

Proceedings of the Third Texas Quail Short Course



**March 24-25, 2004
Kingsville, Texas**

Edited by Fidel Hernandez and Diana Doan-Crider

Additional Proceedings of the Third Texas Quail Shortcourse
and Digital Video Disk (DVD) recordings of the conference
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Texas Quail Short Course III

Symposium Proceedings



March 24-25, 2004
Texas A&M University-Kingsville Campus
Kingsville, Texas

Sponsored by:

Caesar Kleberg Wildlife Research Institute
Richard M. Kleberg, Jr. Center for Quail Research
International Aridlands Consortium

Edited by:

Fidel Hernandez and Diana Doan-Crider
Caesar Kleberg Wildlife Research Institute

PREFACE

It had been several years since the Caesar Kleberg Wildlife Research Institute had organized a Texas Quail Short Course. The first Texas Quail Short Course was held in 1994 at Texas A&M-Kingsville. These symposiums were designed with a purpose of educating landowners, land managers, hunters, and quail enthusiasts about quail management using science based information. The last Texas Quail Short Course was held in 1996. So during 2003 we began planning for the third of these short courses. We felt the time was ripe for a Texas Quail Short Course given that much knowledge had been gained since 1996 and bobwhites had garnered much interest from the community.

We developed this Short Course with the lay public in mind. It was our intent to deliver a Short Course and Proceedings booklet in a format that was understandable by the general public and yet still maintaining a scientific basis. We also wanted a Short Course that contained long-time controversial topics presented in light of new research, highlighted knowledge gained from years of management experience, and presented emerging issues in quail management such as its economics. We believe that we have been successful in accomplishing our goal.

We are indebted to the many people who made this Short Course possible. Many hours were spent planning and organizing this event by Lori Alvarez, Lenny Brennan, Fred Bryant, Diana Doan-Crider, Liisa Hewitt, Chris Reopelle, Sally Rojas, CKWRI staff, numerous graduate students, and yours truly. King Ranch, Inc. and the San Tomas Hunting Camp graciously allowed access to the study area and their facilities for the field day. We also thank the speakers, moderators, and presenters, some of who traveled half-way across Texas to participate. In particular, I like to especially thank Diana for all her time, work, and effort devoted to the development and printing of this Proceedings booklet.

The Texas Quail Short Course III was sponsored by the Caesar Kleberg Wildlife Research Institute, the Richard M. Kleberg, Jr. Center for Quail Research, and a grant from the International Aridlands Consortium. We extend our gratitude to these institutions for sponsoring this event.

We hope you enjoy Texas Quail Short Course III. We look forward to the upcoming years of quail research and continued application of knowledge that will form the basis for our next Short Course down the road. Until next time...

— *Fidel Hernández*

Texas Quail Short Course III
Caesar Kleberg Wildlife Research Institute
Texas A&M University-Kingsville

24 March 2004 (Wednesday)

8:00-8:30 REGISTRATION
(*Jones Auditorium, Texas A&M University-Kingsville*)

Session I. Quail Conservation and Economic Impacts

Moderator: Dr. Fred Bryant

8:30 Introduction and Welcome, *Dr. Fred Bryant, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville*

8:40 Current Status of Quail in the United States and Texas, *Dr. Lenny Brennan, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville*

9:00 The Texas Quail Conservation Initiative, *Mr. Steve DeMaso, Texas Parks and Wildlife Department*

9:20 Some Economic Aspects of Quail Hunting, *Dr. Richard Conner, Department of Agricultural Economics, Texas A&M University, College Station*

9:40-10:00 BREAK

Session II. Quail Management Issues

Moderator: Mr. Robert Perez

10:00 Understanding Relationships Between Northern Bobwhites and Red Imported Fire Ants, *Dr. Brad Dabbert, Department of Range, Wildlife, and Fisheries Management, Texas Tech University*

10:20 Release of Pen-raised Bobwhites: How do they impact wild populations, *Dr. Fidel Hernández, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville*

10:40 Lessons Learned from Bobwhite Harvest at San Tomas, *Mr. Ronnie Howard, San Tomas Hunting Camp*

11:00 Understanding Predation as a Population Process, *Dr. Lenny Brennan, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville*

11:20-1:20 LUNCH
(*Student Union Building, Ballroom A, Texas A&M University-Kingsville*)

