



United States  
Department of  
Agriculture

Natural  
Resources  
Conservation  
Service

August 2009



# Bobwhite Response to Environmental Quality Incentives Program Practices in the High Plains Ecological Region of Texas

RANGELAND  
MANAGEMENT



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**Acknowledgments and disclaimer**

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**Acknowledgments**

Information in this publication was adapted from the M.S. research of Eric Abercrombie under the direction of Dr. Brad Dabbert, Department of Natural Resources Management, Texas Tech University, Lubbock, Texas 79409-2125. Funding for this project was provided by the USDA NRCS Agricultural Wildlife Conservation Center.

Photos were provided by Eric Abercrombie, Department of Natural Resources Management, Texas Tech University.

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# Bobwhite Response to Environmental Quality Incentives Program Practices in the High Plains Ecological Region of Texas

The Northern Bobwhite Conservation Initiative (NBCI) seeks to reverse declines of northern bobwhite (*Colinus virginianus*) populations across the species' range. The goal for the Texas portion of the Shortgrass Prairie Bird Conservation Region (TBCR 18) is to increase the current bobwhite population by 18,933 coveys. Rangeland provides the most potential for adding usable habitat for quail in TBCR 18. However, brush encroachment and overgrazing have caused much of the rangeland to be unusable by bobwhite. New incentives could change the dynamics in TBCR 18. The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP) offers incentives for management practices such as prescribed grazing, brush management, and prescribed burning that may produce habitat conditions that benefit northern bobwhite. However, the potential benefits of EQIP practices for northern bobwhite in TBCR 18 have not been evaluated. The objective was to examine northern bobwhite and scaled quail population responses to brush management and grazing deferment in TBCR 18. Additionally, researchers evaluated the relationships between quail abundance and habitat characteristics in an effort to provide specific recommendations for habitat management in TBCR 18. The study was conducted on eight separate study sites within Bailey, Cochran, Hockley, and Yoakum Counties. Of the eight study sites, five were subjected to brush management, and three were subjected to prescribed grazing. Researchers estimated quail abundance on each study site and an adjacent control site using call counts during 2005, 2006, and 2007. They also evaluated vegetative characteristics of the study sites between May and July 2006 and 2007. Across the study sites,

percentage woody cover and visual obstruction to a height of 29.53 inches were important predictors of quail abundance in TBCR 18. Woody cover was positively related to and was the most important predictor of bobwhite abundance, followed by visual obstruction at heights between 9.85 and 29.53 inches. Large variation among EQIP sites in percent woody cover and grazing history prior to enrollment precluded detection of relationships between quail abundance and EQIP practices within the context of this study. Nevertheless, relationships between bobwhite abundance and vegetation characteristics that will be influenced by prescribed grazing (CPS Code 528) clearly indicate that the practice has great potential for management of quail habitat in TBCR 18 where woody cover is suitable. When implementing the prescribed grazing practice in TBCR 18, it is recommended that stocking rates and deferment periods be tailored so that visual cover is maintained at a height of 15.75 inches or more if bobwhite habitat is an objective. It is also recommended that the woody component of a habitat not become too dense, so that habitat diversity is maintained and the brush species do not outcompete the important grasses and forbs. The brush management conservation practice (CPS Code 314) is useful if percentage woody cover is in excess of 25 percent and is not allowed to drop below 10 percent following management. In contrast to brush management (removal), range planting (CPS Code 550) may be an approved practice that is a more useful tool for providing quail with the necessary woody component where it is lacking in TBCR 18. EQIP conservation practices can be a powerful tool for encouraging proper grazing management to achieve increased acreage of suitable habitat for northern bobwhite in TBCR 18.

# Bobwhite Response to Environmental Quality Incentives Program Practices in the High Plains Ecological Region of Texas

The High Plains ecoregion of Texas has been known to support a wide variety of wildlife, but as land management practices have changed through increased agricultural activities, so have suitable wildlife habitats (fig. 1). According to Breeding Bird Survey data, northern bobwhite (*Colinus virginianus*) abundance has decreased 1.1 percent per year in the Texas High Plains since 1980 (Sauer et al. 2005). Agricultural practices influence more acreage than all other industries combined and, likewise, have a direct influence on available quail habitat. Currently, there are two land uses in this region that seem to have the most impact on bobwhite abundance. First is cotton production, which renders land unsuitable for quail. The second is cattle grazing on natural or seeded rangeland. Cattle grazing can provide suit-

able habitat for quail, if managed properly. However, many areas have been grazed to the point that they provide no suitable habitat for bobwhite (fig. 2). Farm Bill conservation programs provide opportunities for bobwhite restoration in the Texas High Plains through incentives to implement conservation practices that enhance habitat for quail.

