National Quail Symposium Proceedings

Volume 6 Article 26

2009

Half-Cutting as a Management Tool to Increase Abundance of Northern Bobwhite in South Texas

Dale A. Hall
Texas A&M University

Nova J. Silvy
Texas A&M University

Half-Cutting as a Management Tool to Increase Abundance of Northern Bobwhite in South Texas

Dale A. Hall[2], **Nova J. Silvy**[1]

Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77843-2258, USA

We evaluated the effectiveness of half-cutting honey mesquite (*Prosopis glandulosa*) trees to increase northern bobwhite (*Colinus virginianus*; hereafter bobwhite) habitat and abundance in South Texas. We compared the effects of half-cutting on the survival of mesquite and its effects on understory vegetation on both treated and control areas monthly. Data were taken under the tree's canopy to determine understory plant species diversity, height, and density. We used bobwhite whistle counts, mark-recapture, and searched with trained dogs to determine the effects of half-cutting on bobwhite abundance. Half-cut young trees had 23.1% greater survival than did older half-cut trees. The area protected from grazing under half-cut trees was 10.2 times larger than that protected by control trees. Height of understory vegetation under half-cut trees was significantly (P = 0.005) taller then that under control trees. Treated areas supported more plant species than control areas but the difference was not significant (P = 0.072). Three bobwhite food plants had a positive response to half-cutting, whereas 3 were negatively affected. Half-cutting had no significant influence on numbers of cocks whistling (maximum 9 and 8 males calling/5-min period, respectively, for treatment and control). The number of bobwhite trapped on the half-cut area was 91 while only 75 were trapped on the control area. Trained bird dogs located 101 bobwhites on the half-cut areas and 78 on the control areas. The half-cut areas had the same number of coveys (10) as the control areas, however, covey sizes were larger (2.3 birds/covey) on the half-cut areas. We believe that half-cutting can add habitat and increase bobwhite abundance on many heavily grazed rangelands.

Citation: Hall DA, Silvy NJ. 2009. Half-cutting as a management tool to increase abundance of northern bobwhite in South Texas. Pages 251 - 255 in Cederbaum SB, Faircloth BC, Terhune TM, Thompson JJ, Carroll JP, eds. Gamebird 2006: Quail VI and Perdix XII. 31 May - 4 June 2006. Warnell School of Forestry and Natural Resources, Athens, GA, USA.

Key words: abundance, *Colinus virginianus*, habitat, half-cutting, management, northern bobwhite, Texas

Introduction

It is common practice in the United States to manipulate habitat in an attempt to increase northern bobwhite population numbers. Ellis (1972) obtained responses from 25 states on manipulation techniques applied in managing bobwhite habitat and noted the most popular methods included (popular to least most): herbaceous planting, shrub planting, burning, timber clearing, disking, controlling brush, and prescribed grazing. Rosene (1969) described most of these methods and how they were applied to landscapes in the southeastern United States. Jackson (1969) and Webb and Guthery (1982) conducted studies evaluating the effects of several habitat manipulation techniques on quail in the west Texas Rolling Plains.

Reid et al. (1977) concluded that mesquite offered important habitat for bobwhite nesting, but Jackson (1969, p. 27) noted that mesquite alone did not have much value as quail cover. Rather, the value of mesquite was determined by the degree to which it repelled livestock from the understory. Webb and Guthery (1982) noted a 2.2-fold increase in use by quail of an area due to several manipulation techniques, including half-cutting. However, half-cutting was not studied independently of other habitat manipulation techniques. The objective of this study was to monitor and document the response of vegetative understory in half-cut areas and bobwhite abundance to the practice of half-cutting honey mesquite trees in South Texas.

[1]**Correspondence**: n-silvy@tamu.edu
[2]**Current Address**: New Mexico Department of Game and Fish, 3841 Midway Place, NE, Albuquerque, NM 87109, USA.

Methods

Study Area

The study area was located on the Blocker Energy Corporation's San Tomas Hunting Lease (about 9,500 ha) on the Encino Division of the King Ranch, Brooks County, Texas, USA. This area has been described as the South Texas Plains (Gould 1975), the Rio Grande Plain (Kiel 1976), and it is known locally as the South Texas Brush Country. In 1981, the San Tomas Hunting Lease provided 442 hunter days for 200 hunters. From 1979-1983, quail densities on the lease ranged form 2.5 to 5.1 birds/ha as determined with yearly line-transect surveys (Hall 1983). Quail harvests varied from 2,000 to 6,000 quail per season.

