCR-level and overall breeding season dickcissel density (males/ha) on surveyed CP33 and control fields from 2006-2008. Small sample size precluded density estimation for BCR's 11, 23, and 25; however data from all BCRs are included in the overall density estimate. Survey sites in GA, NC, and SC were excluded from analyses as sites in these states are effectively out of the dickcissel range. Error bars represent 95% confidence intervals.

in all 3 years (Figure 8). Simple effect size increased from 2006-2008 from 0.66 to 1.24 males/ha; however relative effect size increased from 100% in 2006 to 165% in 2007 and 2008 (Figure 8, Appendix A).

Low sample size or limited geographic range disallowed reliable density estimation for dickcissel in GA, NC, OH, SC, and TN. In the remaining 9 states, dickcissel densities ranged from 0.24 [TX] to 1.90 [MS] males/ha on CP33 fields, and from 0.14 [IA] to 0.50 [MO] males/ha on control fields in 2006 (Figure 9, Appendix A). State-level dickcissel densities ranged from 0.24 [IN] to 3.52 [NE] males/ha on CP33 fields and from 0.03 [IN] to 1.74 [NE] males/ha on control fields in 2007 (Figure 9, Appendix A). State-level dickcissel

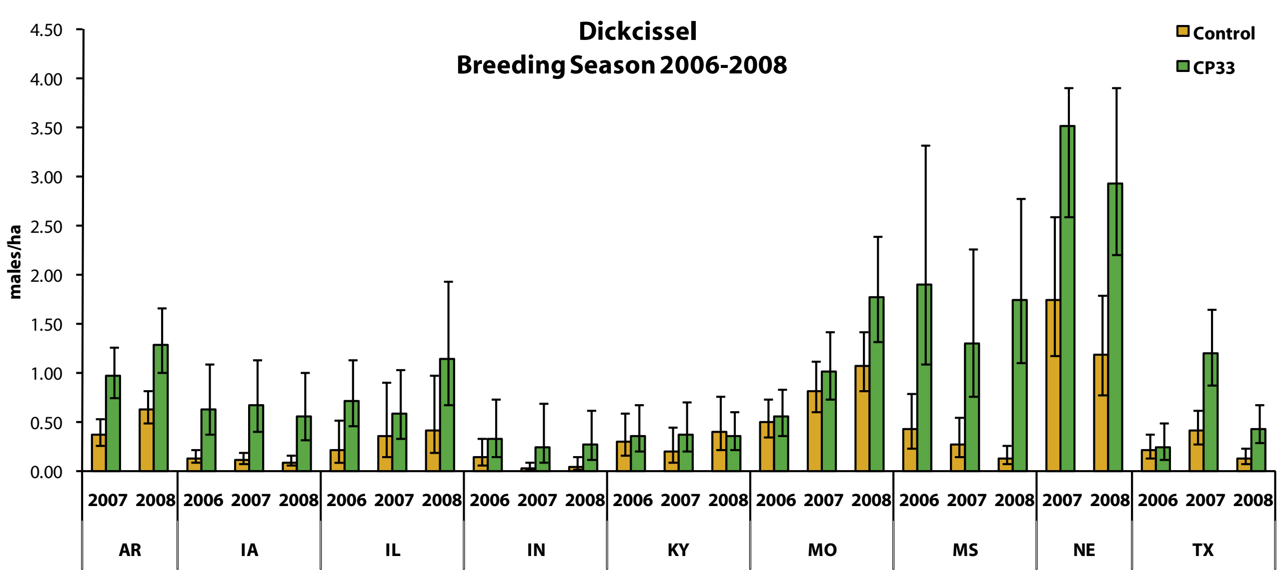


Figure 9. State-level breeding season dickcissel density (males/ha) on surveyed CP33 and control fields from 2006-2008. All error bars represent 95% confidence intervals. Note: Survey sites in GA, NC and SC were excluded from analyses as sites in these states are effectively out of the dickcissel range, and densities for TN were not reported due to small sample size. Note also that AR and NE did not initiate breeding season surveys until 2007.

densities ranged from 0.27 [IN] to 2.93 [NE] males/ha on CP33 fields and from 0.05 [IN] to 1.18 [NE] males/ha on control fields in 2008 (Figure 9, Appendix A). Simple effect size was greatest in IL (1.47 males/ha) and least in TX (0.03 males/ha), whereas relative effect size was greatest in IA (367%) and least in MO (10%) in 2006 (Appendix A). In 2007, simple effect size for dickcissel was greatest in NE (1.79 males/ha) and least in KY (0.18 males/ha), whereas relative effect size was greatest in IN (625%) and least in MO (24%) (Appendix A). In 2008, simple effect size for dickcissel was greatest in NE (1.75 males/ha) and least in KY (-0.04 males/ha), whereas relative effect size was greatest in MS (1229%) and least in KY (-10%) (Appendix A).

Field Sparrow

Field sparrow demonstrated an overall increasing response to CP33 from 2006-2007, followed by a decrease in density on both control and treatment fields and effect size in 2008 (Figures 10 and 25). Overall effect size increased from 0.21 to 0.35 males/ha from 2006-2007, with relative effect size nearly doubling from 94% to 190% (Appendix A). Effect size decreased in 2008 to 0.21 males/ha, with a relative effect size of 158% (Appendix A); however, although density and effect size decreased in 2008 density on CP33 fields was still 2.5 times greater than on control fields, indicating a strong response to CP33 in the landscape. Field sparrow density in the Southeastern Coastal Plain (BCR 27), showed no effect in 2006, with a highly variable control stratum density estimate (Figure 11). In 2007, density decreased sharply on control fields, thus exhibiting a substantial increase in simple (0.25 males/ha) and relative (154%) effect sizes (Appendix A). Field sparrow densities in both CP33 and control strata and effect size then decreased from 2007 to 2008 (Appendix A). Density of field sparrows in the Eastern Tallgrass Prairie (BCR 22) was consistently greater on CP33 fields than control fields

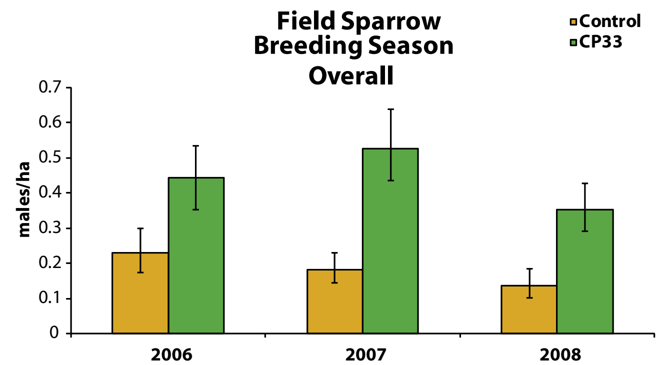


Figure 10. Overall breeding season field sparrow density (males/ha) on all surveyed CP33 and control fields from 2006-2008. Error bars represent 95% confidence intervals. Note: Survey sites in TX were excluded from analyses as sites in this state are effectively out of the field sparrow range.

from 2006-2008 (Figure 11). Decreases in field sparrow densities on control fields from 2006 to 2008 resulted in a steady increase in relative effect size from 191% in 2006 to 311% in 2008 (Appendix A). Field sparrow density increased on both CP33 and control fields in the Central Hardwoods (BCR 24); however, relative effect size decreased from 88% in 2006 to 60% in 2007 (Figure 11, Appendix A). Field sparrow density in both strata decreased in 2008; however relative effect size dropped only slightly to 53% (Figure 11, Appendix A). The Central Mixed Grass Prairie (BCR 19) was out of the effective range for field sparrows and was not included in density estimation. Additionally, low sample size limited the inference for field sparrow in the Mississippi Alluvial Valley (BCR 26) and was therefore excluded from this report.

Low sample size or limited geographic range disallowed density estimation for field sparrow in AR and TX. State-level field sparrow densities ranged from 0.10 [IA] to 0.96 [IL] males/ha on CP33 fields, and from 0.05 [IA] to 0.63 [TN] males/ha on control fields in 2006 (Figure 12, Appendix A). State-level field sparrow densities ranged from 0.09 [MS] to 1.41 [IL] males/ha on CP33 fields, and from 0.03 [IA] to 0.57 [TN] males/ha on control fields in 2007 (Figure 12, Appendix A).

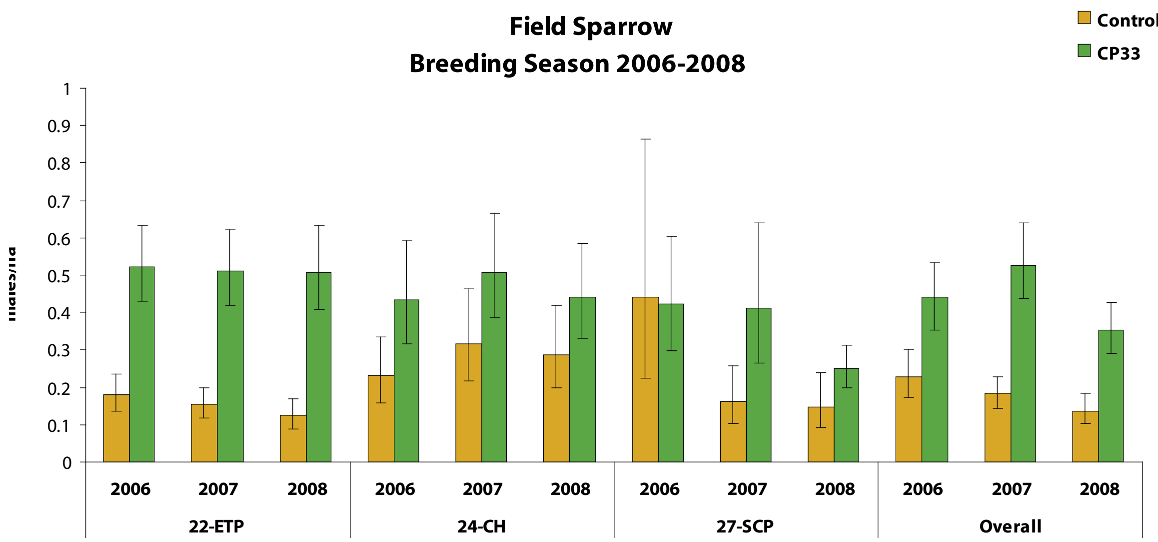


Figure 11. BCR-level and overall breeding season field sparrow density (males/ha) on surveyed CP33 and control fields from 2006-2008. Small sample precluded density estimation for BCR's 11, 23, 25, and 29; however data from all BCR's, except BCR 19 are included in the overall density estimate. BCR 19 was not evaluated as the majority of survey sites are in TX which is effectively out of the field sparrow range. Error bars represent 95% confidence intervals.

State-level field sparrow densities ranged from 0.09 [MS] to 1.41 [IL] males/ha on CP33 fields, and from 0.02 [MS] to 0.51 [TN] males/ha on control fields in 2008 (Figure 12, Appendix A). State-level simple effect size was greatest in IL (0.85 males/ha; 782% relative effect size) and least in MS (0.02 males/ha; 20% relative effect size) in 2006 (Appendix A). State-level simple effect size was greatest in IL (1.23 males/ha; 682% relative effect size) and least in MO and MS (0.03 males/ha; 31%, and 45% relative effect size, respectively) in 2007 (Appendix A). State-level simple effect size was greatest in IL (1.22 males/ha; 622% relative effect size) and least in MO (0.05 males/ha; 40% relative effect size) in 2008 (Appendix A). Field sparrow densities in 8 out

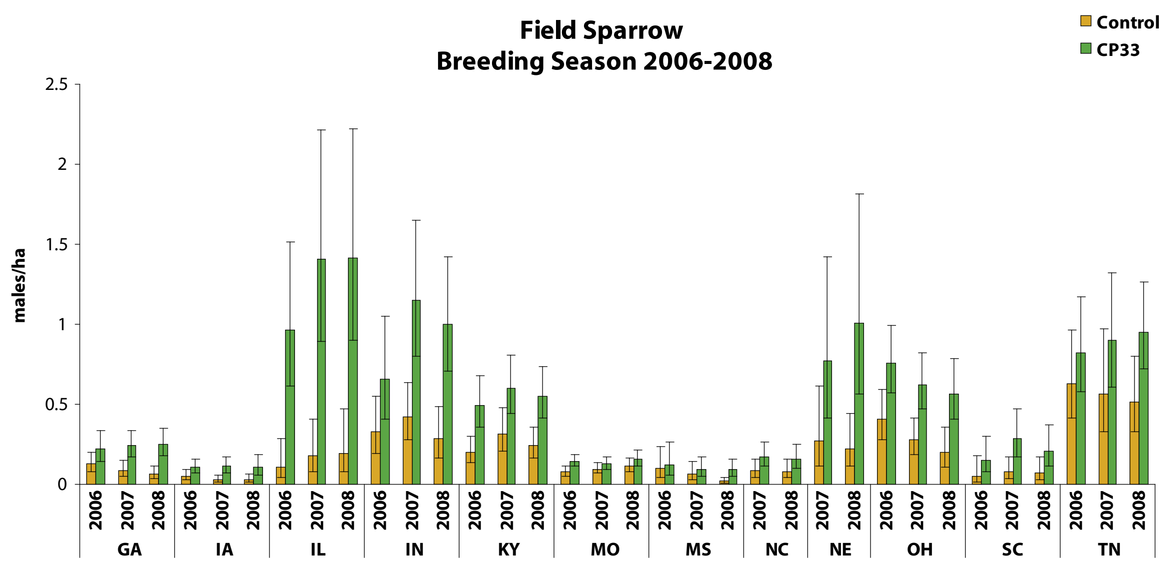


Figure 12. State-level breeding season field sparrow density (males/ha) on surveyed CP33 and control fields from 2006-2008. All error bars represent 95% confidence intervals. Note: Survey sites in TX were excluded from analyses as sites in this state are effectively out of the field sparrow range, and densities for AR were not reported due to small sample size. Note also that NC, and NE did not initiate breeding season surveys until 2007.

of 12 states and 9 out of 12 states were minimally two times greater on CP33 fields than on control fields in 2007 and 2008 (Figure 12, Appendix A).

Indigo Bunting

Overall indigo bunting density was similar on CP33 fields in 2006 and 2007, but decreased in 2008, whereas density increased on control fields from 2006 to 2007, but was constant in 2008 (Figures 13 and 25). This variation in stratum-level density resulted in a decrease in effect size from 0.71 to 0.17 males/ha from 2006-2008 (Figures 13 and 27, Appendix A). Indigo bunting density in the Southeastern Coastal Plain (BCR 27) was greatest on both CP33 and control fields in 2006, followed by a decrease in both strata in 2007, and slight increase in 2008 (Figure 14). Simple effect size decreased from 0.68 to 0.48 males/ha from 2006 to 2008; however relative effect sizes were similar in all 3 years (~30%) (Appendix A). Indigo bunting density in the Eastern Tallgrass Prairie (BCR 22) increased on CP33 fields from 2006 to 2007, but decreased in 2008. Based on simple effect size, density of indigo buntings in BCR 22 was 2 to 2.5 greater on CP33 fields than control fields in 2006 and 2007, but that effect decreased by half in 2008 (Appendix A). Density of indigo buntings in the Central Hardwoods (BCR 24) decreased slightly from 2006-2008 on CP33 fields, whereas density on control fields was constant (Figure 14). Effect size decreased from 0.77 to 0.27 males/ha from 2006 to 2008, corresponding to a decrease in relative effect size from 39% to 13% across the 3 years (Appendix

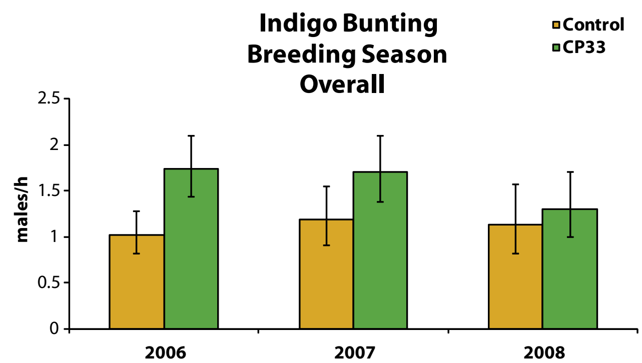


Figure 13. Overall breeding season indigo bunting density (males/ha) on all surveyed CP33 and control fields from 2006-2008. Error bars represent 95% confidence intervals. Note: Survey sites in TX were excluded from analyses as sites in this state are effectively out of the indigo bunting range.

