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Photo by Fidel Hernandez

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FROM THE FIELD: Northern Bobwhite Harvest: Conclusions from 4-yr Research Project in Texas

Photo by Matthew J. Schnupp

Northern bobwhites have declined across their range for at least the past 50–80 years. In the Rio Grande and Rolling Plains of Texas, declines also have occurred; however, according to Breeding Bird Survey data, bobwhite abundance generally is greater in these ecoregions (~53 bobwhites/route) than the national average (~17 bobwhites/route). Bobwhite populations in many parts of the U.S. are faced with habitat patches that are decreasing in size and increasing in isolation. This habitat scenario makes developing biologically justifiable harvest rates a critical component of bobwhite management.

Recommended harvest rates for bobwhites have been quite variable, ranging 25–70% of the pre-hunt population. Many of the studies which suggested higher harvest rates were conducted in northern states such as Illinois. Because the population dynamics of bobwhites can differ between northern and southern latitudes, harvest rates should be tailored by latitude.

In 2006, we embarked on a 4-yr study of determine the appropriate harvest rate of Texas bobwhites. The objective of our study was to evaluate the feasibility of applying sustained-yield harvest on Texas rangelands. Tackling this question involved developing practical methods to estimate bobwhite abundance as well as obtaining measures of natural mortality in the absence of hunting.

We conducted the study on private ranches in 2 ecoregions of Texas (Rio Grande Plains and Rolling Plains). We used radiotelemetry to collect basic ecological information on bobwhites in these 2 ecoregions and evaluated various methods to estimate bobwhite abundance during fall. Using these data, we then built a simulation model to determine sustainable harvest rates for Texas bobwhites. Here we report the major findings of our study.

Summary of Results

Estimating Bobwhite Density. Our research indicates that helicopter surveys appear to be an appropriate method to estimate bobwhite density on Texas rangelands. The best period

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for conducting bobwhite surveys is November–December for the Rio Grande and Rolling Plains. This period is a bit later than the usual timing of wildlife surveys in Texas (September). However, this later survey period will help ensure that bobwhites are old enough to flush and be observed during helicopter surveys, even in years when late hatches happen to occur.

We were able to develop a simple way to estimate bobwhite density (no./acre) using the covey encounter rate (no. coveys seen/mile) obtained during helicopter surveys. The following equation is used:

Bobwhite density = 0.47 × (*coveys/mile*)

Bobwhite Survival and Dispersal. Fluctuations in local population levels often are attributed to movement between populations (i.e., immigration or emigration). We did not detect evidence of over-winter movement between populations during our study. If it did occur, movement into the population (immigration) equaled movement out of the population (emigration).

We observed that winter survival (October–February) can be highly variable in the Rio Grande Plains, ranging from 18% to 76%. This is in contrast to the Rolling Plains, where survival during the same time period was 33–38%. Such drastic variability between ecoregions suggests that sustainable harvest rates may have to be tailored for southern and northern Texas.

Sustainable Harvest Rates. Simulation models represent an important tool to investigate the population dynamics of a species. These models are comprised of population parameters (e.g., survival, nesting rate, and nest success) whose values are set based on field data or estimates from past studies. After a model is validated for proper functioning, researchers can begin to evaluate "what if" scenarios for a population. For example, a researcher could evaluate, "How long would a population persist if harvest was 20% of the fall population? 30%? 40%?".

Our results from simulations of such harvest scenarios suggest that a harvest rate of 20% of the pre-hunt population are sustainable. These harvest rates resulted in a 95% probability of population persistence for 100 years in the Rio Grande Plains. Harvest rates >30% are likely excessive with respect to population persistence. These results may not apply to bobwhite populations in the Rolling Plains. An appropriate data set for the production component of the model was not available, and therefore the effects of harvest could not be modeled for this ecoregion. However, a 20% harvest is conservative and likely applicable to the Rolling Plains.

Management Recommendations

We recommend that 1) helicopter surveys be conducted during November–December to estimate fall bobwhite abundance, and 2) a 20% harvest of the fall population.

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–Joey Sands and Fidel Hernandez

Joey is a native of Oregon and a Research Associate with the Caesar Kleberg Wildlife Research Institute. He is currently conducting quail research for CKWRI and refining avian survey methods for the U.S. Fish & Wildlife Service.