Session III. Management of Quail in Texas

Moderator: Mr. Marc Bartoskewitz

- 1:20 Northern Bobwhite Management in the Piney Woodys of East Texas, *Dr. Monty Whiting, Professor Emeritus, Arthur Temple College of Forestry, Stephen F. Austin University*
- 1:40 Managing Blue Quail in Bobwhite Country, *Dr. Dale Rollins, Texas Cooperative Extension, San Angelo, Texas*
- 2:00 Ecology and Management of West Texas Quail, *Dr. Louis Harveson, Department of Natural Resource Management, Sul Ross University*
- 2:20-2:40 BREAK

Session IV. Habitat Management

Moderator: Dr. Louis Harveson

- 2:40 Using Livestock as a Quail Management Tool, *Dr. Byron Wright, Texas Cooperative Extension, Uvalde, Texas*
- 3:00 Planning Brush Management for Bobwhites in South Texas, *Dr. Fidel Hernández, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville*
- 3:20 The Impact of Quail Management on Associated Wildlife Species in Texas, *Dr. Bill Kuvlesky, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville*
- 3:40 Putting it all together: Panel Discussion, *Mr. Marc Bartoskewitz, King Ranch, Inc.; Mr. Ronnie Howard, San Tomas Hunting Camp; Mr. David Synatzske, Chaparral Wildlife Management Area; Dr. Monty Whiting, Stephen F. Austin University*
- 6:30-8:30 SOCIAL
(*Henrietta Memorial Center, King Ranch Museum, Kingsville, Texas*)

25 March 2004 (Thursday)

- 7:30 Depart for Encino Division of King Ranch
(*meet at parking lot of Jones Auditorium, Texas A&M University-Kingsville*)

Field Day at The South Texas Quail Project

- 9:00-12:00 The South Texas Quail Research Project, *Dr. Fidel Hernández and Johnny Arredondo, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville*

Field Day at The South Texas Quail Project (continued)

9:00-12:00 Brush and Quail Management at the King Ranch, *Mr. Verl Cash, King Ranch, Inc.*

Bobwhite Quail Harvest Strategies on King Ranch, *Mr. Marc Bartoskewitz, King Ranch, Inc.*

Bobwhite Nest Predation in South Texas, *Mike Rader, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville*

Bobwhite Hunting Demographics in South Texas, *Jason Hardin, Quail Program Coordinator, Audubon Texas*