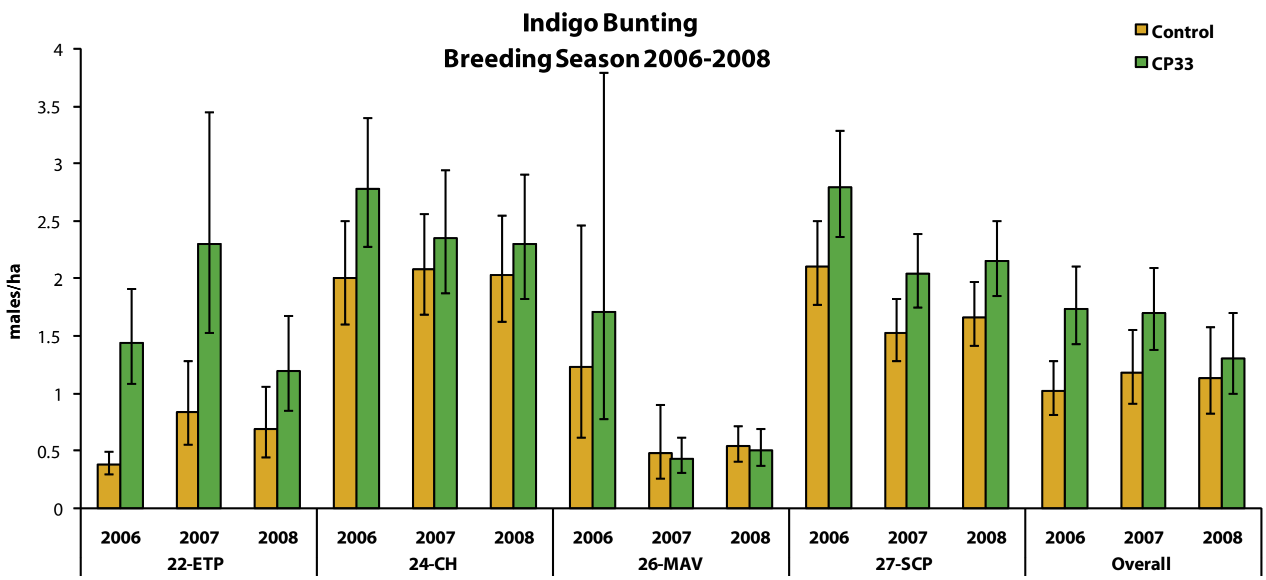


Figure 14. BCR-level and overall breeding season indigo bunting density (males/ha) on surveyed CP33 and control fields from 2006-2008. Small sample size precluded density estimation for BCR's 11, 23, 25, and 29; however data from all BCR's except BCR 19 are included in the overall density estimate. BCR 19 was not evaluated as the majority of survey sites are in TX which is effectively out of the indigo bunting range. Error bars represent 95% confidence intervals.

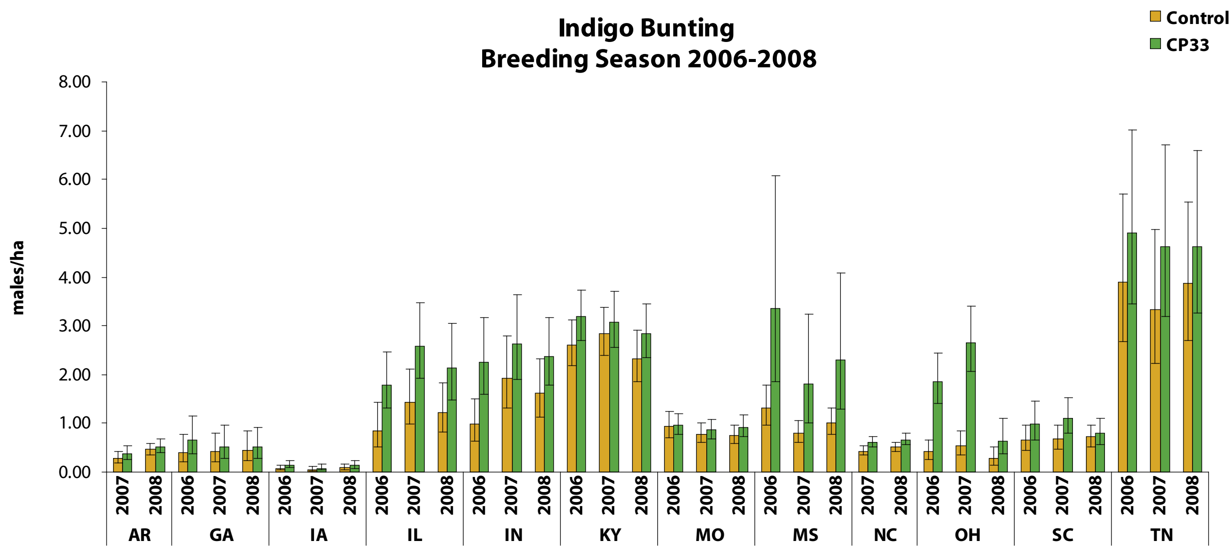


Figure 15. State-level breeding season indigo bunting density (males/ha) on surveyed CP33 and control fields from 2006-2008. All error bars represent 95% confidence intervals. Note: Survey sites in TX were excluded from analyses as sites in this state are effectively out of the indigo bunting range. Small sample size in NE precluded density estimation. AR and NC did not initiate breeding season surveys until 2007.

A). The Mississippi Alluvial Valley (BCR 26) generally contained the lowest densities of indigo buntings on CP33 and control fields compared to other BCR's, and exhibited a substantial (but highly variable) effect in 2006 (39% greater on CP33 than control fields) (Figure 14). However, densities and effect sizes decreased in both strata in 2007 and 2008, with a slightly greater density on control than CP33 fields in 2008 (Figure 14, Appendix A). The Central Mixed-grass Prairie (BCR 19) was out of the effective range for indigo bunting and was not included in density estimation.

State-level indigo bunting densities were variable by state and year, but generally exhibited greater densities on CP33 than control fields (Figure 15). State-level densities ranged from 0.14 [IA] to 4.91 [TN] males/ha on CP33 fields, and from 0. 07 [IA] to 3.90 [TN] males/ha on control fields in 2006 (Figure 15, Appendix A). State-level indigo bunting densities ranged from 0.08 [IA] to 4.63 [TN] males/ha on CP33 fields, and from 0.06 [IA] to 3.34 [TN] males/ha on control fields in 2007 (Figure 15, Appendix A). State-level indigo bunting densities ranged from 0.13 [IA] to 4.63 [TN] males/ha on CP33 fields, and from 0.09 [IA] to 3.87 [TN] males/ha on control fields in 2008 (Figure 15, Appendix A). Low sample size in NE and range limitations in TX precluded the estimation of indigo bunting density in both states. State-level simple effect sizes were greatest in MS (2.03 males/ha) and least in MO (0.02 males/ha) in 2006 (Appendix A). IA exhibited the lowest simple effect size (0.02 males/ha) in 2007, with the greatest occurring in OH (2.10 males/ha) (Appendix A). This trend continued for IA in 2008 with the greatest effect size compared to other states in the study (0.98 males/ha); however indigo buntings again exhibiting the least simple effect size (0.04 males/ha), and MS exhibiting the greatest simple effect size (1.29 males/ha). Relative effect size ranged from 2% [MO] to 341% [OH] in 2006, 8% [KY] to 384% [OH] in 2007, and 11% [SC] to 129% [OH] (Appendix A).

Eastern Meadowlark

Eastern meadowlark density on CP33 and control fields varied widely across years and among BCR's (Figures 16 and 25). Eastern meadowlarks demonstrated an overall reversal in response from 2006 to 2007, followed by a decrease in density on CP33 fields in 2008 (Figure 16). Overall effect size increased from -0.03 males/ha (-22% relative effect size) in 2006 to 0.04 males/ha (41%) in 2007, followed by a decrease in effect to 0.01 males/ha (9%) in 2008 (Appendix A). The Eastern Tallgrass Prairie (BCR 22) demonstrated a substantial reversal in effect from 2006-2007 (-0.09 males/ha (-60%) in 2006 to 0.09 males/ha (75%) in 2007, which may have contributed to the overall reversal of effect observed in 2007 (Figure 17, Appendix A). Although the response remained

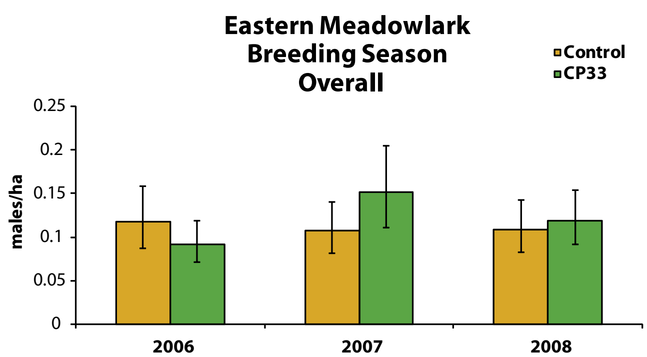


Figure 16. Overall breeding season eastern meadowlark density (males/ha) on all surveyed CP33 and control fields from 2006-2008. Error bars represent 95% confidence intervals.

positive in 2008, effect and relative effect size decreased to 0.04 males/ha (32%) (Appendix A). The reversal of effect, however, was not demonstrated in all BCRs. Eastern meadowlark density in the Southeastern Coastal Plain (BCR 27) remained greater on control fields than CP33 fields from 2006-2008, although density on CP33 fields exhibited a slight increase across the 3 years (Figure 17). Eastern meadowlark density and negative effect size decreased on both CP33 and control fields in the Central Mixed-grass Prairie (BCR 19) from 2006 to 2007, followed by a slight increase in both strata in 2008 (Figure 17). However effect was negligible in BCR 19 during the 3 year study. Conversely, eastern meadowlark density increased on both CP33 and control fields in the Central Hardwoods (BCR 24) from 2006 to 2007, followed by a decrease in density on CP33, but not control fields in 2008 (Figure 17). Eastern meadowlark density in the 26-MAV increased consistently on CP33 and control fields from 2006-2008; however because of increases in control densities, simple and relative effect sizes decreased across the 3 year study (Figure 17, Appendix A).

State-level eastern meadowlark densities ranged from 0.03 [OH] to 0.26 [IN] males/ha on CP33 fields, and

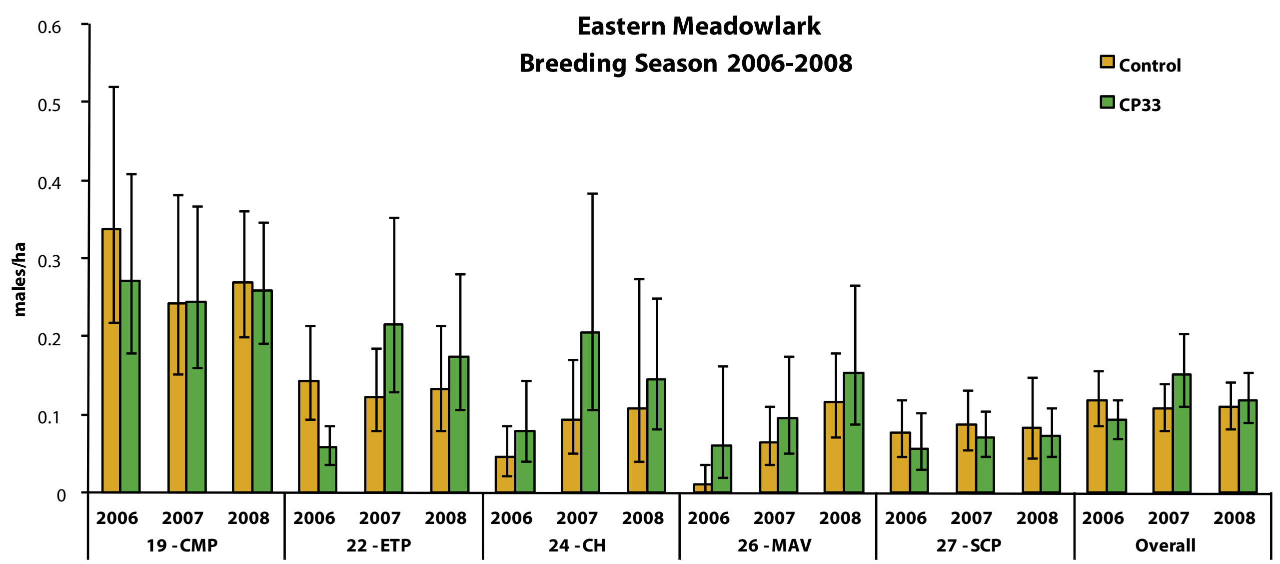


Figure 17. BCR-level and overall breeding season eastern meadowlark density (males/ha) on surveyed CP33 and control fields from 2006-2008. Small sample size precluded density estimation for BCR's 11, 23, 25, and 29; however data from all BCR's are included in the overall density estimate. Error bars represent 95% confidence intervals.

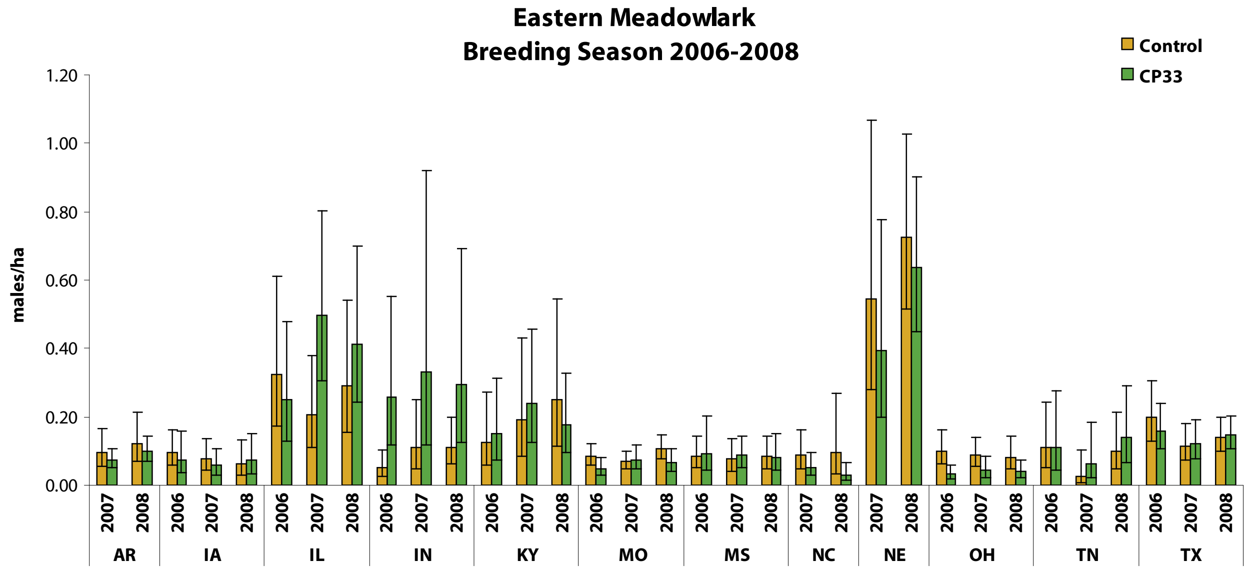


Figure 18. State-level breeding season eastern meadowlark density (males/ha) on surveyed CP33 and control fields from 2006-2008. All error bars represent 95% confidence intervals. Small sample size in GA and SC precluded density estimation. Note: AR, NC and NE did not initiate breeding season surveys until 2007.

from 0.05 [IN] to 0.32 [IL] males/ha on control fields in 2006 (Figure 18). State-level eastern meadowlark densities ranged from 0.05 [OH] to 0.50 [IL] males/ha on CP33 fields, and from 0.03 [TN] to 0.55 [NE] males/ha on control fields in 2007 (Figure 18). State-level eastern meadowlark densities ranged from 0.03 [NC] to 0.64 [NE] males/ha on CP33 fields, and from 0.06 [IA] to 0.73 [NE] males/ha on control fields in 2008 (Figure 18). State-level densities of eastern meadowlarks were consistently greater on control than CP33 fields in 67% of states in 2006, 33% of states in 2007 and 58% of states in 2008, suggesting response by meadowlark to CP33 is highly variable by state and year. Simple effect size ranged from -0.07 [IL] to 0.20 [IN] males/ha in 2006, -0.15 [NE] to 0.29 [IL] males/ha in 2007, and -0.09 [NE] to 0.18 [IN] in 2008 (Appendix A). Relative effect size ranged from -66% [OH] to 407% [IN] in 2006, -50% [OH] to 197% [IN] in 2007, and -68% [NC] to 164% [IN] in 2008 (Appendix A).

Other Species

Limited sample size allowed only for overall density estimation for eastern kingbird, grasshopper sparrow, vesper sparrow, and painted bunting.

Eastern kingbirds exhibited minimal differences in density on CP33 and control fields overall, with variability among years (Figures 19 and 25, Appendix A). Like kingbirds, there was virtually no response by grasshopper sparrows (Figures 20 and 25). SC and GA were excluded from overall analyses as sites had no grasshopper sparrow detections and are effectively out of the range. Although analysis was run for 2006, results were extremely variable; therefore we only report density estimates from 2007 and 2008. Vesper sparrow were only detected in 4 states (IA, IL, IN, OH), and were limited in sample size; however, similar to eastern kingbird, vesper sparrow demonstrated variability in response across years, with a strong response in 2006, no response in 2007, and a strong response again in 2008 (Figures 21 and 25). Relative effects size ranged from 120% in 2006 to 6% in 2007 to 105% in 2008 (Appendix A). Painted buntings were only detected in 4 states (AR, MS, SC, and TX), and were also limited in sample size. Painted buntings demonstrated a strong, but variable response to CP33 in 2006, with a 133% greater density overall on CP33 fields compared to control fields (Figures 22 and 25, Appendix A). However, that response diminished in

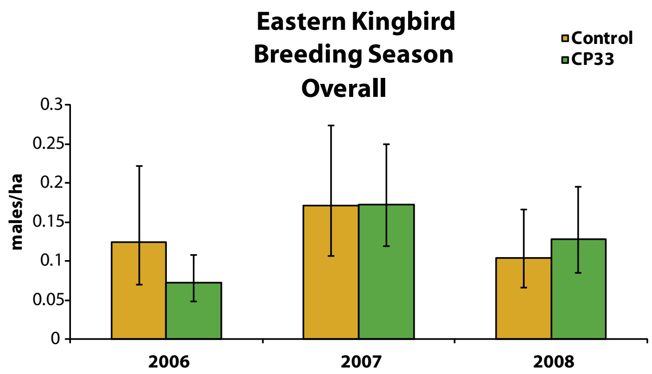


Figure 19. Overall breeding season eastern kingbird density (males/ha) on surveyed CP33 and control fields from 2006-2008. Error bars represent 95% confidence intervals.