Managing Bobwhite Nest Predation: The Issues and The Evidence

Photo by Thomas S. Janke

The Issues

Bobwhites have a life history strategy where they make it tough on themselves. For example, they nest on the ground. Nesting on the ground makes it easy for the myriad predators that walk and crawl to devour a clutch of bobwhite eggs. Fortunately, bobwhites have some strategies that help overcome their handicap of nesting on the ground. They lay large (10-15 eggs) clutches. Eggs hatch in near perfect synchrony. The young, precocial chicks leave the nest within a couple hours of hatching, never to return. If a nest is lost to predators, bobwhites have the ability to move elsewhere and try again if it is not too late in the nesting season.

Despite these adaptive strategies, bobwhites typically endure large nest losses. Usually somewhere between a third and half, and sometimes more, of all bobwhite nests are lost to predators during a given breeding season. Thus, it is not surprising that quail managers have been interested in reducing nest predator populations based on the assumption that doing so will result in an increase in nesting success. It turns out that this assumption, while seemingly simple and straight-forward, is anything but, as shown by the evidence.

The Evidence

One of the great things about science is that different lines of evidence can lead people to the same conclusions based on facts and data rather than opinion. The bobwhite nest predator story in South Texas is one such example. Three different studies using three different methods, each about three decades apart, call into question the assumption that reducing nest predators will substantially increase bobwhite numbers.

Lehmann in the 1940s. In Val W. Lehmann's book, *Bobwhites in the Rio Grande Plain of Texas*, he describes massive efforts at reduction of coyote populations on some South Texas Ranches during the 1940s. Lehmann used simple before and after comparisons of quail numbers to evaluate the impact of predator control. That is, quail abundance was estimated before coyote removal, and then after coyote removal on several locations. His conclusion, was that "On the basis of three indices—nest success, young per adult, and fall density—predator control was hardly worth the effort" (page 192).

Guthery and Beasom in the 1970s. Three decades after Lehmann's before-and-after comparisons of the impacts of predator control on bobwhites, Sam L. Beasom and Fred S. Guthery performed a series of controlled field experiments to test whether reduction in nest predators could increase bobwhite numbers. It is important to note that the controlled experiments (predator removal on one site, no predators removed on another, similar site, replicated over two years) Guthery and Beasom conducted were an approach that was much different from the before and after comparisons done by Lehmann. Using control areas allows

an investigator to overcome impacts of weather that are impossible to get around when using before and after comparisons. Thus, if an experimental response is observed when controls are used, then it is much more likely that such a response is related to the experimental removal, in this case, of predators.

Quite surprisingly, Guthery and Beasom did not observe any obvious trends in bobwhite density related to predator removal. However, Beasom suggested that predator removal might, to some extent, improve bobwhite reproductive success during drought years.

Now, let's fast-forward another 30 years to see what how this hypothesis turned out.

Rader et al. in the 2000s. As part of his Ph.D. dissertation during the early 2000s, Mike Rader gathered a series of nest-video camera observations to determine exactly what predators were most important with respect to consuming bobwhite eggs. Mike then took this information (coyotes, skunks, and badgers were the top three bobwhite nest predators) and used it in conjunction with a simulation model of bobwhite populations of South Texas. Simulation models are used widely throughout science. As noted in the cover article of *The Bobwhite Post*, simulation models are a useful tool that allows an investigator to evaluate a series of "what if' scenarios. In this case, Rader asked a series of questions that revolved around scenarios such as "What if I removed losses from the top three nest predators?" "Would the removal of nest predators compensate for other factors that impact quail numbers, such as excess heat, drought, or loss of nesting cover?"

The results of Rader's simulation analyses (which recently appeared in a Journal of Wildlife Management article) showed that removal of the top nest predators resulted in potentially modest, but far from spectacular, population increases, no matter what the scenario. This was especially the case for scenarios with decreased nesting cover, which had the largest overall negative effect on quail numbers. Rader et al. concluded "….management efforts should focus on maintaining adequate nest-clump availability and then possibly consider nest predator control as a secondary priority."

The Convergence

Three vastly different lines of evidence—before and after comparisons, controlled field experiments, and an integrated system of nest videos and population modeling—all converge on the conclusion that reduction of nest predators is not really a top priority when it comes to bobwhite management in South Texas. When three different lines of evidence all point to the same conclusion, then the odds are that the conclusion is probably correct.

– Lenny Brennan

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