Climate, for the majority of the year is maritime turning continental in winter (Beasom 1973). The growing season is about 300 days (December through February being considered winter) with a 31-year average of 57.4 cm of precipitation (King Ranch, Inc., unpublished records). Peaks of rainfall occur in the spring and fall when tropical storms and hurricanes are active, inundating low areas of the level to gently sloping topography at approximately 10-year intervals. The elevation of the study area is between 15-18 m above sea level.

Soils were similar throughout the study area, were sandy and well-drained, and of the Nueces-Sarita Association (Soil Conservation Service 1973). Mesquite trees were of equal age structure and density on both areas and had similar vegetative composition. Sites were dominated by little bluestem (*Schizachyrium scoparium*), paspalum (*Paspalum setaceum*), Pan American balsomscale (*Elyonuris tripsacoides*), lovegrasses (*Eragrotis* spp.) and roundseed dicanthelium (*Dicanthelium sphaerocarponn*). These sites received a year-round grazing pressure of approximately 1 animal unit/6.5 ha.

We conducted our study in a pasture that, prior to 1969, was dominated by old-growth honey mesquite. In 1969, the pasture was root-plowed in an east-west direction. Strips of mesquite 47-140 m wide every 0.8-1.6 km were left to prevent wind erosion, provide shade for livestock, and furnish cover for wildlife (Lehmann 1960).

Half-cutting

We used half-cutting techniques as described by Jackson (1969) and cut trees before foliation from 2-5 March 1982. We cut all limbs >10 cm diameter with a machete on all trees within 100 m of the tree line center. We cut all vertical limbs below 76 cm and all horizontal limbs below the cutter's shoulders. Limbs were cut and bent over in a manner that produced a wagon-wheel effect with all limbs touching the ground. Because mesquite trees have thorns, the bent over limbs protected vegetation growing under them from cattle grazing.

We randomly selected 1-km sections of the "tree lines" as study sites for the half-cutting experiment. We cut limbs and bent them over in a manner that produced a wagon-wheel effect with all limbs touching the ground. We located all treatment tree lines a minimum of 4 km from randomly selected control tree lines. Both treatment and control tree lines were in the same pasture so all other variables such as grazing pressure were held constant.

Understory Vegetation

We randomly selected 5 half-cut trees and 5 multi-stemmed trees suitable for half-cutting for observation on both the treated and control areas each month (9 months total) to compare the effects that half-cutting had on understory vegetation. We used 2 randomly selected 0.1-m^2 quadrats under each tree's canopy to determine understory plant species composition, maximum individual species height (measured in centimeters), and understory species density. We used a paired *t*-test (Ott 1993) to determine if there were significant ($P < 0.05$) differences in understory height or density between treated and control areas. Because of time constraints, we only sampled 200 (66%) of the 305 half-cut trees to document survival of limbs and trees 9 months post-treatment.

Bobwhite Census Techniques

We used 3 methods to obtain indices of bobwhite abundance on the half-cut and control areas. We

conducted all surveys within 100 m on each side of the tree lines. We recorded the number of whistling cocks (Rosene 1957) per 5-min period from the last week in April to the end of August in the center of each 1 km tree line (either half-cut or control) during days when the wind was less than 8 km/hour and there was no rain. We monitored each station for 2 consecutive days per week. We began each survey 15 min before sunrise and ended each after 90 min of observation (Wilson and Crawford 1987). We used wire funnel-traps baited with sorghum (milo) to capture bobwhites, and we marked individual bobwhites with an aluminum leg band. We placed traps within the tree lines on both the treatment and control areas in the morning and evening to avoid high mid-day temperatures. We placed all traps under trees to provide overhead protection and shading. We ran traps 15 times from 22 July to 6 October. We surveyed treatment and control areas for bobwhite from 18 October to 13 November using trained dogs to find and hold coveys (Ellis et al. 1969). We counted all individuals in the covey as they flushed.

Results

Half-cutting

Of 305 mesquite trees cut, 152 were rough-barked (older trees) and 153 were smooth-barked (younger trees). On average 15.5 limbs were cut on half-cut trees. Nine months after treatment, 56% of limbs on smooth-barked trees survived as compared to only 35% of limbs on rough-barked trees.