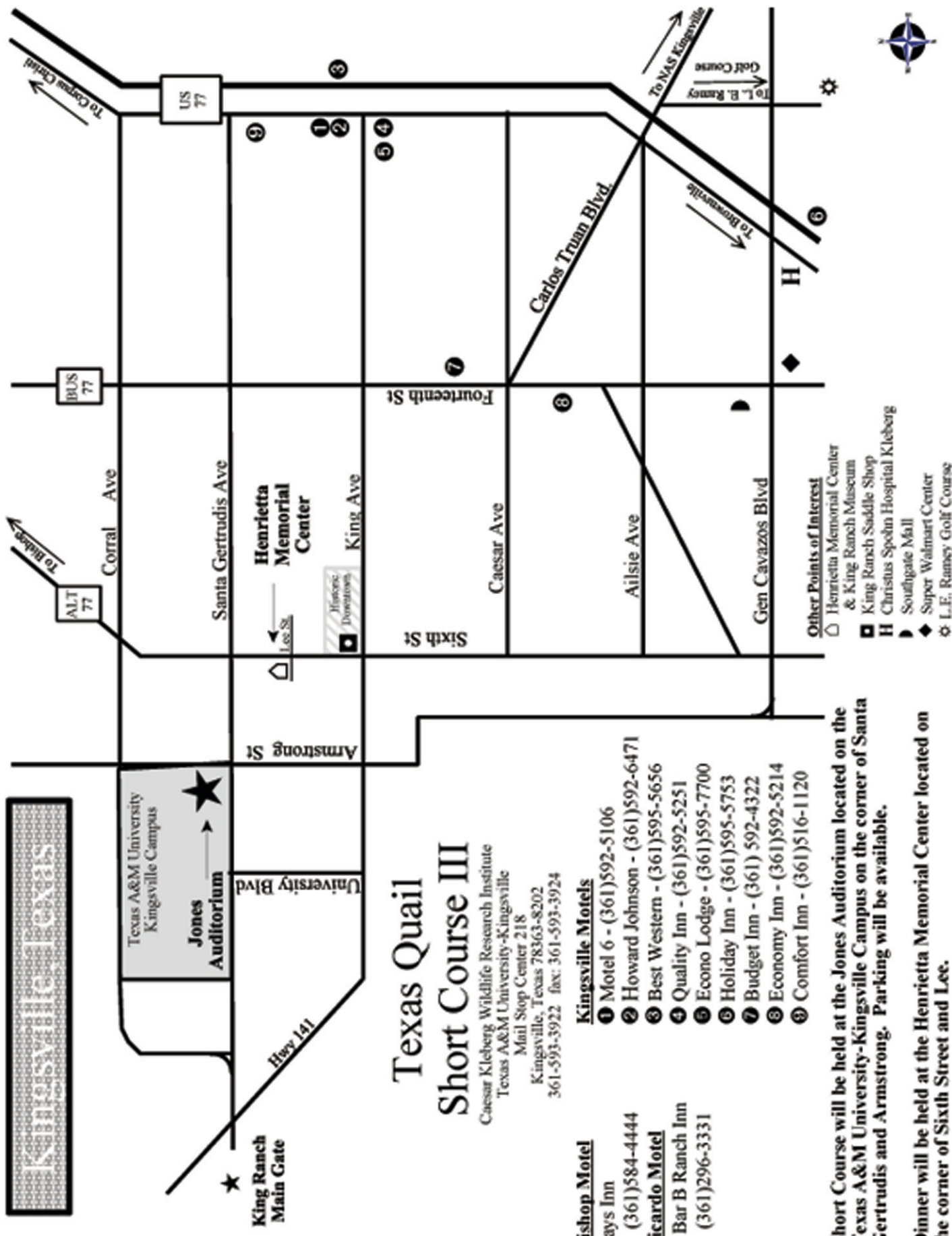


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CURRENT STATUS OF QUAILS IN THE UNITED STATES AND TEXAS

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The purpose of this presentation is to provide a brief overview of the current status of quail populations in the United States and Texas. The primary information used for assessment of current status are the U.S. Fish and Wildlife Breeding Bird data, supplemented with Christmas Bird Count data from the Audubon Society and the Roadside Count data compiled by the Texas Parks and Wildlife Department.

The northern bobwhite has exhibited the most widespread, and ongoing declines of the six species of quails native to the U.S. Bobwhite populations have declined by >70-90% across much of their geographic range. Scaled quail have also exhibited significant declines. Gambel's quail show a combination on increases around metropolitan areas, and declines on areas dominated by rangelands. The California quail had the most widespread areas of increasing populations of any species. The mountain quail exhibited a mix of areas with increases and declines, as well as a regional extinction from the lower Columbia River Basin region. Data on Montezuma quail were insufficient for determining long-term population status.

One of the most surprising aspects of this analysis is that bobwhite numbers are now declining in South Texas, a region that was once thought to be immune to such trends. The declines in this region are probably a function of expanding urbanization in the Lower Rio Grande Valley, as vast areas of habitat remain throughout the brush country of the Central and Upper Rio Grande Plains.

From a continental perspective, the quail are not the only resident game birds that are experiencing widespread population declines. All native species of grouse exhibit large portions of their geographic ranges where population are declining. Even exotic, introduced species such as chukar, gray partridge, and ring-necked pheasant populations are experiencing widespread and ongoing declines. Only the wild turkey, and California quail are experiencing increasing numbers throughout major portions of their geographic ranges.

In summary, the conservation of wild, native resident game birds is developing into one of the major conservation and wildlife management challenges of the 21st century.

TEXAS QUAIL CONSERVATION INITIATIVE

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The Texas Quail Conservation Initiative (TQCI) includes northern bobwhite, scaled quail, Gambel's quail and Montezuma quail. However, due to a lack of basic population and ecological information regarding Gambel's and Montezuma quail in Texas, population goals and habitat objectives are not included for these two species in this version of the TQCI.

From the early 1980s to the late 1990s, the fall bobwhite population in Texas declined from 20 million to 5 million birds (75.0%). Scaled quail fall populations have declined from 6.6 million to 2.2 million birds (66%). The Breeding Bird Survey (BBS) shows a decline in Texas bobwhite breeding numbers at a rate of 5.6% per year from 1980 to 2002. Over the same time period scaled quail breeding numbers declined 2.9% per year in the Shortgrass Prairie and 12.9% per year in the Central Mixed Grass Prairie. For some individual Bird Conservation Regions (BCRs) in Texas, the quail decline is even greater. The BBS and harvest statistics suggest that conservation action is needed to stabilize quail populations in Texas.