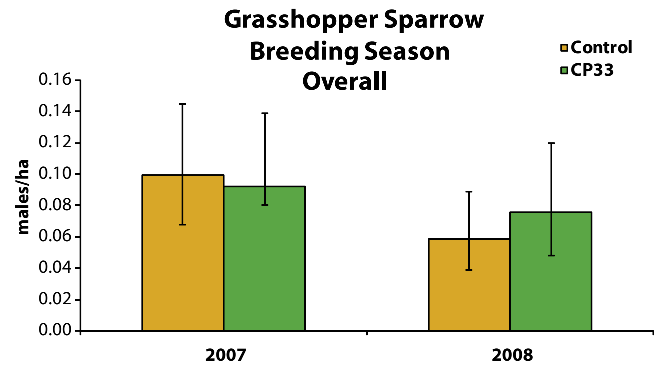


Figure 20. Overall breeding season grasshopper sparrow density (males/ha) on surveyed CP33 and control fields 2007-2008. Results from 2006 were highly erroneous and are not reported. Error bars represent 95% confidence intervals.

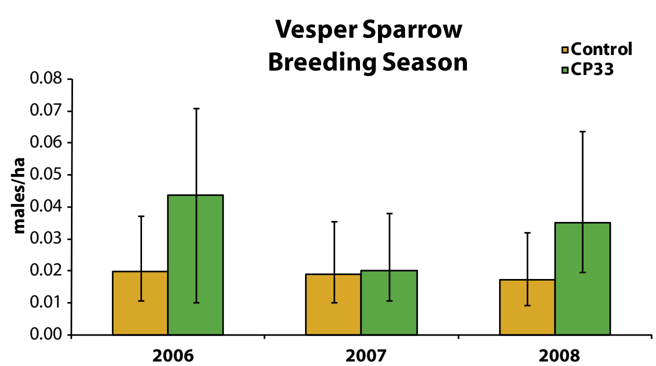


Figure 21. Breeding season vesper sparrow density (males/ha) on surveyed CP33 and control fields from 2006-2008. Vesper sparrows were only detected in IA, IL, IN, and OH. Error bars represent 95% confidence intervals.

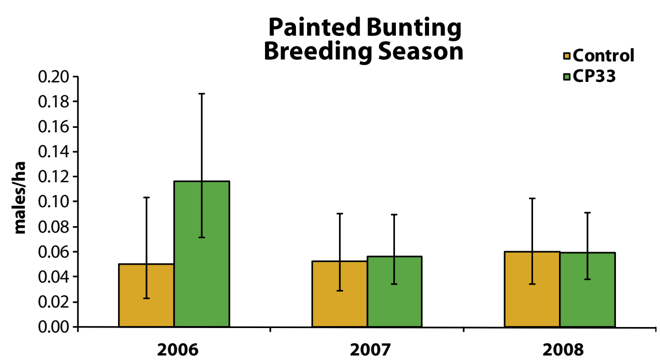


Figure 22. Breeding season painted bunting density (males/ha) on surveyed CP33 and control fields from 2006-2008. Painted buntings were only detected in AR, MS, SC, and TX. Error bars represent 95% confidence intervals.

2007 and 2008 (Figure 22). Ring-necked pheasant were present in several states, but were recorded in IA, IL, and OH. Ring-necked pheasant showed virtually no difference among CP33 and control densities in 2006, but a sharp increase in CP33 density in 2007 (resulting in a 142% relative effect size) (Figures 23 and 25, Appendix A). Pheasant density increased on CP33 and control fields in 2007; however effect size decreased due to the increase in control density (Figure 23). Scissor-tailed flycatchers were detected only in TX, but had ample detections for annual density estimates. Scissor-tailed flycatchers exhibited high densities on both CP33 and control fields in all 3 years, with density decreasing in both strata over time (Figures 24 and 25); however, effect size was negative in 2006 and minimally positive in 2007 and 2008, suggesting limited or no response to CP33 in the landscape (Appendix A). The remaining priority species were too low in number to report density estimates. Over the 3-year study there were 22 Henslow's sparrow observations (control=9, CP33=13), 44 logger-headed shrike observations (control=25, CP33=19), 46 Bell's vireo observations (control=24, CP33=22), 63 upland sandpiper observations (control=29, CP33=34), and 113 western meadowlark observations (control=71, CP33=42).

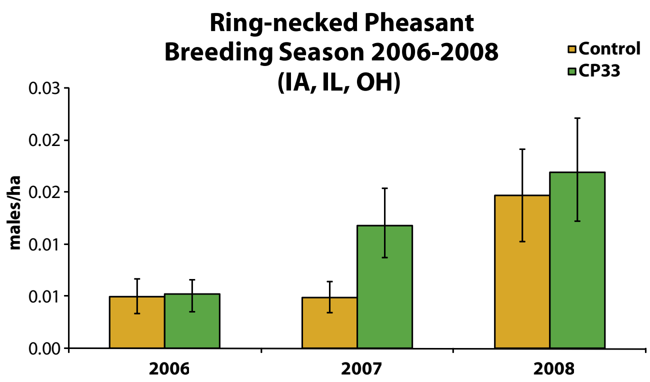


Figure 23. Breeding season ring-necked pheasant density (males/ha) on surveyed CP33 and control fields from 2006-2008. Ring-necked pheasants were only recorded in IA, IL, and OH, but were present in several other states in the study. Error bars represent 95% confidence intervals.

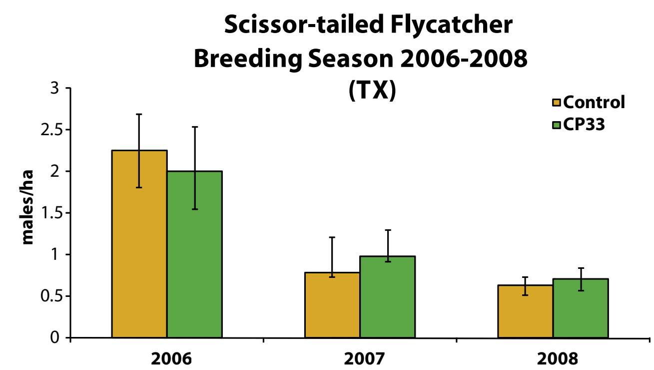


Figure 24. Breeding season scissor-tailed flycatcher density (individuals/ha) on surveyed CP33 and control fields in TX from 2006-2008. Error bars represent 95% confidence intervals.

2006–2008 Fall Bobwhite Coveys

We observed substantively greater density of bobwhite coveys on CP33 compared to control fields in each year from 2006 to 2008. In addition, we observed an increasing effect of CP33 in the landscape, with simple and relative effect sizes increasing annually from 2006-2008 (Figure 26, Appendix B). Relative $((D_{CP33}-D_{Control})/D_{Control})$ effect size for non-adjusted overall covey density increased from 50% in 2006 to 110% in 2008; however density of coveys on both CP33 and control fields decreased in 2008 compared to 2007 (Figure 26, Appendix B). Overall covey density increased slightly on control fields from 2006 (0.029 coveys/ha (1 covey/85 ac)) to 2007 (0.033 coveys/ha (1 covey/75 ac)), but decreased in 2008 to 0.023 coveys/ha (1 covey/107 ac) (Figure 26, Appendix B). Although covey density on CP33 fields remained 0.5 to 2 times greater than on control fields over all

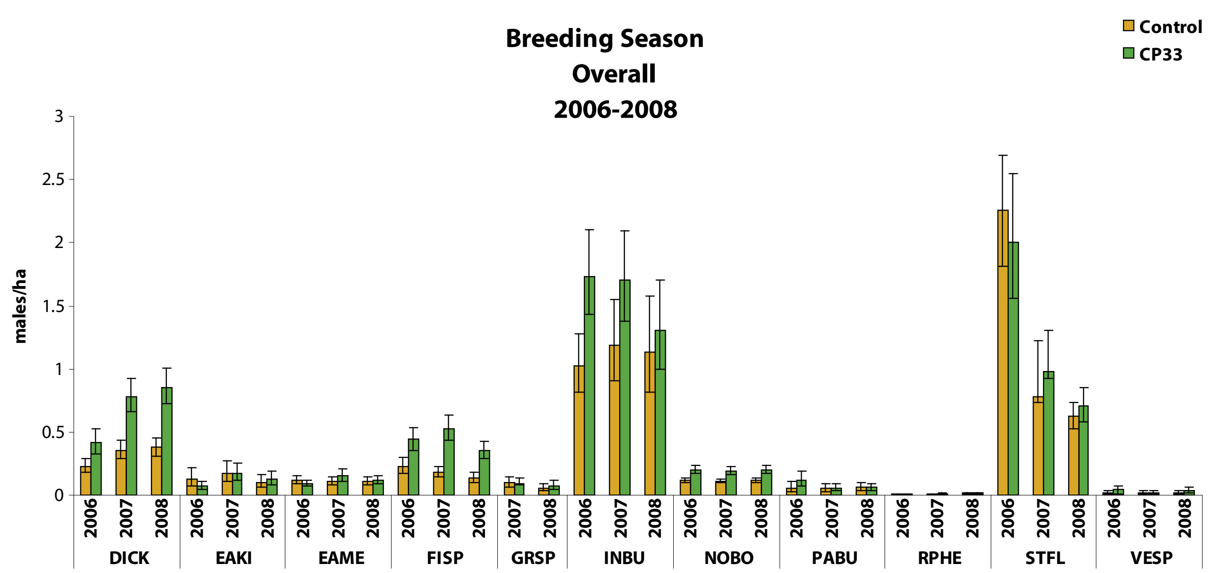


Figure 25. Overall density estimates (males/ha) of species of interest on surveyed CP33 and control fields during the 2006-2008 breeding season. PABU analysis includes only AR, MS, SC, and TX; VESP analysis includes only IA, IL, IN, and OH. Error bars represent 95% confidence intervals.

survey sites, density increased from 0.044 coveys/ha (1 covey/56 ac) in 2006 to 0.056 coveys/ha (1 covey/44 ac) in 2007 on CP33 fields, but decreased to 0.049 coveys/ha (1 covey/51 ac) in 2008 (Appendix B). When covey detections were adjusted for calling rate based on 6-hr change in barometric pressure, cloud cover, wind speed, and number of adjacent calling coveys (Wellendorf et al. 2004) we observed 1.5 to 2 times greater densities on both CP33 and control fields, but a decrease in relative effect sizes in all 3 years (Figure 27, Appendix B).

Covey densities were ≤ 3 times greater on CP33 than control fields in the Southeastern Coastal Plain (BCR 27) annually from 2006-2008 (Figure 28). We observed a slight decrease in covey density on CP33 fields and no change on control fields in BCR 27 from 2006 to 2007, resulting in a decrease in simple and relative effect size (0.030 coveys/ha (205%) in 2006 to 0.026 coveys/ha (183%) in 2007) (Appendix B). However, density increased substantially in 2008 on CP33 fields, while decreasing on control fields, and resulting in a 278% relative effect size (Appendix B). When covey densities were adjusted for calling rate (Wellendorf et al. 2004) we observed nearly double the estimate of density on both CP33 and control fields in each year for BCR 27, but a decrease in relative effect size (Figure 29, Appendix B).

Non-adjusted covey densities in the Eastern Tallgrass Prairie (BCR 22) were 40-50% greater on CP33 than control fields annually from 2006-2008 (Figure 28). Covey density decreased on CP33 and control fields from 2006-2008; however simple and relative effect size was greatest in 2007 (0.008 coveys/ha; 50%) (Appendix B). Covey density estimates on both CP33 and control fields in BCR 22 were lower than estimates for all other BCR's evaluated, except the Mississippi Alluvial Valley (BCR 26) (Figure 28). Although incorporation of an adjustment for calling rate (Wellendorf et al.2004) nearly doubled density estimates on both CP33 and control fields in each year, we observed similar relative effect sizes and slightly decreased simple effect sizes compared to non-adjusted density estimates (Figure 29, Appendix B).

Covey densities were approximately 40-100% greater annually on CP33 than control fields in the Central Hardwoods (BCR 24) from 2006 to 2008 (Figure 28). Density on both CP33 and control fields decreased slightly from 2006 to 2007, followed by a slight increase in 2008. Although densities varied, simple and relative effect size increased annually from

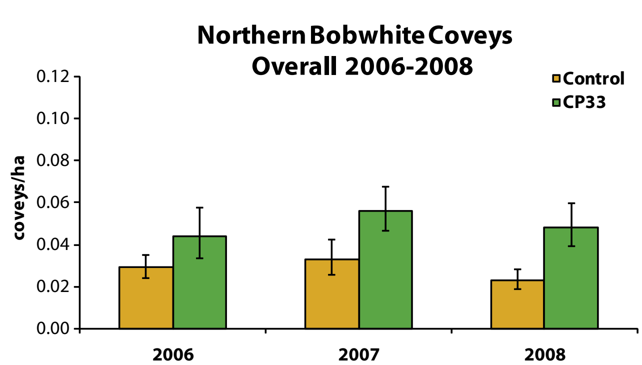


Figure 26. Non-adjusted overall northern bobwhite covey density estimates (coveys/ha) on all surveyed CP33 and control fields from 2006-2008. Error bars represent 95% confidence intervals.

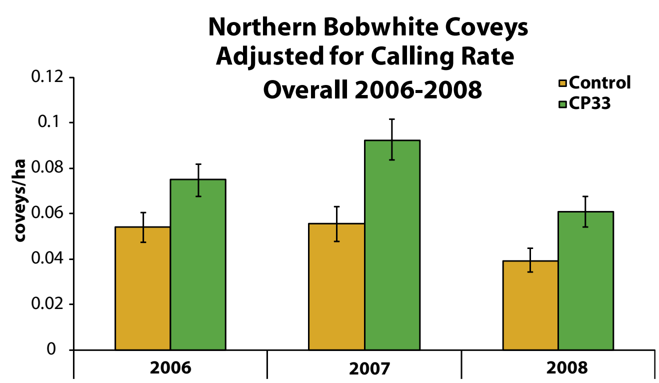


Figure 27. Overall northern bobwhite covey density estimates (coveys/ha) on all surveyed CP33 and control fields from 2006-2008 adjusted for number of adjacent calling coveys, % cloud cover, wind speed, and 6-hr change in barometric pressure (Wellendorf et al. 2004). Error bars represent 95% confidence intervals.

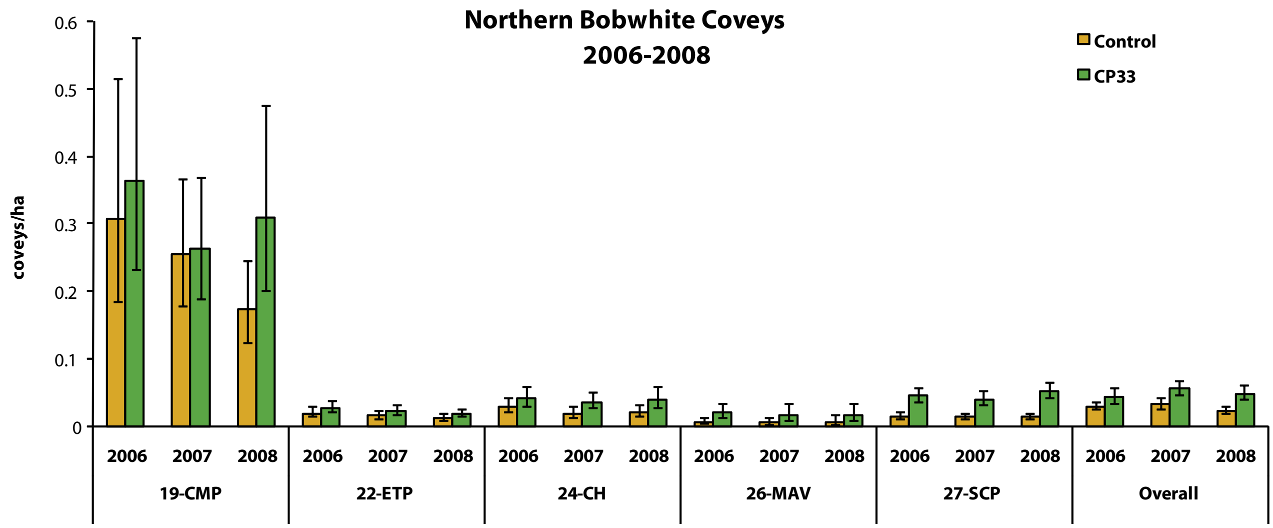


Figure 28. BCR-level and overall non-adjusted northern bobwhite covey density (coveys/ha) on surveyed CP33 and control fields from 2006-2008. Small sample size precluded density estimation for BCR's 11, 23, 25, and 29; however data from all BCR's are included in the overall density estimate. Error bars represent 95% confidence intervals.

0.012 coveys/ha (39%) in 2006 to 0.020 coveys/ha (95%) in 2008 (Appendix B). Density estimates in BCR 24 were 1.5 to 2 times greater following incorporation of a calling rate adjustment (Wellendorf et al. 2004) on CP33 and control fields when compared to non-adjusted density estimates (Figure 29). However, simple and relative effect size for adjusted density estimates peaked in 2007 (0.031 coveys/ha (102%)) rather than 2008 (Appendix B).