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP) is a voluntary incentive program that provides assistance to farmers and ranchers faced with threats to soil, water, air, and related natural resources on their land (USDA NRCS 2004). EQIP offers cost-shares and incentive payments for conservation practices that producers might not otherwise implement. Eligible



Figure 1. This site in the Texas High Plains holds abundant northern bobwhite. Note the well distributed woody cover and significant herbaceous visual obstruction. (Photo credit Eric Abercrombie, TTU).



Figure 2. Sites such as this heavily grazed rangeland do not provide suitable habitat for northern bobwhite in the Texas High Plains. (Photo credit Eric Abercrombie, TTU).

Conservation Practice Standards (CPS) for EQIP in the Texas High Plains include Prescribed Burning (CPS Code 338), Brush Management (CPS Code 314), and Prescribed Grazing (CPS Code 528) (USDA NRCS 2004). Although the primary wildlife species of concern in the Texas High Plains are the lesser prairie-chicken (*Tympanuchus pallidicinctus*) and the black-tailed prairie dog (*Cynomys ludovicianus*), these practices can also enhance habitat for bobwhite. However, prior to this study, the potential benefits for bobwhite populations of conservation practices conducted under EQIP had not been evaluated in the Texas High Plains.

Prescribed grazing by periodic grazing deferment may be one of the most effective methods of increasing acreage of suitable bobwhite habitat in the Texas High Plains. The Texas High Plains is a region of relatively low productivity. Grazing deferment provides rangeland an opportunity to return to a higher range condition class with greater vegetation height, thus providing superior cover for bobwhite and more obstruction from predators (Dabbert, Lucia, and Mitchell 2007; Campbell-Kissock, Blankenship, and White 1984). As a result, bobwhite survival and reproductive success may increase. Under NRCS CPS Code 528, prescribed grazing, grazing duration, intensity, and frequency can be adjusted to provide adequate cover for wildlife. More specific guidelines are not available for the Texas High Plains because the relationships among specific habitat characteristics, such as vegetation composition and height and bobwhite population performance, have not been evaluated. The objective was to examine these relationships in an effort to provide more specific habitat prescriptions for bobwhite on rangelands in the Texas High Plains.

### EQIP Contract Characteristics

A 2-year study was conducted on eight separate study sites (620–>2,500 acres) within four different counties of the Southern High Plains of Texas. Of the eight study sites, three were enrolled in EQIP

Prescribed Grazing (CPS Code 528) and five were enrolled in EQIP Brush Management (CPS Code 314). Each study site was subdivided into two units with a unit on which EQIP conservation practice was being implemented (treatment) and second on which the practice was not applied (control). This array of study areas provided a wide continuum of habitat conditions within which to evaluate the relationships between northern bobwhite abundance and specific habitat characteristics.

The guidelines for EQIP Prescribed Grazing practice for the Southern High Plains require that landowners rest their grazing land for at least two, nonconsecutive growing seasons during a 5-year period of enrollment, while also requiring that landowners move from using primarily continuous grazing methods to primarily rotational grazing methods with reduced stocking intensities. This grazing prescription is intended to improve overall range condition, which is important in the High Plains, where productivity is low due to low annual rainfall.

The guidelines for EQIP Brush Management practice for the Southern High Plains require that landowners treat target brush species with herbicide to reduce brush density to a desirable percentage. Target brush species in the study included sand Harvard oak (*Quercus havardii*), honey mesquite (*Prosopis glandulosa*), and yucca (*Yucca* spp.). This management practice is based on the premise that many upland bird species require a certain percentage of woody cover. Too much woody cover is undesirable because the woody plants will outcompete the grasses and forbs that provide nesting cover and food (Guthery 1986).

### Estimating Quail Abundance and Habitat Characteristics

Three replicate spring call counts per year were conducted to estimate northern bobwhite abundance during spring 2006 and 2007. Additionally, habitat characteristics on all study sites were mea-

sured using two separate methods. First, researchers estimated percentage woody, grass, forb, and litter cover, and bare ground using the step-point method (Evans and Love 1957). Next, estimated visual obstruction was estimated, a measure of the vegetation’s ability to provide concealment, using a profile board that provided visual obstruction scores for each 9.84 inches (0–9.84 in, 9.85–19.69 in, 19.70–29.53 in, and 29.54–39.37 in) of height up to 3.28 feet (39.37 in) (Guthery, Doerr, and Taylor 1981). Concealment was scored according to the percent obstruction of each 9.84-inch bar on the profile board (fig. 3). Obstruction scores of 0, 1, 2, 3, 4, and 5 represent 0, 1 to 20, 21 to 40, 41 to 60, 61 to 80, and 81 to 100 percent coverage, respectively. Sorrelation analysis and linear regression was used to examine the relationships between northern bobwhite abundance and individual habitat characteristics.