Understory Vegetation

The area protected from grazing under the half-cut trees ($\bar{x}$ = 14.3 m^2, SE = 3.2, n = 45) was 10.2 times larger in area than the area protected by control trees ($\bar{x}$ = 1.4 m^2, SE = 0.3, n = 45). Mean height ($\bar{x}$ = 75 cm, SE = 0.42, n = 45) of understory vegetation under half-cut trees during the 9 months of the study was taller (P = 0.005) than mean height ($\bar{x}$ = 61 cm, SE = 0.37, n = 45) of understory vegetation under control trees. During the 9 months of study, understory vegetation consisted of 51 species for both the half-cut and control areas combined. The treated area supported more species ($\bar{x}$ = 26.3, SE =1.34, n = 45) than the control area ($\bar{x}$ = 23.0, SE = 1.39, n = 45), but the difference was not significant (P = 0.072). Both the treated and control areas supported 10 of the most common bobwhite food plants in the area, but they occurred more frequently ($\bar{x}$ difference = 4.7%, SE = 5.10, n = 45) and averaged 8.1 cm (SE = 4.30, n = 45) taller under the protected canopies (Table 1). The major food plants that responded positively were crotons (*Croton* spp.), fringed signalgrass (*Brachiaria ciliatissima*), ragweed (*Ambrosia* spp.), thin paspalum (*Paspalum setaceum*), partridgepeas (*Cassia* spp.), erect dayflower (*Commelian erecta*), and hoary milkpea (*Galactia canescensa*) (Table 1). Food plants that decreased in frequency relative to the control sites were cowpen daisy (*Verbersina* spp), American snoutbean (*Rhynchosia americana*), and tomatillo groundcherry (*Physalis ixocarpa*).

Bobwhite Abundance

Bobwhite whistling-cock surveys indicated June was the peak calling period for all study areas. The number of calling males peaked on 9 June and dropped to 0 on 28 July 1982. Half-cutting had no significant (P = 1.000) influence on numbers of cocks whistling (maximum 9 and 8 males calling/5-min period, respectively for treatment [$\bar{x}$ = 5.1, SE = 2.3, n = 12] and control [$\bar{x}$ = 5.1, SE =1.8, n = 12]). During 15 trap-days, the number of bobwhite trapped on the half-cut area was 91 while 75 were trapped on the control area. Thirty-three recaptures also was recorded for both the half-cut and control areas. Bobwhites were counted 3 times on the treatment and the control areas using the trained bird dogs with 101 ($\bar{x}$ = 33.7, SE = 1.3, n = 3) bobwhites located on the half-cut areas and 78 ($\bar{x}$ = 26.0, SE = 2.7, n = 3) located on the control areas. The half-cut areas had the same number of coveys (10) as the control areas, however, covey sizes were larger (2.3 birds/covey) on the half-cut areas.

Discussion

Half-cutting mesquite was a valuable tool for increasing bobwhite habitat on our study area. Although the number of males calling did not support

Table 1: Monthly frequency (%) and height (cm) of major food plants on the half-cut and control areas, Brooks County, Texas, 1982.

Food plants	Mean Frequency Half-cut	Control	Mean Height Half-cut	Control
Croton	86	52	62.2	53.4
Tropic croton	56	34	48	31.7
Cowpen daisy	18	42	95	58
Fringed signalgrass	6	2	13	20
Ragweed	46	24	52.3	49.4
American snoutbean	26	44	13.5	15.9
Thin paspalum	36	32	42.6	20.6
Partridgepea	12	12	32.4	17.8
Erect dayflower	24	18	26.5	15.3
Hoary milkpea	6	2	6	18
Tomatillo groundcherry	32	34	14.2	16.7
Mean	32	27	36.9	28.8

this assumption, trapping and counting quail with dogs indicated that bobwhite used the treated areas 1.2 and 1.3 times more often than the control, respectively. The half-cut areas also had the most calling cocks on a given census (9 on 9 June 1983).