Inference from the Central Mixed-grass Prairie (BCR 19) is limited because fall survey sites were only located in TX from 2006-2008. Because of limited sample size, annual results from BCR 19 are highly variable (Figure 28). Covey density was greatest on both CP33 and control fields in 2006, and decreased in both strata through 2008 (Figure 28). Additionally, similar to breeding season results, density of bobwhite coveys was much higher in BCR 19 than all other BCR's and the overall estimate. Effect size decreased from 0.057 coveys/ha (19%) in 2006 to 0.008 coveys/ha (3%) in 2007, followed by an increase to 0.136 coveys/ha (78%) in 2008 (Appendix B). Incorporation of calling rate adjustments (Wellendorf et al. 2004) produced ~1.5 times greater density on control fields each year and on CP33 fields in 2007 and 2008, but a decrease in the 2006 CP33 density estimate (Figure 29, Appendix B). This shift in 2006 adjusted density estimate in the CP33 strata caused a reversal of effect from the non-adjusted to adjusted density estimate. We again suggest using caution when interpreting estimates from BCR 19, as they are largely variable.

Although sample size was limited in the Mississippi Alluvial Valley (BCR 26), a detection function based off the 3-year data set allowed for annual estimation of covey densities. Covey density was 170-194% greater on CP33 than control fields annually from 2006 to 2008 (Figure 28). However, year-specific densities within control and CP33 strata were minimally variable across years. Effect size decreased from 0.013 coveys/ha (194%) in 2006 to 0.011 coveys/ha (170%) in 2008 (Appendix B). Similar to most other BCR's, density estimates in BCR 26 were nearly 2 times greater for control fields and 1.5 times greater for CP33 fields following incorporation of adjustments for calling rate (Wellendorf et al. 2004) (Figure 29). However annual relative effect size was lower for calling-rate adjusted

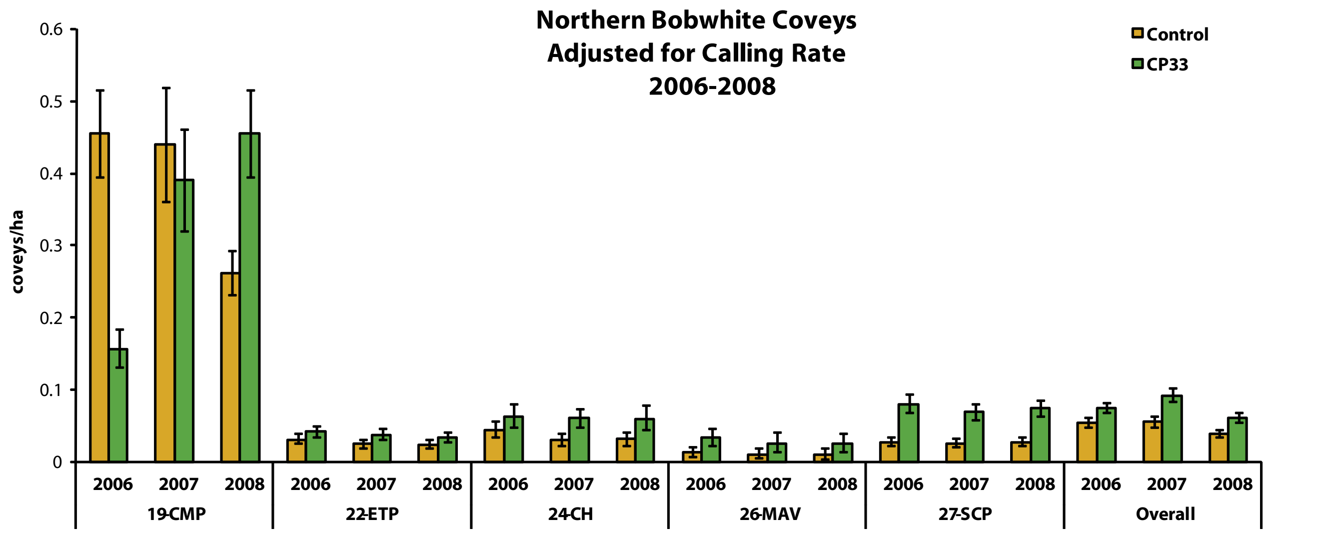


Figure 29. BCR-level and overall northern bobwhite covey density estimates (coveys/ha) on surveyed CP33 and control fields adjusted for number of adjacent calling coveys, % cloud cover, wind speed, and 6-hr change in barometric pressure (Wellendorf et al. 2004). Small sample size precluded density estimation for BCR's 11, 23, 25, and 29; however data from all BCRs are included in the overall density estimate. Error bars represent 95% confidence intervals.

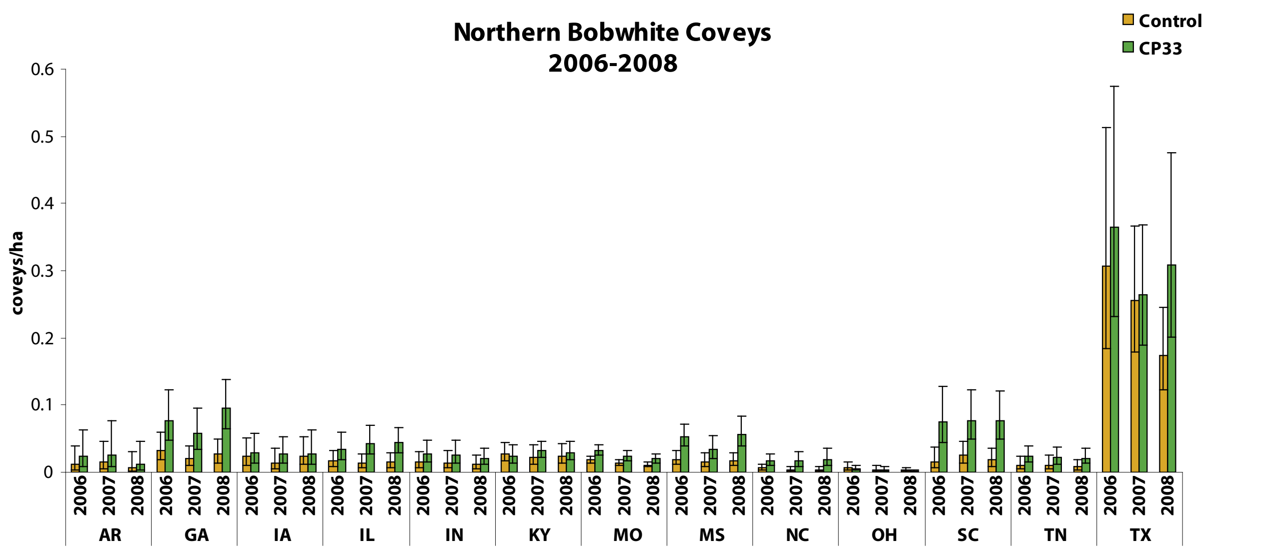


Figure 30. State-level non-adjusted northern bobwhite covey density (coveys/ha) on surveyed CP33 and control fields from 2006-2008. Error bars represent 95% confidence intervals.

densities than for non-adjusted density estimates (Appendix B).

State-level non-adjusted covey densities ranged from 0.006 [OH] to 0.364 [TX] coveys/ha on CP33 fields, and from 0.006 [NC] to 0.307 [TX] coveys/ha on control fields in 2006, from 0.003 [OH] to 0.264 [TX] coveys/ha on CP33 fields, and from 0.003 [NC] to 0.256 [TX] coveys/ha on control fields in 2007, and from 0.001 [OH] to 0.309 [TX] coveys/ha on CP33 fields, and from 0.003 [OH] to 0.173 [TX] coveys/ha on control fields in 2008 (Figure 30, Appendix B). Most states exhibited substantially greater covey densities on CP33 than control fields each year. However, OH maintained the lowest densities on both control and CP33 fields and

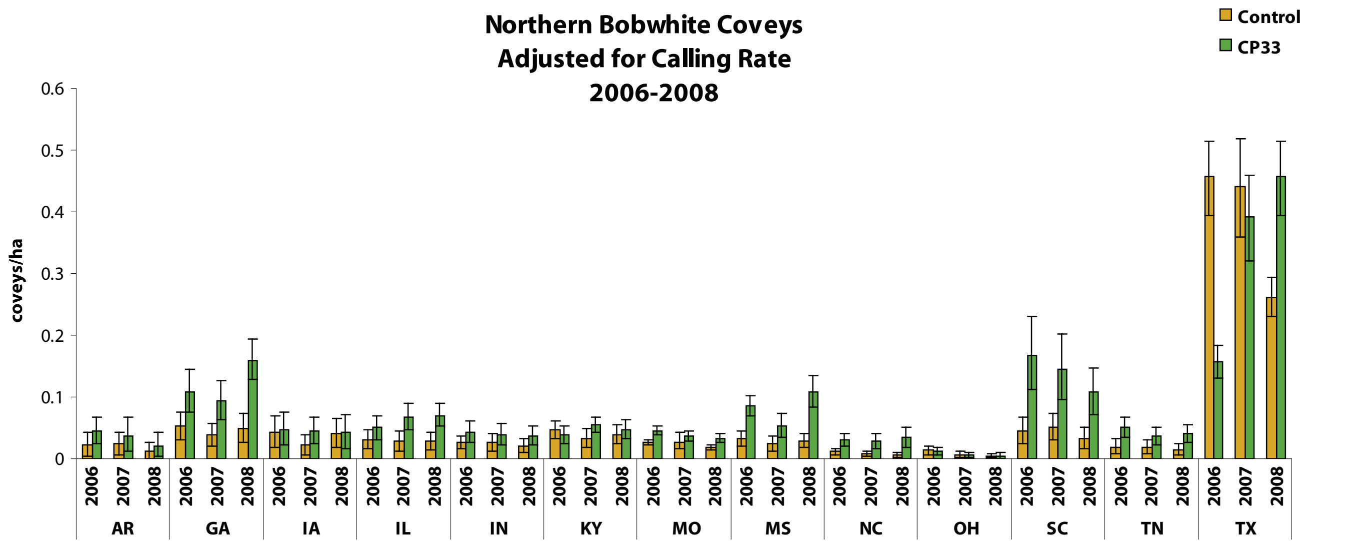


Figure 31. State-level northern bobwhite covey density (coveys/ha) on surveyed CP33 and control fields during fall 2006-2008 adjusted for number of adjacent calling coveys, % cloud cover, wind speed, and 6-hr change in barometric pressure (Wellendorf et al. 2004). Error bars represent 95% confidence intervals.

the smallest effect when compared to the remaining states. As noted previously, TX exhibited much greater densities on control and CP33 fields than the remaining states, though results for TX were highly variable. SC and GA also had a very strong response to CP33 in the landscape in all 3 years of the study. Effect size ranged from -0.004 [KY] to 0.059 [SC] coveys/ha in 2006, from -0.001 [OH] to 0.052 [SC] coveys/ha in 2007, and from -0.001 [OH] to 0.136 [TX] coveys/ha in 2008 (Appendix B). Relative effect size ranged from -25% [OH] to 367% [SC] in 2006, from -18% [OH] to 326% [NC] in 2007, and from -51% [OH] to 373% [NC] in 2008 (Appendix B). Similar to the BCR-level analyses, incorporation of adjustments for calling rate (Wellendorf et al. 2004) generally doubled state-level estimates of density in all 3 years, but reflected similar trends in relative effect size (Figures 31, Appendix B).

2007–2008 Vegetation Surveys

Vegetation surveys were conducted following variable protocols in 15 states in 2007 and 10 states in 2008. 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) in 2007 and 80.24 ft (24.46 m) in 2008 (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 in both years (0.96% shrubs, 2.15% trees in 2007; 1.38% shrubs, 2.02% trees in 2008) (Table 3). For states that quantified noncompliant activities, percent noncompliance was relatively small in 2007 (7.57%) and 2008 (10.09%) (Table 4). Predominant noncompliance activities in both years included mowing, road/turnrow/driven, equipment disturbance/parking/hay storage, planted to crops and herbicide drift, with mowing and driving on buffers generally the most prevalent type of noncompliance (Table 4). Vegetation transect surveys at 10 systematically placed points along each CP33 field demonstrated that mean percentage cover was generally less than 35% for all cover variables in both years (NWSG, forb, legume, exotic, litter, bare, woody)

(Figure 32, Table 5). Percent NWSG cover was constant (~28%) in both years, whereas percent forb cover increased slightly from 29% in 2007 to 33% in 2008 (Figure 32, Table 5). Percent cover of litter increased substantially in 2008 to ~34%, whereas percent cover of legumes, exotics, woody plants, and bare ground was fairly constant across years (Table 5). However, we suggest using caution when comparing estimates across years due to the difference in number of states conducting vegetation surveys in 2008. Common exotics present in CP33 buffers in both years included bahiagrass (*Paspalum notatum*), Bermudagrass (*Cynodon dactylon*), tall fescue (*Schedonorus phoenix*), Johnsongrass (*Sorghum halepense*), and brome (*Bromus* spp.) (Table 4). As expected, mid-contract management activities increased from ~7% in 2007 to ~15% in 2008 (Table 4). Disking was the predominant mid-contract management type, with prescribed burning and herbicide used in 3 states as well (Table 4).

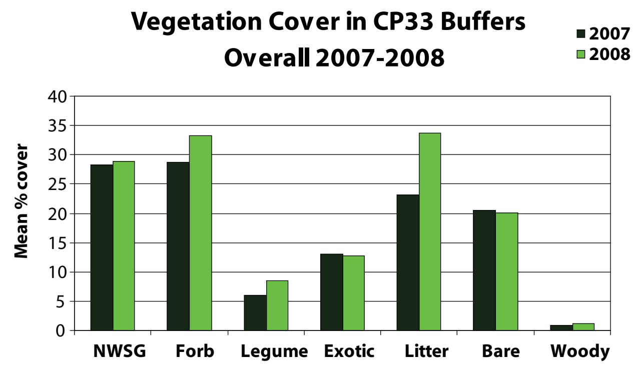


Figure 32. Percent cover of native warm-season grasses (NWSG), forbs, legumes, exotics, litter, bare ground, and woody plants within CP33 upland habitat buffers averaged over 14 states in 2007 and 10 states in 2008.

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. From 2006 to 2008 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 BCR's. Overall breeding season bobwhite densities were 70-75% greater on CP33 than control fields annually, whereas fall covey densities exhibited an increasing effect from 50% in 2006 to 110% in 2008. It is important to note that previous reports suggest that overall effect size for breeding season bobwhite densities increased from 2006-2007. Analysis of the 3-year data set suggested that detection functions were most reliable if generated separately for each stratum (CP33 and control), but not for each stratum in each year (although ΔAIC for year*type specific detection functions was competing at 1.03).

Although annually variable, breeding season bobwhite in most BCR's exhibited up to or greater than 2 times greater densities on fields containing CP33 versus non-buffered crop fields. Although densities of breeding bobwhite were greatest in the Central Mixed-grass Prairie (BCR 19) each year, some of the greatest effect sizes were observed in the Eastern Tallgrass Prairie (BCR 22), Mississippi Alluvial Valley (BCR 26), and Southeastern Coastal Plain (BCR 27). Fall bobwhite covey densities were also up to 2 times greater on CP33 fields than non-buffered control fields in most BCR's, with densities on CP33 fields in the Central Hardwoods (BCR 24), Mississippi Alluvial Valley, and Southeastern Coastal Plain double or triple those of control fields in most years. The Mississippi Alluvial Valley maintained the lowest densities on CP33 and control fields in both the breeding season and fall in each year of the study; however bobwhite exhibited a strong response to CP33 once buffers were fully developed. Low overall bobwhite densities and a strong response to CP33 in the landscape were not surprising in the Mississippi Alluvial Valley, as that region (including sites in the Mississippi delta) is one of the most intensively cropped areas in the contiguous U.S.

Results from detection functions generated from the 3-year data set suggested that breeding season male bobwhites in the Eastern Tallgrass Prairie (BCR 22) responded very strongly to CP33 in the landscape in all 3 years (122-256% relative effect sizes). This effect also increased from 2006-2008, suggesting bobwhite were increasing use of CP33 as buffer vegetation developed. It is important to note that previous reports suggest limited response in the Eastern Tallgrass Prairie in 2006, with a strong response in 2007. This change is a consequence of changes in stratification of the detection function when the 3-year data set was analyzed. We believe the current 2008 density estimates for the Eastern Tallgrass Prairie are robust and more accurately reflect the actual number of observations (CP33=266 males, control=211 males). Complicating the large response by breeding season bobwhite in the Eastern Tallgrass Prairie, we observed decreased relative effect sizes (40-51%) for bobwhite coveys in each year compared to breeding season estimates. 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 the Eastern Tallgrass Prairie appeared to exhibit 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. As the shrub component of CP33 buffers become more fully developed over time, we might expect to see a fall/winter response more similar to that observed during the breeding season in BCR 22.

Breeding bobwhite densities in the Central Hardwoods (BCR 24) peaked in 2007, though effect decreased from 60-31% from 2006-2008. However covey densities were fairly consistent on CP33 fields but decreased on control fields across the 3-year study, resulting in an increase in effect from 39-95% from 2006 to 2008. Breeding bobwhite populations in the Central Hardwoods may have had a sudden cyclical increase in 2007, which may be, in part, due to the increases in density in KY and IN in 2007 (which have a large proportion of their sites in BCR 24). Bobwhite in the Central Hardwoods BCR 24 may be using CP33 buffers for nesting and brood-rearing habitat in addition to protective and thermoregulatory needs in the fall. Breeding bobwhite response to CP33 in the Southeastern Coastal Plain (BCR 27) was greatest in 2006, but effect size decreased through 2008, although densities in both control and CP33 strata peaked in 2008. In contrast effect size was greatest in 2008 for fall coveys in the Southeastern Coastal Plain, though the effect was strong each year (183-277%). Although breeding season densities and effect size declined in 2007, relative effect size of fall coveys nearly tripled from 2006 to 2007. As noted previously, results from the Central Mixed-grass Prairie (BCR 19) are limited in inference, but did show a reversal in breeding season effect from 2006 to 2007 and continuation of positive response to CP33 in 2008. However, this was not exhibited in the fall, where there was a strong positive effect in 2006, followed by virtually no effect in 2007 and a peak in effect in 2008.