**Woody Cover and Visual Obstruction Relate to Quail Abundance**

Percent woody cover had a strong positive relationship with and was the most important predictor of northern bobwhite abundance across the study sites. Most studies indicate that northern bobwhite

use woody cover for various life history purposes including escape, shelter, and nesting. Studies in other ecological regions have reported that northern bobwhite require between 5 and 30 percent woody cover (Lehman 1984; Guthery 1986; Townsend et al. 2001). Recently, Lusk et al. (2006) suggested a woody cover requirement of greater than or equal to 25 percent for nesting habitat. In this study, northern bobwhite were absent from sites with no available woody cover. Although complete lack of woody cover makes habitat unsuitable for northern bobwhite, it is difficult to define an optimal percent woody cover because of the ability of some herbaceous cover sources to functionally make up for deficiencies in availability of woody cover (Guthery 2002). This interchangeability, or slack, makes it possible for two sites to have different amounts of woody cover and be equally suitable for northern bobwhite (Guthery 2002). In this study, the eight greatest bobwhite abundances were recorded on sites that had greater than or equal to 10 percent woody cover. When percent woody cover occurred at a frequency less than 10 percent, northern bobwhite abundance was greatly diminished (fig. 4).



Figure 3. The cover board on the left is an example of visual obstruction scores of zero for every 9.84-inch height with the exception of the first 9.84 inches, which would score a 1. The cover board on the right would score much higher. (Photo credit Eric Abercrombie, TTU)

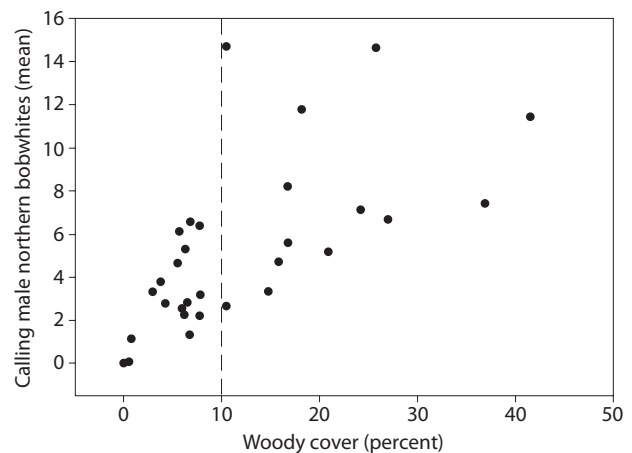


Figure 4. The relationship between northern bobwhite abundance and percent woody cover. Note that most abundant populations occur at sites with greater than 10 percent woody cover.

Other limiting factors including herbaceous cover and bare ground may play more of a role in influencing northern bobwhite abundance on sites with greater than 10 percent woody cover (fig. 5). It is suggested that managers maintain 25 percent woody cover, as herbaceous cover may not supply visual obstruction during times of drought, which can occur frequently in the Texas High Plains.

After the requirement for woody cover is satisfied, visual obstruction becomes the next important predictor of northern bobwhite abundance. Visual obstruction at 0 to 9.84 inches, 9.85 to 19.69 inches, and 19.70 to 29.53 inches were all positively related to northern bobwhite abundance. Visual obstruction between 19.70 and 29.53 inches was more important than visual obstruction at 0 to 9.84 inches. As average bobwhite height is 10.24 inches (Rosene 1984), it is intuitive that visual obstruction greater than 9.84 inches would supply more concealment for an animal of this size than visual obstruction below 9.84 inches. Moreover, obstruction between 0 and 9.84 inches might impede movement of chicks and adults. Observations are consistent with Lusk et al. (2006), who reported that northern bobwhite require nest canopy height that is greater than 15.75 inches.