The Initiative is a step-down version of the Northern Bobwhite Conservation Initiative (NBCI) which was prepared by the Southeast Quail Study Group Technical Committee at the request of the Directors of the Southeastern Association of Fish and Wildlife Agencies. The charge issued to the committee was to develop a quantitative, habitat-oriented plan to restore bobwhites to a density during the baseline year 1980. The TQCI follows that same charge, and is organized to delineate population and habitat objectives for northern bobwhite and scaled quail in the eight BCRs that comprise Texas. This approach was selected to facilitate coordination and cooperation with other bird management plans, e.g., Partners in Flight (PIF), North American Waterfowl Plan, etc.

The scope of the TQCI is enormous. For example, it will require incorporation and changes of land management on between 40 and 100 million acres in Texas to meet the targeted northern bobwhite and scaled quail population goals. An accurate and efficient monitoring system to track whether quail populations will respond to the implementation of landscape-scale habitat improvements needs to be designed, and tested.

The TQCI includes 3 chapters that detail specific quail habitat management practices to be used on agricultural land, grasslands, and forests, and one chapter outlining the approaches to be taken to implement the Initiative. Also, sections covering implementation strategies for the Initiative, outreach and training needs, management needs, research needs, funding needs and sources, and the development of a Texas Quail Council (TQC) and a Texas Quail Technical Support Committee (TQTSC).

The recently formed TQC serves as a coordinating and oversight Council for quail activities in Texas. The TQC is supported by the TQTSC that reviews and proposes research projects, habitat improvement projects, and provides the TQC with scientific-based recommendations.

Harvest records maintained by Texas Parks and Wildlife Department (TPWD) were used to assess the change in bobwhite harvests from the early 1980s to the late 1990s. These data were also used to estimate densities of bobwhites and scaled quail in the pre-hunt population and breeding densities at the initiation of the breeding season. The BBS data from 1978-1999 were used to observe and forecast trends in the breeding population by BCRs, and the entire state.

The National Resources Inventory (NRI) generated by the Natural Resources Conservation Service (NRCS) provides detailed land use data at 5-year intervals. Data from 1982 and 1997 were used as sources for land use information used in the Initiative.

Northern Bobwhite

Restoring northern bobwhites in Texas to target levels recommended by the NBCI will require the addition of 1.1 million coveys to the current population. Achieving this population will require impacting the habitat on about 100 million acres of crop, hay and rangeland. However, the recommended land management practices would change the primary land use on about 22.0% of this acreage.

Rangeland management practices, including prescribed grazing and prescribed fire can improve bobwhite habitat and enhance range productivity. About 75% of the needed coveys could be produced by altering range management practices in Texas. Replacing exotic vegetation with native grasses and forbs, can also improve bobwhite habitat. However, such practices are costly and would likely not occur on a landscape scale without an incentive based program similar to TPWD's Pastures for Upland Birds (PUB).

Farm lands (crops, pasture/hay, Conservation Reserve Program) could produce almost 25% of the total number of needed coveys. Notably, the conversion of pasture, hay and croplands to properly managed, diverse stands of native warm-season grasses (NWSG) and forbs.

Altering forest management practices to encourage habitat favorable to bobwhites should yield 2-3% of the needed coveys. Important management practices include site preparation to encourage native grass and forb communities, prescribed fire, thinning to encourage light penetration, and where ecologically sound, increase acreage of longleaf pine.

Scaled Quail

Scaled quail recovery will require the addition of 196,000 coveys to the current population. Achieving this population will necessitate impacting the habitat on about 47 million acres of farm and rangeland. However, most of the recommended land management practices would be on rangelands and involve planned grazing management.

Rangeland management practices, including brush sculpting, prescribed grazing and seasonal grazing deferrals can improve scaled quail habitat, enhance range productivity and produce

90% of all the needed scaled quail coveys. Replacing exotic vegetation with native grasses and forbs, can also improve scaled quail habitat but for the same reasons mentioned above, would not likely occur without an incentive-based program. The remaining 10% of the needed coveys could be produced on farm lands.

Implementation of the TQCI will require the long-term cooperation among federal, state, and private wildlife organizations, as well as individual landowners and managers. For this initiative to be successful, it will require huge cultural and policy changes among resource management agencies, stakeholders, and the general public.