In the 2006 and 2007 Annual Reports 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 this report we use an average 3-year effect size for calling rate adjusted overall covey densities of 0.026 coveys/ha that reflects differences in bobwhite covey density at the spatial scale of the enrolled field. Given an effective survey radius of 500 m or 78.5 ha (194 ac) our 3-year average estimate of effect size for adjusted covey densities (0.026 coveys/ha) translates to an average 2.04 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 (an assumption made in the NBCI), this would translate into 24.49 more birds in the survey area around CP33 than control fields. For illustrative purposes, a hypothetical 40 ac square field buffered with a 60' buffer would have 6.9 acres of buffer. The May 2009 national enrollment of 207,298 acres could accommodate 30,043.19such hypothetical 40 ac fields with 60' buffers. Assuming 24.49 additional birds in the fall population/CP33 field and no overlap of 194 ac regions around CP33 fields this would translate to 735,903.4 additional birds, or 3.55 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 actual 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. We observed a strong overall, BCR-, and state-level effect in several breeding season songbird densities, with overall dickcissel densities 80-127% and field sparrow densities 94-190% greater on CP33 than control fields from 2006 to 2008. Dickcissel densities were greatest in the Mississippi Alluvial Valley (BCR 26) and least in the Southeastern Coastal Plain (BCR 27) (likely due to the absence of dickcissels from GA, SC). Response to CP33 was very strong in the Mississippi Alluvial Valley each year, in the Central Mixed-grass Prairie (BCR 19) in 2007, and in the Eastern Tallgrass Prairie (BCR 22) and Central Hardwoods (BCR 24) in 2008, however most BCR's showed substantially greater dickcissel densities on CP33 versus control fields annually. Field sparrow response was extremely strong in the 3 BCR's containing adequate sample size for analysis (BCR 22, 24, 27); however field sparrow exhibited substantial annual variation in the Southeastern Coastal Plain (BCR 27). Indigo buntings, which are considered scrub-successional, exhibited an overall decrease in effect from 2006-2008, with large annual variability in response. There were generally high indigo bunting densities in each BCR, with a very strong response in the Eastern Tallgrass Prairie in 2006 and 2007, but a trend toward decreasing density on CP33 fields and increasing density on control fields in most other BCR's. 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 evident in some years. Other less numerous species also showed preferences for CP33 including painted bunting and vesper sparrow, but response varied largely by year. 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.

Eastern meadowlark exhibited substantial annual variability in response to CP33, with a reversal of effect from 2006 to 2007 and a continued slight positive response to CP33 in 2008. Eastern meadowlark densities were greater on control than CP33 fields in all 3 years in the Central Mixed-grass Prairie (BCR 19) and Southeastern Coastal Plain (BCR 27), though densities on both strata in the Central Mixed-grass Prairie were greater than all other BCR's. Grasshopper sparrow exhibited virtually no response to CP33, which is discouraging in that grasshopper sparrow populations are experiencing sharp range-wide declines (Sauer et al. 2008). However, these results are not unexpected, because grasshopper sparrow and eastern meadowlark tend to be area-sensitive (Herkert 1994, Vickery et al. 1994, Johnson and Igl 2001, Bakker et al. 2002, Ribic et al. 2009), and thus show preferences for large tracts of continuous grassland. The majority of CP33 buffers do not provide the minimum area requirement to attract/support grasshopper sparrow or eastern meadowlark, 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 or meadowlark populations, but instead these species are not showing a preference for this type of habitat. 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 (Herkert 1994; Winter and Faaborg 1999). 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 in 2 of the 3 years. Though sample size was low eastern kingbird exhibited virtually no or negative annual 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.

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 many instances, increasing as buffer vegetation develops. Moreover, the observed response validates an underlying assumption of the Northern Bobwhite Conservation Initiative, that a relatively small (5-15%) change in primary land use in agricultural landscapes can affect measurable and substantive population response. 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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We also appreciate the efforts of many dedicated state wildlife agency employees and other entities who coordinated and collected the bird data in each state. Finally, we recognize that participating state wildlife resource agencies invested substantively more resources in delivering CP33 monitoring than we were able to provide in subcontracts. Thank you for your commitment to this effort.

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Table 1. Distribution of CP33 monitoring during 2006–2008 breeding season, vegetation, and fall bobwhite covey surveys.

	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
2008 Breeding Season	AR, GA, IA, IL, IN, KY MO, MS, NC, NE, OH, SC, TN, TX	
2008 Vegetation Sampling	GA, IA, IN, KY, MS, MO, NC, NE, SC, TN	
2008 Fall Covey Counts	AR, GA, IA, IL, IN, KY MO, MS, NC, 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 2006–2008.

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
Overall	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 14 states in 2007 and 10 states in 2008.

State	Year	% Shrub	% Tree	% NC	Noncompliance Type	% MCM	MCM Type
Arkansas	2007	1.03	0.26	2.56	Mow	10.90	Disk
Georgia	2007	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
	2008	3.58	1.63	14.18	Mow, planted to crops, road/turnrow/driven, equipment parking	20.20	Disk, burn, herbicide
Illinois	2007	0.73	8.71	10.07	Mow, road/turnrow/driven, planted to crops, not contract width,	0	N/A
Indiana	2007	0.77	2.03	10.91	Herbicide drift, mow, road/driven/turnrow, equipment disturbance	0	N/A
	2008	0.27	0.00	12.27	Mow, herbicide drift, planted to crops, road/turnrow/driven, equipment parking	5.65	Disk
Iowa	2007	0.13	0.00	N/A	Mow, road/turnrow/driven	12.37	N/A
	2008	0.26	0.13	N/A	N/A	8.38	N/A
Kansas	2007	0.53	0.25	2.76	Road/turnrow/driven, mow, equipment parking/debris/hay, underwater	0.22	N/A
Kentucky	2007	1.00	6.00	15.25	Mow, road/turnrow/driven, equipment parking/debris/hay, lanted to crops, not contract width	0.50	N/A
	2008	1.07	6.56	21.05	Mow, road/turnrow/driven, equipment storage, barn built	2.26	Mow
Mississippi	2007	0.00	1.38	7.00	Road/turnrow/driven, planted to crops, mow, equipment disturbance, herbicide drift	0.00	N/A
	2008	0.28	1.03	0.56	Road/turnrow/driven	3.42	
Missouri	2007	N/A	N/A	N/A	N/A	N/A	N/A
	2008	N/A	N/A	N/A	N/A	N/A	N/A
Nebraska	2007	0.46	0.78	7.39	Road/turnrow/driven, herbicide drift, mow Equipment parking/debris/hay, planted to crops	0.00	N/A
	2008	0.28	0.92	16.25	Road/turnrow/driven, herbicide drift, mow, planted to crops	N/A	N/A
North Carolina	2007	2.39	3.34	8.73	Road/turnrow/driven, mowed, planted to crops, plowed Herbicide drift, food plot	13.15	Disk
	2008	2.44	6.58	4.39	Herbicide drift, planted to crops, road/turnrow/driven	21.19	Disk, burn, herbicide
Ohio	2007	0.10	0.60	N/A		N/A	
South Carolina	2007	2.89	0.97	4.86	Road/turnrow/driven, planted to crops, food plot, mow Equipment parking/debris/hay, herbicide drift	30.49	Disk
	2008	3.99	1.18	3.22	Road/turnrow/driven, planted to crops, herbicide drift, mow, equipment parking	31.63	Disk

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 14 states in 2007 and 10 states in 2008 (continued).

State	Year	% Shrub	% Tree	% NC	Noncompliance Type	% MCM	MCM Type
Tennessee	2007	0.00	0.00	6.28	Mow, equipment parking/debris/hay, road/turnrow/driven, planted to crops, herbicide drift	N/A	N/A
	2008	0.24	0.12	8.78	Mow	N/A	N/A
Texas	2007	2.44	4.69	7.46	Mowed, road/turnrow/driven	0.00	N/A
Overall	2007	0.96	2.15	7.57		6.56	
	2008	1.38	2.02	10.09		13.25	

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

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 and 10 states in 2008.

State	Year	Mean Buffer Width (ft)	% NWSG	% Forb	% Legume	% Exotic	% Litter	% Bare	% Woody
Arkansas	2007	98.82	34.40	24.34	3.18	9.28	11.02	16.15	1.03
Georgia	2007	87.98	8.21	35.34	2.44	15.04	23.58	13.28	0.39
	2008	81.10	5.45	31.97	3.27	6.13	35.45	19.76	1.19
Illinois	2007	82.33	36.82	15.49	5.06	13.44	13.89	15.66	0.16
Indiana	2007	67.44	21.38	30.15	8.58	12.33	18.63	11.83	1.01
	2008	76.51	35.43	26.31	8.73	12.78	0.00	11.82	0.00
Iowa	2007	111.01	36.68	20.61	3.89	15.91	47.97	N/A	0.32
	2008	76.41	61.19	26.25	6.22	2.88	78.12	N/A	0.32
Kansas	2007	106.80	32.50	20.23	3.47	10.28	20.55	19.21	0.17
Kentucky	2007	80.16	29.88	21.36	14.53	17.08	27.32	6.42	1.44
	2008	77.37	35.21	21.74	20.60	15.86	35.29	8.99	193
Mississippi	2007	79.07	62.89	42.36	14.68	11.99	22.20	49.86	0.14
	2008	N/A	38.00	43.72	13.12	7.71	22.80	21.76	0.40
Missouri	2007	N/A	N/A	24.05	N/A	20.18	37.15	31.21	0.87
	2008	N/A	N/A	39.93	N/A	22.22	61.14	38.25	2.08
Nebraska	2007	77.42	24.67	34.26	11.91	16.00	29.41	21.21	1.20
	2008	76.62	28.31	20.79	6.53	16.72	43.36	22.19	1.23
North Carolina	2007	74.95	8.28	41.02	3.33	15.37	12.42	14.82	2.87
	2008	88.75	8.06	51.22	6.15	20.01	16.15	18.35	1.50
Ohio	2007	62.34	29.10	28.30	0.85	8.40	26.20	13.70	0.60
South Carolina	2007	92.40	21.63	33.39	2.96	7.03	15.09	18.34	1.36
	2008	90.59	19.51	37.11	2.85	7.99	11.60	19.18	1.37
Tennessee	2007	74.80	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2008	74.58	N/A	N/A	N/A	14.73	N/A	N/A	N/A
Texas	2007	116.12	21.15	30.39	3.72	9.85	18.39	35.61	0.48
Overall	2007	86.55	28.28	28.66	6.05	13.01	23.13	20.56	0.86
	2008	80.24	28.89	33.23	8.43	12.70	33.77	20.04	1.11

Appendix A. BCR and state-level density (males/ha) estimates, standard error, 95% confidence intervals, 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 breeding season from 2006-2008.

Density (# males/ha)										
Northern Bobwhite		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
19-CMP	2006	0.859120	0.176370	0.575-1.283	0.691020	0.091853	0.532-0.898	-0.168100	(-0.558-0.222)	-0.195665
	2007	0.327080	0.043314	0.252-0.424	0.436720	0.052253	0.345-0.552	0.109640	(-0.023-0.243)	0.335209
	2008	0.276340	0.034054	0.217-0.352	0.390250	0.036997	0.324-0.470	0.113910	(0.015-0.213)	0.412210
22-ETP	2006	0.080650	0.034958	0.036-0.183	0.179130	0.117700	0.055-0.582	0.098480	(-0.142-0.339)	1.221079
	2007	0.056791	0.011090	0.039-0.083	0.202100	0.051049	0.124-0.329	0.145309	(0.043-0.248)	2.558662
	2008	0.083688	0.014924	0.059-0.119	0.260770	0.069507	0.156-0.436	0.177082	(0.038-0.316)	2.115978
24-CH	2006	0.105950	0.021939	0.071-0.159	0.168710	0.030222	0.119-0.240	0.062760	(-0.010-0.136)	0.592355
	2007	0.200620	0.045329	0.129-0.312	0.264600	0.078280	0.149-0.469	0.063980	(-0.113-0.241)	0.318911
	2008	0.126800	0.025357	0.086-0.188	0.166530	0.033241	0.113-0.246	0.039730	(-0.042-0.122)	0.313328
26-MAV	2006	0.092091	0.035291	0.041-0.206	0.113760	0.043564	0.051-0.254	0.021669	(-0.088-0.132)	0.235300
	2007	0.023805	0.006975	0.013-0.042	0.065947	0.015791	0.041-0.106	0.042142	(0.008-0.076)	1.770300
	2008	0.014269	0.005111	0.007-0.029	0.052004	0.011833	0.033-0.081	0.037735	(0.013-0.063)	2.644544
27-SCP	2006	0.057382	0.012328	0.038-0.087	0.197110	0.028741	0.148-0.262	0.139728	(0.078-0.201)	2.435049
	2007	0.080183	0.080183	0.055-0.117	0.158000	0.024434	0.117-0.214	0.077817	(-0.087-0.242)	0.970492
	2008	0.166120	0.064259	0.080-0.347	0.249940	0.074268	0.141-0.443	0.083820	(-0.109-0.276)	0.504575
Overall	2006	0.11678	0.0090609	0.100-0.136	0.20367	0.016787	0.173-0.239	0.086890	(0.050-0.124)	0.744049
	2007	0.11232	0.008570	0.097-0.130	0.19157	0.016874	0.161-0.228	0.079250	(0.042-0.116)	0.705573
	2008	0.116850	0.008352	0.102-0.134	0.20169	0.015579	0.173-0.235	0.084840	(0.050-0.120)	0.726059

Appendix A. BCR and state-level density (males/ha) estimates, standard error, 95% confidence intervals, 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 breeding season from 2006-2008 (continued).

Density (# males/ha)										
Northern Bobwhite		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
AR	2007	0.006687	0.002765	0.003-0.015	0.015836	0.005293	0.008-0.030	0.009150	(-0.003-0.021)	1.368354
	2008	0.003278	0.001430	0.001-0.008	0.012036	0.003802	0.007-0.022	0.008758	(0.001-0.017)	2.672087
GA	2006	0.042346	0.008678	0.028-0.064	0.139160	0.032446	0.088-0.219	0.096814	(0.031-0.163)	2.286261
	2007	0.027979	0.006713	0.017-0.045	0.106730	0.025415	0.067-0.170	0.078751	(0.027-0.130)	2.814647
	2008	0.043044	0.007595	0.030-0.061	0.169870	0.036118	0.112-0.257	0.126826	(0.054-0.199)	2.946427
IL	2006	0.093167	0.024652	0.055-0.157	0.525540	0.153850	0.296-0.932	0.432373	(0.127-0.738)	4.640838
	2007	0.161910	0.046978	0.092-0.286	0.827130	0.209680	0.504-1.358	0.665220	(0.244-1.086)	4.108579
	2008	0.129080	0.038193	0.072-0.230	0.753610	0.193490	0.456-1.246	0.624530	(0.238-1.011)	4.838317
IN	2006	0.148130	0.038609	0.088-0.248	0.214020	0.053065	0.131-0.350	0.065890	(-0.063-0.194)	0.444812
	2007	0.147110	0.044904	0.080-0.144	0.319350	0.130480	0.144-0.707	0.172240	(-0.098-0.443)	1.170825
	2008	0.147110	0.040573	0.085-0.254	0.208110	0.046701	0.133-0.325	0.061000	(-0.060-0.182)	0.414656
IA	2006	0.013987	0.004683	0.007-0.027	0.023078	0.006300	0.013-0.040	0.009091	(-0.006-0.025)	0.649961
	2007	0.014496	0.005508	0.007-0.030	0.022888	0.007102	0.012-0.042	0.008392	(-0.009-0.026)	0.578918
	2008	0.007553	0.003712	0.003-0.019	0.002518	0.002100	0.001-0.011	-0.005035	(-0.013-0.003)	-0.666671
KY	2006	0.117180	0.019652	0.084-0.164	0.192500	0.032642	0.137-0.270	0.075320	(0.001-0.150)	0.642772
	2007	0.174700	0.046098	0.103-0.295	0.219780	0.051136	0.138-0.349	0.045080	(-0.090-0.180)	0.258042
	2008	0.195660	0.037320	0.134-0.286	0.217780	0.036838	0.155-0.305	0.022120	(-0.081-0.125)	0.113053
MS	2006	0.031379	0.011264	0.016-0.063	0.204620	0.050249	0.126-0.333	0.173241	(0.072-0.274)	5.520922
	2007	0.024718	0.010379	0.011-0.055	0.138140	0.037519	0.081-0.236	0.113422	(0.037-0.190)	4.588640
	2008	0.022116	0.008730	0.010-0.047	0.157170	0.038237	0.097-0.255	0.135054	(0.058-0.212)	6.106620
MO	2006	0.078593	0.007528	0.065-0.095	0.075518	0.006505	0.064-0.090	-0.003075	(-0.023-0.016)	-0.039126
	2007	0.054136	0.006789	0.042-0.069	0.056866	0.007260	0.044-0.073	0.002730	(-0.017-0.022)	0.050429
	2008	0.066671	0.007989	0.053-0.085	0.063968	0.007501	0.051-0.081	-0.002703	(-0.024-0.019)	-0.040542
NE	2007	0.232320	0.069593	0.129-0.418	0.719580	0.177250	0.442-1.171	0.487260	(0.114-0.861)	2.097366
	2008	0.162080	0.047997	0.091-0.290	1.022000	0.172610	0.731-1.429	0.859920	(0.509-1.211)	5.305528

Appendix A. BCR and state-level density (males/ha) estimates, standard error, 95% confidence intervals, 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 breeding season from 2006-2008 (continued).