Figure 5. This site held northern bobwhite because of the well-distributed woody cover. However, the quail population was limited due to a grazing intensity, which decreased the height of the herbaceous visual cover rendering the site overall less suitable. (Photo credit Eric Abercrombie, TTU)

### Summary

The Texas High Plains, considered to be a low productivity ecological region because of its relatively low annual rainfall, could support both healthy bobwhite populations and productive cattle herds if maintained in a higher range condition class (Campbell-Kissock et al. 1984). The NRCS CPS for Prescribed Grazing (CPS Code 528) has great potential as a tool for management of quail in the Texas High Plains where woody cover is suitable. Other studies confirm that proper grazing management, which incorporates rotational grazing regimes with seasonal deferment and light grazing intensities, can greatly improve northern bobwhite abundance by providing some disturbance to improve plant diversity and increase protective cover (Lusk et al. 2006; Wilkins and Swank 1992; Guthery 1986; Campbell-Kissock, Blankenship, and White 1984). It is recommended, when implementing the Prescribed Grazing practice in the Texas High Plains, that stocking rates and deferment periods be tailored so that visual cover is maintained at a height of 15.75 inches if bobwhite habitat is a consideration.

Brush management was not useful within the context of the study sites because canopy coverage was below the optimal range for bobwhite. However, on sites with extensive brush coverage, brush management may be a useful practice within the Texas High Plains.

### Management Recommendations

- Site-specific brush management prescriptions should be tailored to ensure that sufficient residual brush (~25%) is left.
- Also recommend is that the woody component of a habitat not become too dense so that habitat diversity is maintained and the brush species do not outcompete the important grasses and forbs (Guthery 1986).
- In contrast to Brush Management (removal), Range Planting (CPS Code 550) may be an

approved practice that is a more useful tool for providing quail with the necessary woody component where it is lacking.

- EQIP and other Farm Bill programs can be powerful tools for encouraging proper range management to achieve increased acreage of suitable habitat for northern bobwhite in the Texas High Plains.

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**Texas Tech University  
Department of Natural Resources Management  
Quail Management in the High Plains Field Day  
May 22, 2007**

Dr. Brad Dabbert (associate professor) and Eric Abercrombie (graduate research assistant) of Texas Tech University, Department of Natural Resources Management hosted a USDA NRCS Bobwhite Restoration Project Field Day on May 22, 2007, in the High Plains region of West Texas. The Quail Management in the High Plains Field Day featured morning and afternoon sessions held in two locations. There were 64 natural resources professionals and private landowners from three States in attendance (fig. 1). The morning session was held in Morton, Texas, and included overviews of bobwhite and scaled quail biology, the Environmental Quality Incentives Program (EQIP) and wildlife management practices, and effects of EQIP practices on quail populations. The morning session also included informational sessions about grazing and brush management and the use of prescribed burning as a management technique. Attendees then traveled to Muleshoe, Texas, for an afternoon field tour at one of the eight study sites used in research evaluating bobwhite and scaled quail responses to EQIP Brush Management and Prescribed Grazing practices in the Shortgrass Prairie Bird Conservation Region (TBCR 18). Topics for the afternoon field tour included identification of key quail food and cover vegetation (fig. 2), instruction on formation and the benefits of quail and wildlife cooperatives (fig. 3), conducting quail counts, vegetation monitoring (fig. 4), harvest management, and estimating reproductive success.

<b>Attendance</b>	
<b>Natural Resources Conservation Service (NRCS)</b>	<b>29</b>
<b>Private landowners</b>	<b>19</b>
<b>Texas Tech University</b>	<b>13</b>
<b>Texas Parks and Wildlife Department (TPWD)</b>	<b>1</b>
<b>New Mexico Game and Fish Department</b>	<b>1</b>
<b>Mississippi State University</b>	<b>1</b>
<b>Total</b>	<b>64</b>

**Evaluation**

Question	Land-owner	NRCS	Professional	All Participants
Was format suitable?	100% yes	100% yes	100% yes	100% yes
Was info useful?	100% yes	100% yes	100% yes	100% yes
Overall Field Day rank (high score = 5)	4.4	4.4	4.0	4.3
Would you like another field day?	100% yes	100% yes	100% yes	100% yes



Figure 1. Attendees visit one of eight study sites used in research evaluating response by bobwhite and scaled quail to EQIP management practices.



Figure 2. Charles Coffman (NRCS) teaches attendees how to identify key quail food and cover plants and emphasizes the importance of managing for these plants in the landscape.

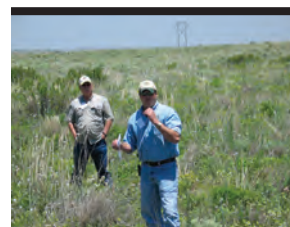


Figure 3. Jason Brooks (TPWD) provides direction to landowners on how to join forces with other landowners to start a quail cooperative on their land.



Figure 4. Dr. Brad Dabbert and Eric Abercrombie (Texas Tech University) demonstrate how to measure density of vegetation at different heights using a profile board.