Cover was increased (over 10-fold) by half-cutting on our study area. Guthery (1997) argued that usable space was limiting for northern bobwhites. Although distance to woody mottes limited habitat usability in his northern bobwhite model, Guthery (1999) suggested that availability of herbaceous land-cover also might be limiting. The height of the understory vegetation in our study was increased by 1.4 cm primarily due to the mechanical protection afforded by the half-cut branches from large herbivores. By cutting smooth-barked, multi-stemmed mesquite, the area of protection was increased >10 times. Because smooth-barked limbs are less brittle than rough-barked limbs, they survived better when cut and forced to the ground. Although we cut limbs that met all of the criteria suggested in Jackson (1969), our study suggested that one should concentrate on cutting the more tolerant smooth-barked trees (Jackson 1969, Webb and Guthery 1982). In cases where rough-barked trees are all that are available, cutting can still provide some protection although survivability of cut limbs is lower.

There was a positive response of quail food plants under the half-cut trees which was related to an increase in height and density of vegetative understory. Eight food plants responded positively to half-cutting, while 3 were negatively affected.

Management Implications

Our study suggests that half-cutting can be a valuable tool for increasing bobwhite use of areas that are lacking in cover. Half-cutting protects herbaceous vegetation from large herbivores, thereby creating islands of cover and additional quail food in grazed pastures. Management efforts should focus on maximizing habitat usability both spatially and temporally. We believe that half-cutting can add useable space on many heavily grazed rangelands.

Acknowledgments

We would like to thank Blocker Energy Corporation and Texas A&M University for providing support for this project. We appreciate the help of

David Bracksieck in collecting field data, Ronnie Howard (hunting camp manager) for his invaluable field support, and William Kiel for setting up the internship on the Blocker Energy Corporation hunting lease.

References

Beasom, S. L. 1973. Ecological factors affecting wild turkey reproductive success in South Texas. Ph.D. thesis, Texas A&M University, College Station, TX, USA.

Ellis, J. A., W. R. Edwards, and K. P. Thomas. 1969. Responses of bobwhites to management in Illinois. Journal of Wildlife Management 33:749–762.

Ellis, R. J. 1972. Bobwhite quail management on state controlled wildlife areas. Pages 7–10 *in* J. A. Morrison and J. C. Lewis, editors. Proceedings of the First National Bobwhite Quail Symposium. Oklahoma State University, Research Foundation, Stillwater, OK, USA.

Gould, F. W. 1975. Texas plants: A checklist and ecological summary. Miscellaneous Publication 585, Texas Agricultural Experiment Station, College Station, TX, USA.

Guthery, F. S. 1997. A philosophy of habitat management for northern bobwhites. Journal of Wildlife Management 61:291–301.

Guthery, F. S. 1999. Slack in the configuration of habitat patches for northern bobwhites. Journal of Wildlife Management 63:245–250.

Hall, D. A. 1983. Review of an internship with San Tomas Hunting Camp, Blocker Energy Corporation. Master's thesis, Texas A&M University, College Station, Texas, USA.

Jackson, A. S. 1969. A handbook for bobwhite quail management in the west Texas Rolling Plains. Technical Bulletin 48, Texas Parks and Wildlife Department, Austin, TX, USA.

Kiel, W. H., Jr. 1976. Bobwhite quail population characteristics and management implications in South Texas. Transactions of the North American Wildlife and Natural Resources Conference 41:407–420.

Lehmann, V. W. 1960. Problems of maintaining game on ranges subjected to brush control. Pages 1807–1809 *in* Proceedings of the World Forestry Congress, volume 5.

Ott, R. L. 1993. An introduction to statistical methods and data analysis. 4 edition. Duxbury Press, Belmont, CA, USA.

Reid, R. R., C. E. Grue, and N. J. Silvy. 1977. Breeding habitat of the bobwhite in Texas. Proceedings of the Annual Conference of Southeastern Fish and Wildlife Agencies 31:62–71.

Rosene, W. 1957. A summer whistling cock count of bobwhite quail as an index to wintering populations. Journal of Wildlife Management 21:153–158.

Rosene, W. 1969. The bobwhite quail: Its life and management. Rutgers University Press, New Brunswick, NJ, USA.

Soil Conservation Service. 1973. General soil map, Brooks County, Texas. United States Department of Agriculture, Washington D.C., USA.

Webb, W. M., and F. S. Guthery. 1982. Response of bobwhite to habitat management in northwest Texas. Wildlife Society Bulletin 10:142–146.

Wilson, M. H., and J. A. Crawford. 1987. Habitat selection by Texas bobwhites and chestnut-bellied scaled quail in south Texas. Journal of Wildlife Management 51:575–582.