Density (# males/ha)										
Northern Bobwhite		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
NC	2007	0.081733	0.017808	0.053-0.126	0.094071	0.022453	0.09-0.151	0.012338	(-0.044-0.069)	0.150955
	2008	0.088301	0.022836	0.053-0.147	0.109820	0.025729	0.069-0.174	0.021519	(-0.046-0.089)	0.243701
OH	2006	0.085321	0.023198	0.050-0.145	0.059194	0.019618	0.031-0.113	-0.026127	(-0.086-0.033)	-0.306220
	2007	0.042002	0.017818	0.019-0.095	0.025461	0.009547	0.012-0.052	-0.016541	(-0.056-0.023)	-0.393815
	2008	0.056283	0.021822	0.027-0.119	0.021892	0.008658	0.010-0.047	-0.034391	(-0.080-0.017)	-0.611037
SC	2006	0.25645	0.064976	0.156-0.422	0.458100	0.088668	0.312-0.673	0.201650	(-0.014-0.417)	0.786313
	2007	0.270280	0.087729	0.143-0.510	0.473900	0.113260	0.295-0.761	0.203620	(-0.077-0.484)	0.753367
	2008	0.243250	0.067660	0.141-0.421	0.273670	0.068211	0.167-0.448	0.030420	(-0.158-0.219)	0.125057
TN	2006	0.134930	0.039197	0.076-0.239	0.215720	0.048665	0.138-0.337	0.080790	(-0.042-0.203)	0.598755
	2007	0.141850	0.040347	0.080-0.251	0.218710	0.056980	0.230-0.369	0.076860	(-0.060-0.214)	0.541840
	2008	0.107200	0.030540	0.061-0.188	0.162810	0.037864	0.103-0.258	0.055610	(-0.040-0.151)	0.518750
TX	2006	0.471000	0.056154	0.370-0.600	0.530610	0.050160	0.439-0.642	0.059610	(-0.088-0.207)	0.126561
	2007	0.349290	0.030542	0.293-0.416	0.426740	0.039665	0.354-0.514	0.077450	(-0.021-0.176)	0.221736
	2008	0.370950	0.033592	0.309-0.445	0.456680	0.029709	0.401-0.520	0.085730	(-0.002-0.174)	0.231109

Appendix A. BCR and state-level density (males/ha) estimates, standard error, 95% confidence intervals, 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 breeding season from 2006-2008 (continued).

	Density (# males/ha)									
Dickcissel		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
19-CMP	2006	0.432340	0.168260	0.203-0.919	0.596490	0.260180	0.259-1.376	0.164150	(-0.443-0.771)	0.379678
	2007	0.396420	0.091203	0.253-0.621	1.565200	0.238210	1.159-2.114	1.168780	(0.669-1.669)	2.948338
	2008	0.199240	0.066304	0.105-0.379	0.668750	0.147720	0.434-1.032	0.469510	(0.152-0.787)	2.356505
22-ETP	2006	0.207270	0.033768	0.151-0.285	0.396190	0.063779	0.289-0.523	0.188920	(0.047-0.330)	0.911468
	2007	0.326730	0.052420	0.239-0.447	0.467730	0.073359	0.344-0.636	0.141000	(-0.036-0.318)	0.431549
	2008	0.404590	0.061243	0.301-0.544	0.791960	0.118460	0.591-1.062	0.387370	(0.126-0.649)	0.957438
24-CH	2006	0.248820	0.088684	0.125-0.494	0.312890	0.102750	0.166-0.591	0.064070	(-0.202-0.330)	0.257495
	2007	0.668040	0.445200	0.200-2.234	0.739480	0.155980	0.488-1.120	0.071440	(-0.853-0.996)	0.106940
	2008	0.411670	0.110080	0.245-0.692	1.128400	0.238970	0.745-1.709	0.716730	(0.201-1.232)	1.741030
26-MAV	2006	0.658700	0.274730	0.274-1.584	1.317300	0.633690	0.484-3.583	0.658600	(-0.695-2.012)	0.999848
	2007	0.548090	0.116360	0.360-0.835	1.455400	0.241990	1.046-2.025	0.907310	(0.381-1.433)	1.655403
	2008	0.748920	0.116300	0.550-1.019	1.987500	0.281090	1.501-2.632	1.238580	(0.642-1.835)	1.653822
27-SCP	2006	0.289100	0.115070	0.136-0.615	0.456700	0.192780	0.206-1.015	0.167600	(-0.272-0.608)	0.579730
	2007	0.185440	0.079104	0.083-0.416	0.345010	0.141910	0.158-0.753	0.159570	(-0.159-0.478)	0.860494
	2008	0.231260	0.106980	0.097-0.552	0.412090	0.164250	0.193-0.878	0.180830	(-0.203-0.565)	0.781934
Overall	2006	0.22952	0.027483	0.182-0.290	0.4127	0.050774	0.324-0.525	0.183180	(0.070-0.296)	0.798100
	2007	0.35633	0.036058	0.292-0.434	0.7812	0.066157	0.662-0.922	0.424870	(0.277-0.573)	1.192350
	2008	0.376490	0.037269	0.310-0.457	0.85437	0.072885	0.723-1.010	0.477880	(0.317-0.638)	1.269303

Appendix A. BCR and state-level density (males/ha) estimates, standard error, 95% confidence intervals, 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 breeding season from 2006-2008 (continued).

Density (# males/ha)										
Dickcissel		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
AR	2007	0.368100	0.065147	0.259-0.524	0.970170	0.126410	0.749-1.257	0.602070	(0.323-0.881)	1.635615
	2008	0.631540	0.083637	0.486-0.821	1.288700	0.160680	1.006-1.650	0.657160	(0.302-1.012)	1.040568
IL	2006	0.21374	0.100190	0.088-0.517	0.713190	0.164430	0.451-1.127	0.499450	(0.122-0.877)	2.336718
	2007	0.3545	0.175770	0.140-0.898	0.586170	0.168450	0.333-1.033	0.231670	(-0.246-0.709)	0.653512
	2008	0.416800	0.185760	0.179-0.968	1.137700	0.302250	0.673-1.924	0.720900	(0.026-1.416)	1.729607
IN	2006	0.14531	0.062149	0.064-0.329	0.329350	0.135680	0.150-0.726	0.184040	(-0.109-0.477)	1.266534
	2007	0.032605	0.017010	0.012-0.087	0.236380	0.135640	0.081-0.691	0.203775	(-0.064-0.472)	6.249808
	2008	0.048907	0.029253	0.016-0.149	0.268990	0.117220	0.117-0.619	0.220083	(-0.017-0.457)	4.500031
IA	2006	0.1355	0.030487	0.087-0.211	0.632620	0.174400	0.371-1.080	0.497120	(0.150-0.844)	3.668782
	2007	0.117020	0.029731	0.071-0.193	0.669220	0.180440	0.397-1.129	0.552200	(0.194-0.911)	4.718851
	2008	0.091462	0.025549	0.053-0.159	0.563600	0.166160	0.318-0.999	0.472138	(0.143-0.802)	5.162122
KY	2006	0.30349	0.101500	0.159-0.579	0.360680	0.112650	0.195-0.666	0.057190	(-0.240-0.354)	0.188441
	2007	0.199020	0.081631	0.091-0.437	0.375840	0.119980	0.201-0.705	0.176820	(-0.108-0.461)	0.888453
	2008	0.403380	0.129930	0.216-0.753	0.361640	0.092720	0.218-0.601	-0.041740	(-0.354-0.271)	-0.103476
MS	2006	0.42603	0.13339	0.230-0.788	1.898100	0.537990	1.085-3.321	1.472070	(0.386-2.558)	3.455320
	2007	0.27267	0.096250	0.137-0.544	1.303500	0.360350	0.755-2.250	1.030830	(0.299-1.762)	3.780504
	2008	0.131370	0.045147	0.067-0.258	1.745400	0.405730	1.101-2.766	1.614030	(0.814-2.414)	12.286138
MO	2006	0.50084	0.093739	0.345-0.727	0.550260	0.114930	0.363-0.834	0.049420	(-0.241-0.340)	0.098674
	2007	0.816020	0.128170	0.599-1.113	1.013000	0.171050	0.723-1.414	0.196980	(-0.222-0.616)	0.241391
	2008	1.069800	0.151680	0.809-1.415	1.774000	0.266420	1.318-2.387	0.704200	(0.103-1.305)	0.658254
NE	2007	1.7361	0.34685	1.166-2.585	3.521300	0.541450	2.593-4.782	1.785200	(0.525-3.046)	1.028282
	2008	1.178900	0.247360	0.775-1.792	2.929300	0.421080	2.198-3.903	1.750400	(0.793-2.708)	1.484774
TX	2006	0.21233	0.059370	0.122-0.371	0.237220	0.085574	0.117-0.482	0.024890	(-0.179-0.229)	0.117223
	2007	0.41259	0.083827	0.276-0.618	1.197500	0.191270	0.871-1.647	0.784910	(0.376-1.194)	1.902397
	2008	0.12755	0.038222	0.071-0.230	0.435000	0.094154	0.283-0.669	0.307450	(0.108-0.507)	2.410427

Appendix A. BCR and state-level density (males/ha) estimates, standard error, 95% confidence intervals, 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 breeding season from 2006-2008 (continued).

Density (# males/ha)										
Field Sparrow		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
22-ETP	2006	0.17914	0.024296	0.137-0.234	0.52093	0.052067	0.428-0.634	0.341790	(0.229-0.454)	1.907949
	2007	0.15343	0.020425	0.118-0.199	0.50932	0.051628	0.418-0.621	0.355890	(0.247-0.465)	2.319559
	2008	0.123740	0.020308	0.090-0.171	0.5089	0.056312	0.410-0.632	0.385160	(0.268-0.503)	3.112656
24-CH	2006	0.23027	0.044158	0.158-0.335	0.43321	0.068953	0.317-0.592	0.202940	(0.042-0.363)	0.881313
	2007	0.31736	0.061705	0.217-0.464	0.50661	0.070689	0.385-0.666	0.189250	(0.005-0.373)	0.596326
	2008	0.287660	0.055478	0.197-0.420	0.44052	0.064051	0.331-0.586	0.152860	(-0.013-0.319)	0.531391
27-SCP	2006	0.44072	0.155150	0.225-0.864	0.42327	0.076668	0.297-0.603	-0.017450	(-0.356-0.322)	-0.039594
	2007	0.16204	0.038136	0.103-0.256	0.41229	0.093737	0.265-0.641	0.250250	(0.052-0.449)	1.544372
	2008	0.147080	0.036567	0.091-0.238	0.24913	0.028696	0.199-0.312	0.102050	(0.011-0.193)	0.693840
Overall	2006	0.22864	0.031720	0.174-0.300	0.44295	0.042051	0.368-0.533	0.214310	(0.111-0.318)	0.937325
	2007	0.18199	0.021640	0.144-0.230	0.52744	0.051367	0.436-0.638	0.345450	(0.236-0.455)	1.898181
	2008	0.136980	0.020552	0.102-0.184	0.35315	0.034234	0.292-0.427	0.216170	(0.138-0.294)	1.578114

Appendix A. BCR and state-level density (males/ha) estimates, standard error, 95% confidence intervals, 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 breeding season from 2006-2008 (continued).

Density (# males/ha)										
Field Sparrow		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
GA	2006	0.12739	0.029082	0.081-0.200	0.218690	0.046152	0.144-0.333	0.091300	(-0.016-0.198)	0.716697
	2007	0.085103	0.025421	0.047-0.153	0.240310	0.040473	0.172-0.336	0.155207	(0.062-0.249)	1.823755
	2008	0.063785	0.019196	0.035-0.115	0.249210	0.042354	0.178-0.349	0.185425	(0.094-0.277)	2.907031
IL	2006	0.109230	0.055124	0.042-0.282	0.963470	0.219980	0.614-1.511	0.854240	(0.410-1.299)	7.820562
	2007	0.179980	0.077753	0.079-0.410	1.407100	0.323220	0.895-2.211	1.227120	(0.576-1.879)	6.818091
	2008	0.196010	0.091618	0.081-0.475	1.414600	0.324780	0.900-2.223	1.218590	(0.557-1.880)	6.216979
IN	2006	0.325140	0.087171	0.191-0.553	0.654830	0.156810	0.407-1.053	0.329690	(-0.022-0.681)	1.013994
	2007	0.420790	0.087299	0.278-0.636	1.151000	0.209050	0.81-1.653	0.730210	(0.286-1.174)	1.735331
	2008	0.284650	0.076607	0.167-0.485	1.002500	0.176470	0.706-1.424	0.717850	(0.341-1.095)	2.521869
IA	2006	0.050410	0.016619	0.026-0.096	0.104180	0.021500	0.069-0.157	0.053770	(0.001-0.107)	1.066653
	2007	0.025663	0.009841	0.012-0.054	0.113650	0.024297	0.074-0.174	0.087987	(0.037-0.139)	3.428555
	2008	0.028229	0.012216	0.012-0.066	0.104850	0.031152	0.058-0.189	0.076621	(0.011-0.142)	2.714265
KY	2006	0.200140	0.041037	0.134-0.299	0.495810	0.080047	0.361-0.682	0.295670	(0.119-0.472)	1.477316
	2007	0.312680	0.066668	0.206-0.475	0.599010	0.090379	0.445-0.806	0.286330	(0.066-0.506)	0.915729
	2008	0.244590	0.048378	0.166-0.361	0.551420	0.081274	0.413-0.737	0.306830	(0.121-0.492)	1.254467
MS	2006	0.099705	0.045195	0.042-0.239	0.119230	0.048733	0.054-0.264	0.019525	(-0.111-0.150)	0.195828
	2007	0.065004	0.026744	0.029-0.145	0.094236	0.029268	0.051-0.174	0.029232	(-0.049-0.107)	0.449695
	2008	0.018367	0.008348	0.008-0.044	0.090150	0.024290	0.053-0.154	0.071783	(0.021-0.122)	3.908259
MO	2006	0.075477	0.016465	0.049-0.117	0.145150	0.018878	0.112-0.188	0.069673	(0.021-0.119)	0.923102
	2007	0.095267	0.015884	0.069-0.133	0.126580	0.018303	0.095-0.169	0.031313	(-0.016-0.079)	0.328687
	2008	0.113590	0.022030	0.078-0.167	0.158500	0.025263	0.116-0.217	0.044910	(-0.021-0.111)	0.395369
NE	2007	0.2693	0.1159	0.118-0.617	0.769440	0.241130	0.417-1.419	0.500140	(-0.024-1.025)	1.857185
	2008	0.224420	0.077273	0.115-0.440	1.0099	0.30086	0.563-1.812	0.785480	(0.177-1.394)	3.500045
NC	2007	0.083843	0.026100	0.045-0.155	0.173820	0.037066	0.114-0.266	0.089977	(0.001-0.179)	1.073161
	2008	0.080229	0.026612	0.042-0.154	0.156650	0.036585	0.099-0.249	0.076421	(-0.012-0.165)	0.952536

Appendix A. BCR and state-level density (males/ha) estimates, standard error, 95% confidence intervals, 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 breeding season from 2006-2008 (continued).

Density (# males/ha)											
Field Sparrow		Control	SE	95% CI	CP33	SE	95% CI	Effect Size	95% CI (ES)	Relative ES
OH	2006	0.404940	0.079787	0.276-0.595	0.755580	0.105760	0.574-0.994	0.350640	(0.091-0.610)	0.865906
	2007	0.276030	0.057014	0.184-0.413	0.620050	0.087869	0.470-0.819	0.344020	(0.139-0.549)	1.246314
	2008	0.197000	0.060683	0.108-0.359	0.566690	0.093354	0.410-0.784	0.369690	(0.152-0.588)	1.876599
SC	2006	0.053143	0.035450	0.016-0.180	0.152340	0.052631	0.078-0.299	0.099197	(-0.025-0.224)	1.866605
	2007	0.076171	0.032502	0.034-0.173	0.282920	0.074687	0.169-0.475	0.206749	(0.047-0.366)	2.714274
	2008	0.068554	0.032198	0.028-0.168	0.205660	0.063043	0.113-0.375	0.137106	(-0.002-0.276)	1.999971
TN	2006	0.63057	0.13515	0.411-0.967	0.82313	0.14601	0.578-1.173	0.192560	(-0.197-0.583)	0.305375
	2007	0.56593	0.15117	0.330-0.971	0.896820	0.170840	0.609-1.321	0.330890	(-0.116-0.778)	0.584684
	2008	0.512200	0.114800	0.328-0.801	0.95248	0.13359	0.719-1.261	0.440280	(0.095-0.786)	0.859586

Appendix A. BCR and state-level density (males/ha) estimates, standard error, 95% confidence intervals, 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 breeding season from 2006-2008 (continued).