Existing Joint Ventures provide a delivery system to develop partnerships, leverage funds, and conduct landscape scale, habitat based projects that improve wildlife habitat. Much of the needed funding can be derived from existing federal and state programs, though increased appropriations will be required, and some new funding initiatives may be needed. It is also suggested that the TPWD Commission consider requesting 2005 legislative approval for reorganization of existing game bird stamps to provide a stable, secure source of funding for the upland game bird program.

It is anticipated that if immediate action is taken the quail decline may be stabilized in 5-7 years, and if the TQCI is followed to its conclusion, the restoration may be effected in 20-25 years.

SOME ECONOMIC ASPECTS OF QUAIL HUNTING

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Introduction

From an economic perspective the proliferation of quail habitat and, therefore, quail populations over most of the 20th century was an “externality” of the agricultural production industry; at least in the Southern US. An “externality” is an unintended, or accidental, impact on individuals or entities other than the business firm responsible for creating the effect. Externalities may be either positive, as in the case of quail habitat being created by the early-day cultural practices of small-farm agricultural production, or negative, as in the water pollution resulting from nutrient and/or pesticide laden runoff from some crop producing areas.

Small-farm, crop oriented agricultural production has now largely disappeared in the Southern US. As quail numbers declined throughout most of the Southern US, quail hunters focused on the southern Great Plains as the last remaining area with habitat to support quail numbers sufficient for hunting. The southern Great Plains was characterized by a drier climate with large-scale livestock ranching as the predominant land use. None-the less, it could be argued that quail habitat was enhanced as an externality of land management practices designed primarily to enhance forage production for livestock; e.g., brush control.

By the last quarter of the 20th century quail hunting had fostered a relatively large and enthusiastic following. In addition, as personal incomes had generally increased, quail hunters were able and willing to spend more in pursuit of their sport. These quail hunting enthusiasts formed the basis of the “consumer” or “demand” side of the current quail hunting economic equation. This basis of demand for quail hunting was, and is, enhanced by the development of the corporate client / employee perk “entertainment package”. Along with the growth in importance of the entertainment package is the increased demand for consistency in the quality of the hunting experience and for associated amenities such as high quality food, lodging and comfortable access to the hunting site.

The “supply” side of the quail hunting economic equation is more complex in that there are several categories of goods and services associated with supplying the various types of quail hunting experiences sought by consumers (hunters). I like to think of the goods and services associated with supplying quail hunting opportunities first in terms of the basics; land/habitat, shotguns and dogs. Modern-day developments require two additional categories; services/amenities and raised/released quail. Time and space do not permit a discussion of all of these categories, so, the following paragraphs will briefly describe the services/amenities and the raised/released quail categories.

Services and Quail Hunting Amenities

Quail hunting today incorporates a large array of services and amenities that were not present in the early days of quail hunting. In the following paragraphs, we will briefly explore them in four

categories: resource management, booking/outfitting, lodging and associated services and guides/dog handlers.

Wildlife biologists have perhaps the longest history of consulting with landowners regarding the status of their wildlife habitat and population(s). This type of service can be as simple as involving periodic visits to a tract of land and providing the landowner with advice or, a more encompassing arrangement involving a resource management company providing the trend assessments and taking responsibility for implementing the prescribed management practices. In some cases, the resource management function is integrated into an outfitting or hunting operations company.

The primary purpose of the booking/outfitting segment of the quail hunting service industry is to connect the hunters with a specific land/habitat location and time for their hunt. The booking agency collects revenue via a booking or referral fee paid by the landowner/manager or via a commission collected from the hunter(s). Outfitting is a term used to describe the role of an agent or company that provides a multitude of services that facilitate a complete and enjoyable experience for the hunter.

Hunting lodges differ from other lease hunting operations in several ways. They are operated more as resort hotels in that they aim to provide an array of entertainment and relaxation opportunities, offer a high level of quality service and comfortable facilities. Most lodges cater to short-term “packaged” hunting opportunities, the price of which reflects not only the quality of the hunt but also the quality of service and amenities. Lodge overhead costs are high due to the large investments in buildings and equipment. Operating costs are high due to the large number of people required to provide services.

Over the past couple of decades, many quail hunting lessees, outfitters and lodge operators have found that engaging the services of a guide/dog handler is more efficient than owning and handling their own dogs. Persons operating a guide/dog handler service normally provide a truck that doubles as a hunter transport/observation platform and portable dog kennel as well as the dogs. To be able to offer this kind of service the guide/dog handler must maintain a kennel with approximately 10 to 12 pointing dogs for each truck that is operated.