Density (# males/ha)										
Eastern Meadow-lark		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
19-CMP	2006	0.337240	0.072929	0.218-0.521	0.271370	0.055743	0.180-0.409	-0.065870	(-0.246-0.114)	-0.195321
	2007	0.241770	0.056122	0.153-0.382	0.243930	0.050530	0.162-0.367	0.002160	(-0.146-0.150)	0.008934
	2008	0.269440	0.040036	0.201-0.362	0.258400	0.038430	0.192-0.347	-0.011040	(-0.120-0.098)	-0.040974
22-ETP	2006	0.142370	0.030244	0.094-0.215	0.057004	0.012172	0.038-0.086	-0.085366	(-0.149--0.021)	-0.599607
	2007	0.122700	0.026054	0.081-0.185	0.215060	0.055135	0.131-0.353	0.092360	(-0.027-0.212)	0.752730
	2008	0.131820	0.033286	0.081-0.215	0.173840	0.043516	0.107-0.282	0.042020	(-0.065-0.149)	0.318768
24-CH	2006	0.044495	0.015309	0.023-0.087	0.077847	0.024930	0.042-0.145	0.033352	(-0.024-0.091)	0.749567
	2007	0.093595	0.029449	0.051-0.172	0.203870	0.067453	0.108-0.386	0.110275	(-0.034-0.255)	1.178215
	2008	0.107980	0.053946	0.042-0.276	0.143980	0.041134	0.083-0.251	0.036000	(-0.097-0.169)	0.333395
26-MAV	2006	0.337240	0.072929	0.218-0.521	0.271370	0.055743	0.180-0.409	-0.065870	(-0.246-0.114)	-0.195321
	2007	0.241770	0.056122	0.153-0.382	0.243930	0.050530	0.162-0.367	0.002160	(-0.146-0.150)	0.008934
	2008	0.269440	0.040036	0.201-0.362	0.258400	0.038430	0.192-0.347	-0.011040	(-0.120-0.098)	-0.040974
27-SCP	2006	0.142370	0.030244	0.094-0.215	0.057004	0.012172	0.038-0.086	-0.085366	(-0.149--0.021)	-0.599607
	2007	0.122700	0.026054	0.081-0.185	0.215060	0.055135	0.131-0.353	0.092360	(-0.027-0.212)	0.752730
	2008	0.131820	0.033286	0.081-0.215	0.173840	0.043516	0.107-0.282	0.042020	(-0.065-0.149)	0.318768
Overall	2006	0.044495	0.015309	0.023-0.087	0.077847	0.024930	0.042-0.145	0.033352	(-0.024-0.091)	0.749567
	2007	0.093595	0.029449	0.051-0.172	0.203870	0.067453	0.108-0.386	0.110275	(-0.034-0.255)	1.178215
	2008	0.107980	0.053946	0.042-0.276	0.143980	0.041134	0.083-0.251	0.036000	(-0.097-0.169)	0.333395

Appendix A. BCR and state-level density (males/ha) estimates, standard error, 95% confidence intervals, 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 breeding season from 2006-2008 (continued).

Density (# males/ha)										
Eastern Meadow-lark		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
AR	2007	0.095112	0.027255	0.055-0.166	0.074703	0.013816	0.052-0.108	-0.020409	(-0.080-0.039)	-0.214579
	2008	0.122090	0.035055	0.070-0.213	0.100820	0.017480	0.072-0.142	-0.021270	(-0.098-0.056)	-0.174216
IL	2006	0.323380	0.105000	0.171-0.611	0.249470	0.083282	0.130-0.479	-0.073910	(-0.337-0.189)	-0.228555
	2007	0.205520	0.064233	0.112-0.379	0.496680	0.121430	0.307-0.803	0.291160	(0.022-0.560)	1.416699
	2008	0.289660	0.092665	0.155-0.542	0.412540	0.111040	0.243-0.700	0.122880	(-0.161-0.406)	0.424222
IN	2006	0.050520	0.018313	0.025-0.102	0.256010	0.103380	0.119-0.921	0.205490	(-0.000-0.411)	4.067498
	2007	0.111280	0.047084	0.049-0.252	0.330350	0.181580	0.119-0.921	0.219070	(-0.149-0.587)	1.968638
	2008	0.111280	0.033246	0.062-0.200	0.293650	0.133170	0.124-0.693	0.182370	(-0.087-0.451)	1.638839
IA	2006	0.095683	0.025168	0.057-0.160	0.074420	0.028660	0.035-0.157	-0.021263	(-0.096-0.054)	-0.222223
	2007	0.077320	0.022741	0.043-0.138	0.057990	0.018334	0.031-0.108	-0.019330	(-0.077-0.038)	-0.250000
	2008	0.063789	0.023554	0.0310.131	0.072294	0.027447	0.035-0.152	0.008505	(-0.062-0.079)	0.133330
KY	2006	0.125660	0.051353	0.058-0.273	0.152070	0.056431	0.074-0.312	0.026410	(-0.123-0.176)	0.210170
	2007	0.192180	0.081460	0.086-0.429	0.239960	0.079365	0.126-0.457	0.047780	(-0.1750.271)	0.248621
	2008	0.250340	0.102450	0.115-0.545	0.176650	0.055756	0.096-0.326	-0.073690	(-0.302-0.155)	-0.294360
MS	2006	0.085675	0.022202	0.051-0.143	0.093218	0.036835	0.043-0.201	0.007543	(-0.077-0.092)	0.088042
	2007	0.075924	0.022722	0.042-0.137	0.087137	0.022055	0.053-0.144	0.011213	(-0.051-0.073)	0.147687
	2008	0.083028	0.022762	0.048-0.143	0.082462	0.025758	0.045-0.152	-0.000566	(-0.068-0.067	-0.006817
MO	2006	0.083704	0.015703	0.058-0.122	0.048205	0.012262	0.029-0.080	-0.035499	(-0.075-0.004)	-0.424102
	2007	0.069144	0.012922	0.048-0.100	0.073815	0.016949	0.047-0.116	0.004671	(-0.037-0.046)	0.067555
	2008	0.105820	0.017302	0.077-0.146	0.065799	0.015777	0.041-0.105	-0.040021	(-0.086-0.006)	-0.378199
NE	2007	0.546600	0.186540	0.028-1.067	0.393600	0.137080	0.199-0.778	-0.153000	(-0.607-0.301)	-0.279912
	2008	0.725830	0.126060	0.514-1.026	0.636960	0.110910	0.450-0.901	-0.088870	(-0.418-0.240)	-0.122439
NC	2007	0.086621	0.027296	0.047-0.161	0.053154	0.015948	0.029-0.096	-0.033467	(-0.095-0.0.29)	-0.386361
	2008	0.093936	0.052271	0.033-0.268	0.029737	0.012702	0.013-0.068	-0.064199	(-0.170-0.041)	-0.683433
OH	2006	0.100610	0.024087	0.063-0.161	0.033960	0.009330	0.020-0.058	-0.066650	(-0.117--0.016)	-0.662459
	2007	0.089143	0.020465	0.057-0.140	0.044673	0.014809	0.023-0.085	-0.044470	(-0.094-0.005)	-0.498861
	2008	0.081576	0.023150	0.047-0.143	0.040384	0.011992	0.023-0.072	-0.041192	(-0.092-0.010)	-0.504952

Appendix A. BCR and state-level density (males/ha) estimates, standard error, 95% confidence intervals, 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 breeding season from 2006-2008 (continued).

Density (# males/ha)										
Eastern Meadow-lark		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
TN	2006	0.111790	0.045553	0.051-0.243	0.109440	0.054101	0.043-0.278	-0.002350	(-0.141-0.136)	-0.021022
	2007	0.025946	0.019753	0.007-0.103	0.063232	0.035914	0.022-0.184	0.037286	(-0.043-0.118)	1.437062
	2008	0.100300	0.039608	0.047-0.213	0.140710	0.053705	0.068-0.292	0.040410	(-0.090-0.171)	0.402891
TX	2006	0.198110	0.042258	0.129-0.304	0.159420	0.032251	0.106-0.239	-0.038690	(-0.143-0.066)	-0.195296
	2007	0.115330	0.025899	0.074-0.181	0.121090	0.027786	0.077-0.191	0.005760	(-0.069-0.080)	0.049944
	2008	0.140550	0.024547	0.099-0.199	0.146470	0.024280	0.105-0.204	0.005920	(-0.062-0.074)	0.042120

Appendix A. BCR and state-level density (males/ha) estimates, standard error, 95% confidence intervals, 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 breeding season from 2006-2008 (continued).

Density (# males/ha)										
Indigo Bunting		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
22-ETP	2006	0.37938	0.050787	0.292-0.493	1.435500	0.208370	1.081-1.906	1.056120	(0.636-1.477)	2.783805
	2007	0.8395	0.183630	0.549-1.284	2.2972	0.480550	1.530-3.449	1.457700	(0.449-2.466)	1.736391
	2008	0.683520	0.153930	0.441-1.059	1.1898	0.207920	0.846-1.673	0.506280	(-0.001-1.013)	0.740695
24-CH	2006	2.0025	0.226600	1.602-2.503	2.782400	0.284100	2.276-3.402	0.779900	(0.068-1.492)	0.389463
	2007	2.0745	0.220590	1.683-2.558	2.3486	0.268390	1.875-2.942	0.274100	(-0.407-0.955)	0.132128
	2008	2.032500	0.231030	1.625-2.543	2.3047	0.271950	1.826-2.908	0.272200	(-0.427-0.972)	0.133924
26-MAV	2006	1.2284	0.420270	0.612-2.466	1.713800	0.706130	0.774-3.795	0.485400	(-1.125-2.096)	0.395148
	2007	0.48022	0.155400	0.257-0.898	0.43445	0.079257	0.304-0.621	-0.045770	(-0.388-0.296)	-0.095310
	2008	0.537250	0.078900	0.403-0.717	0.50954	0.079280	0.375-0.692	-0.027710	(-0.247-0.192)	-0.051577
27-SCP	2006	2.1067	0.183460	1.776-2.499	2.789200	0.232650	2.368-3.285	0.682500	(0.102-1.263)	0.323966
	2007	1.5295	0.135990	1.285-1.821	2.0404	0.163240	1.744-2.387	0.510900	(0.095-0.927)	0.334031
	2008	1.667100	0.140840	1.413-1.968	2.1489	0.162830	1.852-2.493	0.481800	(0.060-0.904)	0.289005
Overall	2006	1.0215	0.118590	0.814-1.282	1.735100	0.170060	1.432-2.102	0.713600	(0.307-1.120)	0.698581
	2007	1.1836	0.162530	0.905-1.548	1.6998	0.180620	1.381-2.093	0.516200	(0.040-0.992)	0.436127
	2008	1.135700	0.189920	0.820-1.573	1.3057	0.178120	1.000-1.704	0.170000	(-0.340-0.680)	0.149687

Appendix A. BCR and state-level density (males/ha) estimates, standard error, 95% confidence intervals, 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 breeding season from 2006-2008 (continued).

Density (# males/ha)										
Indigo Bunting		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
AR	2007	0.284780	0.053884	0.195-0.416	0.379650	0.066536	0.267-0.539	0.094870	(-0.073-0.263)	0.333134
	2008	0.462880	0.057859	0.361-0.594	0.519360	0.070427	0.396-0.681	0.056480	(-0.122-0.235)	0.122019
GA	2006	0.40717	0.13311	0.217-0.763	0.65218	0.19477	0.367-1.160	0.245010	(-0.217-0.707)	0.601739
	2007	0.422290	0.141860	0.222-0.805	0.525010	0.161960	0.290-0.951	0.102720	(-0.319-0.525)	0.243245
	2008	0.444820	0.147220	0.236-0.840	0.513600	0.153820	0.288-0.915	0.068780	(-0.349-0.486)	0.154624
IL	2006	0.852450	0.221910	0.511-1.423	1.791200	0.284930	1.308-2.454	0.938750	(0.231-1.647)	1.101238
	2007	1.436500	0.282240	0.976-2.114	2.579200	0.385250	1.921-3.464	1.142700	(0.207-2.079)	0.795475
	2008	1.227000	0.252430	0.819-1.839	2.127100	0.386640	1.485-3.048	0.900100	(-0.005-1.805)	0.733578
IN	2006	0.97922	0.20729	0.642-1.493	2.2443	0.38958	1.587-3.173	1.265080	(0.400-2.130)	1.291926
	2007	1.923600	0.359770	1.324-2.796	2.619300	0.426210	1.892-3.627	0.695700	(-0.398-1.789)	0.361666
	2008	1.616600	0.291330	1.128-2.318	2.373800	0.345560	1.774-3.176	0.757200	(-0.129-1.643)	0.468390
IA	2006	0.074025	0.025422	0.038-0.145	0.13748	0.035591	0.083-0.229	0.063455	(-0.022-0.149)	0.857210
	2007	0.057682	0.023098	0.027-0.125	0.080755	0.028589	0.040-0.161	0.023073	(-0.049-0.095)	0.400003
	2008	0.088830	0.028392	0.047-0.166	0.133250	0.036424	0.078-0.228	0.044420	(-0.046-0.135)	0.500056
KY	2006	2.6122	0.23166	2.187-3.120	3.1806	0.25471	2.710-3.734	0.568400	(-0.106-1.243)	0.217594
	2007	2.836700	0.247010	2.382-3.379	3.074800	0.282870	2.556-3.699	0.238100	(-0.498-0.974)	0.083936
	2008	2.323100	0.261450	1.853-2.912	2.839400	0.274640	2.338-3.448	0.516300	(-0.227-1.260)	0.222246
MS	2006	1.3159	0.20426	0.965-1.795	3.3504	1.034600	1.851-6.066	2.034500	(-0.032-4.101)	1.546090
	2007	0.806120	0.110940	0.612-1.062	1.806800	0.544560	1.012-3.226	1.000680	(-0.089-2.090)	1.241354
	2008	1.005400	0.133800	0.771-1.312	2.299700	0.682740	1.299-4.072	1.294300	(-0.069-2.658)	1.287348
MO	2006	0.94368	0.13319	0.711-1252	0.962	0.102320	0.777-1.190	0.018320	(-0.311-0.348)	0.019413
	2007	0.777810	0.098583	0.605-1.001	0.865550	0.100310	0.687-1.090	0.087740	(-0.188-0.363)	0.112804
	2008	0.752490	0.097108	0.582-0.973	0.921870	0.115730	0.718-1.183	0.169380	(-0.127-0.465)	0.225093
NC	2007	0.43156	0.049114	0.344-0.542	0.608780	0.056814	0.505-0.733	0.177220	(0.030-0.324)	0.410650
	2008	0.507940	0.050340	0.417-0.619	0.666980	0.061935	0.554-0.803	0.159040	(0.003-0.315)	0.313108

Appendix A. BCR and state-level density (males/ha) estimates, standard error, 95% confidence intervals, 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 breeding season from 2006-2008 (continued).

Density (# males/ha)										
Indigo Bunting		Control	SE	95% CI	CP33	SE	95% CI	Effect Size	95% CI (ES)	Relative ES
OH	2006	0.419870	0.094763	0.269-0.656	1.8504	0.256930	1.408-2.433	1.430530	(0.894-1.967)	3.407078
	2007	0.546050	0.119000	0.355-0.840	2.643100	0.339170	2.053-3.403	2.097050	(1.393-2.802)	3.840399
	2008	0.278740	0.090558	0.147-0.527	0.638590	0.174410	0.373-1.094	0.359850	(-0.025-0.745)	1.290988
SC	2006	0.648160	0.127990	0.438-0.959	0.986420	0.194130	0.667-1.458	0.338260	(-0.118-0.794)	0.521877
	2007	0.681530	0.121730	0.478-0.972	1.112000	0.179740	0.807-1.533	0.430470	(0.005-0.856)	0.631623
	2008	0.715600	0.109960	0.527-0.971	0.790930	0.133320	0.566-1.106	0.075330	(-0.263-0.414)	0.105268
TN	2006	3.897	0.75932	2.666-5.697	4.9134	0.901010	3.438-7.023	1.016400	(-1.293-3.326)	0.260816
	2007	3.3377	0.685290	2.235-4.985	4.633400	0.882000	3.196-6.717	1.295700	(-0.894-3.485)	0.388201
	2008	3.868300	0.712800	2.702-5.539	4.633400	0.841050	3.253-6.599	0.765100	(-1.396-2.926)	0.197787

Density (# males/ha)										
Eastern Kingbird		Control	SE	95% CI	CP33	SE	95% CI	Effect Size	95% CI (ES)	Relative ES
Overall	2006	0.12412	0.037313	0.069-0.222	0.071524	0.014817	0.048-0.107	-0.052596	(-0.131-0.026)	-0.423751
	2007	0.17067	0.041394	0.107-0.273	0.1724	0.032752	0.119-0.250	0.001730	(-0.102-0.105)	0.010137
	2008	0.104170	0.024750	0.066-0.165	0.12837	0.027534	0.085-0.195	0.024200	(-0.048-0.097)	0.232313

Density (# males/ha)										
Grass-hopper Sparrow		Control	SE	95% CI	CP33	SE	95% CI	Effect Size	95% CI (ES)	Relative ES
Overall	2006	0.099304	0.019372	0.068-0.145	0.092077	0.019518	0.080-0.139	-0.007227	(-0.061-0.047)	-0.072777
	2007	0.058763	0.012518	0.039-0.089	0.075881	0.017902	0.048-0.120	0.017118	(-0.026-0.060)	0.291306

Appendix A. BCR and state-level density (males/ha) estimates, standard error, 95% confidence intervals, 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 breeding season from 2006-2008 (continued).

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	0.049881	0.019290	0.024-0.104	0.116190	0.028474	0.072-0.187	0.066309	(-0.001-0.134)	1.329344
	2007	0.052260	0.015159	0.030-0.092	0.056336	0.013790	0.035-0.091	0.004076	(-0.036-0.044)	0.077995
	2008	0.060328	0.016694	0.035-0.103	0.059441	0.013276	0.038-0.092	-0.000887	(-0.043-0.041)	-0.014703

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	0.019969	0.006465	0.011-0.037	0.043880	0.010820	0.027-0.071	0.023911	(-0.001-0.049)	1.197406
	2007	0.019038	0.006177	0.010-0.036	0.020225	0.006642	0.011-0.038	0.001187	(-0.017-0.019)	0.062349
	2008	0.017176	0.005554	0.009-0.032	0.035183	0.010804	0.020-0.034	0.018007	(-0.006-0.042)	1.048381

Density (# males/ha)										
Ring-necked pheasant		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
IA, IL, OH	2006	0.004988	0.0015976	0.003-0.007	0.005201	0.0015225	0.003-0.007	0.000213	(-0.004-0.005)	0.042702
	2007	0.0048574	0.0015158	0.003-0.007	0.011749	0.0027495	0.009-0.015	0.006892	(0.001-0.130)	1.418784
	2008	0.014679	0.0035991	0.010-0.019	0.016885	0.0042721	0.012-0.022	0.002206	(-0.009-0.132)	0.150283

Density (# males/ha)										
Scissor-tailed flycatcher		**Control**	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
TX	2006	2.2534	0.61613	1.815-2.691	2.0041	0.40333	1.559-2.549	-0.249300	(-1.693-1.194)	-0.110633
	2007	0.77945	0.1402	0.737-1.220	0.97691	0.13542	0.922-1.307	0.197460	(-0.185-0.580)	0.253332
	2008	0.625660	0.10711	0.523-0.736	0.7076	0.11452	0.578-0.849	0.081940	(-0.225-0.389)	0.130966

Appendix B. BCR and state-level density estimates (coveys/ha), standard error, 95% confidence intervals, 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 2006-2008, 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))(continued).

Density (# males/ha)										
		Control	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
19-CMP	2006	0.306850	0.081328	0.183-0.514	0.364230	0.085025	0.231-0.574	0.057380	(-0.173-0.288)	0.186997
	2007	0.255580	0.046883	0.178-0.367	0.263540	0.044773	0.189-0.368	0.007960	(-0.119-0.135)	0.031145
	2008	0.173370	0.030456	0.122-0.246	0.309180	0.067808	0.201-0.475	0.135810	(-0.010-0.282)	0.783354
22-ETP	2006	0.019798	0.003613	0.014-0.028	0.027744	0.004152	0.021-0.037	0.007946	(-0.003-0.019)	0.401354
	2007	0.015745	0.003113	0.011-0.023	0.023807	0.003662	0.012-0.032	0.008062	(-0.001-0.018)	0.512036
	2008	0.013403	0.002706	0.009-0.020	0.018974	0.003023	0.014-0.026	0.005571	(-0.002-0.014)	0.415653
24-CH	2006	0.029463	0.005212	0.021-0.042	0.040963	0.007713	0.028-0.059	0.011500	(-0.007-0.030)	0.390320
	2007	0.018490	0.004066	0.012-0.029	0.036037	0.005801	0.026-0.050	0.017547	(0.004-0.031)	0.948999
	2008	0.020481	0.004078	0.012-0.030	0.039961	0.007870	0.027-0.059	0.019480	(0.002-0.037)	0.951125
26-MAV	2006	0.006792	0.002151	0.004-0.013	0.019990	0.004975	0.012-0.033	0.013199	(0.003-0.024)	1.943385
	2007	0.006295	0.002258	0.003-0.013	0.017626	0.006044	0.009-0.034	0.011331	(-0.001-0.024)	1.799911
	2008	0.006421	0.003233	0.002-0.017	0.017288	0.006092	0.009-0.034	0.010867	(-0.003-0.024)	1.692374
27-SCP	2006	0.014747	0.002423	0.010-0.020	0.045040	0.005238	0.036-0.057	0.030293	(0.019-0.042)	2.054181
	2007	0.014259	0.002343	0.010-0.020	0.040342	0.004986	0.032-0.051	0.026083	(0.015-0.037)	1.829231
	2008	0.013615	0.002257	0.010-0.019	0.051406	0.005874	0.041-0.064	0.037791	(0.025-0.050)	2.775689
Overall	2006	0.029248	0.002776	0.024-0.035	0.043947	0.006011	0.034-0.057	0.014699	(0.002-0.028)	0.502564
	2007	0.033027	0.004223	0.026-0.042	0.056035	0.005294	0.047-0.067	0.023008	(0.010-0.036)	0.696642
	2008	0.023119	0.002400	0.019-0.028	0.048447	0.005125	0.039-0.060	0.025328	(0.014-0.036)	1.095549

Appendix B. BCR and state-level density estimates (coveys/ha), standard error, 95% confidence intervals, 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 2006-2008, 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))(continued).

Density (# males/ha)										
		Control	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
AR	2006	0.012196	0.007805	0.004-0.039	0.023203	0.012492	0.009-0.063	0.011007	(-0.018-0.040)	0.902509
	2007	0.014604	0.009245	0.005-0.046	0.025035	0.015354	0.008-0.077	0.010431	(-0.025-0.046)	0.714256
	2008	0.006795	0.005864	0.002-0.030	0.011325	0.008960	0.003-0.046	0.004530	(-0.017-0.026)	0.666642
GA	2006	0.033192	0.009695	0.019-0.059	0.076945	0.017785	0.048-0.122	0.043753	(0.004-0.083)	1.318179
	2007	0.019613	0.006951	0.010-0.039	0.057331	0.014548	0.035-0.095	0.037718	(0.006-0.069)	1.923112
	2008	0.026476	0.008244	0.014-0.049	0.095001	0.017877	0.065-0.139	0.068525	(0.030-0.107)	2.588193
IL	2006	0.017261	0.005493	0.009-0.033	0.033289	0.009680	0.019-0.060	0.016028	(-0.006-0.38)	0.928567
	2007	0.013699	0.004843	0.007-0.028	0.043381	0.010349	0.027-0.070	0.029682	(-0.007-0.052)	2.166727
	2008	0.014880	0.005090	0.008-0.029	0.044180	0.008982	0.029-0.066	0.029300	(0.009-0.050)	1.969086
IN	2006	0.015365	0.005552	0.008-0.031	0.027934	0.007727	0.016-0.048	0.012569	(-0.006-0.031)	0.818028
	2007	0.014142	0.005913	0.006-0.032	0.026185	0.007882	0.014-0.048	0.012043	(-0.007-0.031)	0.851577
	2008	0.011448	0.004994	0.005-0.026	0.020360	0.005619	0.012-0.035	0.008912	(-0.006-0.024)	0.778477
IA	2006	0.023646	0.009512	0.011-0.052	0.028714	0.010392	0.014-0.058	0.005068	(-0.023-0.033)	0.214328
	2007	0.013642	0.006926	0.005-0.036	0.027284	0.009345	0.014-0.053	0.013642	(-0.009-0.036)	1.000000
	2008	0.024632	0.009606	0.012-0.053	0.027161	0.011718	0.012-0.063	0.002529	(-0.027-0.032)	0.102671
KY	2006	0.027907	0.006449	0.018-0.044	0.024175	0.006500	0.014-0.041	-0.003732	(-0.022-0.014)	-0.133730
	2007	0.021409	0.007082	0.011-0.044	0.032169	0.005868	0.022-0.046	0.010760	(-0.007-0.029)	0.502592
	2008	0.023927	0.006748	0.014-0.042	0.028938	0.006765	0.018-0.046	0.005011	(-0.014-0.024)	0.209429
MS	2006	0.018911	0.005101	0.011-0.032	0.052737	0.008142	0.039-0.072	0.033826	(0.015-0.053)	1.788694
	2007	0.015313	0.005071	0.008-0.029	0.034181	0.008188	0.021-0.055	0.018868	(-0.001-0.038)	1.232156
	2008	0.016844	0.004883	0.010-0.030	0.056736	0.011104	0.038-0.084	0.039892	(0.016-0.064)	2.368321
MO	2006	0.018297	0.002413	0.014-0.024	0.031836	0.003806	0.025-0.40	0.013539	(0.005-0.022)	0.739957
	2007	0.013457	0.002135	0.010-0.018	0.023840	0.003479	0.018-0.032	0.010383	(0.002-0.018)	0.771569
	2008	0.010943	0.001930	0.008-0.016	0.019908	0.003290	0.014-0.028	0.008965	(0.002-0.016)	0.819245

Appendix B. BCR and state-level density estimates (coveys/ha), standard error, 95% confidence intervals, 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 2006-2008, 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))(continued).

Density (# males/ha)										
		Control	**SE**	**95% CI**	**CP33**	**SE**	**95% CI**	**Effect Size**	**95% CI (ES)**	**Relative ES**
NC	2006	0.006352	0.001911	0.004-0.012	0.016905	0.004273	0.010-0.028	0.010553	(0.001-0.020)	1.661241
	2007	0.003970	0.001498	0.002-0.008	0.016905	0.005332	0.009-0.031	0.012935	(0.002-0.024)	3.257972
	2008	0.003970	0.001386	0.002-0.008	0.018772	0.006223	0.010-0.036	0.014802	(0.002-0.027)	3.728225
OH	2006	0.007449	0.002827	0.004-0.016	0.005568	0.001900	0.003-0.011	-0.001882	(-0.009-0.005)	-0.252614
	2007	0.003974	0.001984	0.002-0.010	0.003255	0.001680	0.001-0.009	-0.000719	(-0.006-0.004)	-0.180814
	2008	0.002767	0.001497	0.001-0.007	0.001353	0.000800	0.001-0.004	-0.001414	(-0.005-0.002)	-0.510861
SC	2006	0.016175	0.006997	0.007-0.037	0.075552	0.020254	0.045-0.128	0.059377	(0.017-0.101)	3.670912
	2007	0.025611	0.007926	0.014-0.047	0.077395	0.017970	0.049-0.122	0.051784	(0.013-0.090)	2.021944
	2008	0.017951	0.006445	0.009-0.036	0.077395	0.017616	0.049-0.121	0.059444	(0.023-0.096)	3.311459
TN	2006	0.010702	0.004400	0.005-0.024	0.024080	0.005678	0.015-0.038	0.013378	(-0.001-0.027)	1.250047
	2007	0.010492	0.004831	0.004-0.026	0.022034	0.006067	0.013-0.038	0.011542	(-0.003-0.027)	1.100076
	2008	0.008394	0.003536	0.004-0.019	0.021212	0.005403	0.013-0.035	0.012818	(0.0002-0.026)	1.527073
TX	2006	0.306850	0.081328	0.183-0.514	0.364230	0.085025	0.231-0.574	0.057380	(-0.173-0.288)	0.186997
	2007	0.255580	0.046883	0.178-0.367	0.263540	0.044773	0.189-0.368	0.007960	(-0.119-0.135)	0.031145
	2008	0.173370	0.030456	0.122-0.246	0.309180	0.067808	0.201-0.475	0.135810	(-0.010-0.282)	0.783354

Appendix B. BCR and state-level density estimates (coveys/ha), standard error, 95% confidence intervals, 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 2006-2008, 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))(continued).

Density (coveys/ha) adjusted for calling rate							
		Control	**95% BootstrapCI**	**CP33**	**95% BootstrapCI**	**Effect Size**	**Relative ES**
19-CMP	2006	0.456312	0.395-0.515	0.156783	0.131-0.184	-0.299529	-0.656413
	2007	0.439944	0.360-0.512	0.390912	0.320-0.460	-0.049032	-0.111450
	2008	0.261976	0.231-0.293	0.456312	0.395-0.515	0.194337	0.741812
22-ETP	2006	0.031294	0.025-0.038	0.042376	0.035-0.050	0.011083	0.354154
	2007	0.024726	0.019-0.031	0.037679	0.030-0.045	0.012953	0.523847
	2008	0.024199	0.019-0.030	0.034555	0.028-0.042	0.010355	0.427905
24-CH	2006	0.044722	0.034-0.055	0.062494	0.047-0.079	0.017772	0.397382
	2007	0.029929	0.022-0.039	0.060579	0.048-0.074	0.030650	1.024099
	2008	0.031782	0.023-0.040	0.059708	0.044-0.078	0.027927	0.878707
26-MAV	2006	0.012854	0.006-0.020	0.033412	0.022-0.045	0.020558	1.599371
	2007	0.010985	0.005-0.018	0.026145	0.013-0.041	0.015160	1.380101
	2008	0.010530	0.003-0.019	0.025593	0.013-0.039	0.015062	1.430364
27-SCP	2006	0.027521	0.021-0.034	0.080583	0.068-0.093	0.053062	1.928057
	2007	0.025896	0.020-0.032	0.069191	0.0.58-0.081	0.043296	1.671928
	2008	0.027167	0.022-0.034	0.073974	0.062-0.085	0.046807	1.722972
Overall	2006	0.054076	0.048-0.060	0.075002	0.068-0.082	0.020926	0.386979
	2007	0.055592	0.048-0.063	0.092508	0.084-0.102	0.036916	0.664057
	2008	0.039404	0.034-0.045	0.060869	0.054-0.068	0.021465	0.544753

Appendix B. BCR and state-level density estimates (coveys/ha), standard error, 95% confidence intervals, 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 2006-2008, 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))(continued).

Density (coveys/ha) adjusted for calling rate							
		Control	**95% BootstrapCI**	**CP33**	**95% BootstrapCI**	**Effect Size**	**Relative ES**
AR	2006	0.022542	0.005-0.042	0.044366	0.024-0.068	0.021825	0.968201
	2007	0.024147	0.007-0.044	0.036442	0.012-0.067	0.012295	0.509147
	2008	0.011768	0.000-0.026	0.019683	0.005-0.042	0.007914	0.672518
GA	2006	0.053185	0.031-0.077	0.109177	0.075-0.145	0.055993	1.052798
	2007	0.037962	0.021-0.057	0.093657	0.063-0.126	0.055694	1.467095
	2008	0.049294	0.027-0.073	0.160152	0.128-0.194	0.110858	2.248899
IL	2006	0.030908	0.016-0.046	0.050566	0.031-0.070	0.019658	0.636025
	2007	0.028397	0.013-0.045	0.068057	0.046-0.091	0.039660	1.396614
	2008	0.02799	0.014-0.044	0.070107	0.052-0.089	0.042120	1.505012
IN	2006	0.02565	0.016-0.037	0.042847	0.027-0.061	0.017201	0.670724
	2007	0.026102	0.013-0.041	0.038699	0.022-0.057	0.012597	0.482595
	2008	0.020488	0.009-0.033	0.036599	0.022-0.052	0.016110	0.786311
IO	2006	0.042200	0.019-0.069	0.047280	0.023-0.075	0.005080	0.120384
	2007	0.022109	0.007-0.040	0.044682	0.024-0.067	0.022572	1.020958
	2008	0.041133	0.019-0.066	0.042516	0.016-0.071	0.001383	0.033624
KY	2006	0.04594	0.032-0.061	0.038194	0.025-0.053	-0.007743	-0.168565
	2007	0.03349	0.019-0.050	0.055808	0.043-0.068	0.022321	0.666570
	2008	0.03868	0.024-0.055	0.046451	0.032-0.063	0.007772	0.200931
MS	2006	0.03184	0.020-0.044	0.085319	0.069-0.102	0.053479	1.679602
	2007	0.02414	0.013-0.037	0.053791	0.036-0.075	0.029651	1.228340
	2008	0.02943	0.019-0.040	0.107771	0.083-0.134	0.078345	2.662470
MO	2006	0.02634	0.022-0.031	0.045208	0.038-0.052	0.018873	0.716662
	2007	0.02747	0.017-0.042	0.036757	0.029-0.044	0.009289	0.338150
	2008	0.01819	0.014-0.023	0.033012	0.026-0.040	0.014825	0.815189
NC	2006	0.011616	0.007-0.017	0.030304	0.020-0.041	0.018688	1.608733
	2007	0.00847	0.004-0.013	0.029528	0.017-0.042	0.021059	2.486657
	2008	0.00686	0.003-0.011	0.034964	0.019-0.051	0.028104	4.097202

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Density (coveys/ha) adjusted for calling rate								
		Control	**95% BootstrapCI**	**CP33**	**95% BootstrapCI**	**Effect Size**	**Relative ES**
OH	2006	0.01388	0.007-0.021	0.012115	0.006-0.019	-0.001769	-0.127401
	2007	0.00708	0.003-0.012	0.005675	0.002-0.010	-0.001406	-0.198551
	2008	0.00482	0.002-0.009	0.004234	0.001-0.009	-0.000586	-0.121566
SC	2006	0.0448	0.024-0.067	0.167066	0.112-0.231	0.122265	2.729017
	2007	0.051	0.031-0.073	0.145834	0.097-0.201	0.094838	1.859729
	2008	0.03317	0.017-0.050	0.107805	0.071-0.147	0.074635	2.250013
TN	2006	0.01933	0.007-0.033	0.050620	0.035-0.068	0.031292	1.619027
	2007	0.01821	0.008-0.031	0.037329	0.023-0.051	0.019119	1.049909
	2008	0.01433	0.006-0.024	0.040762	0.027-0.054	0.026436	1.845424
TX	2006	0.456312	0.395-0.515	0.156783	0.131-0.184	-0.299529	-0.656413
	2007	0.439944	0.360-0.512	0.390912	0.320-0.460	-0.049032	-0.111450
	2008	0.261976	0.231-0.293	0.456312	0.395-0.515	0.194337	0.741812

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