Pen Raised – Released Quail

As the popularity of hunting lodges and their packaged hunts grew over the past two decades, the demand for quail hunts began to exceed the capacity of even well managed land resources to provide populations that could support the number of hunts being demanded over the entire season. To accommodate this increased demand for consistently good hunting experiences, the hunting lodges and outfitters began supplementing their wild birds with pen raised, released birds.

Hatcheries that cater to the demand for quail that will substitute for wild birds produce and market what is commonly referred to as “flight conditioned” birds. To produce flight conditioned quail, the hatchery first hatches eggs, and grows out the chicks. After the chicks are hatched, and throughout their growth to maturity, care is taken to minimize their exposure to

humans and their pets. This is to insure that they maintain a natural fear of humans so that they will flush like wild birds. Also, when the birds reach the stage of development where flight is possible they are enclosed in large screened-in flyway pens and periodically frightened into flight so that they get sufficient exercise to develop their flight capability.

Concluding Remarks

Clearly quail hunting is an economically important sport and industry in Texas. With the advent and growth of lease hunting, many landowners were able to maintain the economic viability of their ranches by making lease hunting and the habitat management that supports it a primary focus, equal or exceeding, traditional livestock production. To the extent that quail hunting supports the lease hunting enterprise it shares in the support of large numbers of rural Texans maintaining their land ownership and livelihoods.

UNDERSTANDING RELATIONSHIPS BETWEEN NORTHERN BOBWHITE AND RED IMPORTED FIRE ANTS

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Red imported fire ants (RIFA) have injured people and their pets, and caused agricultural and utility damage since their arrival from Brazil in the 1930's. Observations of such damage have led to much discussion about the impacts of RIFA on wildlife. Several scientific studies have reported RIFA as potential predators of northern bobwhite chicks, as well as competitors for food. Consequently, some have concluded that immobile animals near RIFA colonies, such as hatching northern bobwhite chicks, must certainly be killed. Others have observed relatively dense northern bobwhite populations in areas occupied by RIFA and concluded that RIFA must not affect northern bobwhite populations. We explore these apparently contradictory points of view and provide an explanation using evidence that we gathered through field experimentation.

Our research team initiated an experiment in 1997 to compare hatching success and survival rate between northern bobwhite broods that hatched from nests protected from RIFA using an insecticide and controls in Refugio County, Texas. We used radio telemetry to locate and monitor bobwhite hens and their nests. Half of the nests were protected by broadcasting an insecticide (Amdro® at 1.5 pounds per acre) onto a 200- x 200-foot area centered on the nests. Chicks hatching in non-treated nests were exposed to the naturally occurring density of RIFA in the area of the nest. We measured hatching success on the day of hatch by determining the proportion of eggs that hatched successfully. We measured brood survival when chicks were 21 days old by flushing the hen and chicks and determining the proportion of hatched chicks that were still alive. Hens led broods away from the nests a few hours after hatch, so broods that hatched from protected and unprotected nests were exposed to the same habitat conditions and RIFA densities after hatch. Broods benefited from the insecticide treatment only during hatch and for a few hours post-hatch. This experiment was repeated in 1998.

Our results were surprising. Only 2% of the chicks in unprotected nests were killed by RIFA while hatching. However, survival of chicks from nests treated with insecticide was more than twice that of chicks from unprotected nests (60% versus 22%). Mortality caused by RIFA appears to be additive to other mortality factors. In our study, 38% of all chick mortality to 21 days of age was attributable to RIFA stings at hatching. Mortality caused by RIFA can only be compensatory (substituting for historical mortality factors) if subsequent chick survival is higher. This change in survival could result from the lower density of northern bobwhite chicks in areas with RIFA. For example, the surviving chicks may have more food to eat or be less susceptible to disease due to the lower density of chicks. We can use a simple mathematical model to examine the potential for RIFA mortality to be compensatory. If we compare the expected chick production from 1,000 nests protected from RIFA with that of 1,000 unprotected nests using the data of Mueller et al. (1999) (clutch size of 14, nest success of 38%, and survival of chicks from

protected and non-protected nests of 60 and 22%, respectively), we would expect 3,192 chicks from protected nests and 1,170 chicks from non-protected nests to survive to 21 days-of-age. If only 50% of chicks (1,596 chicks) from protected nests survive to 15 weeks-of-age (Fatora et al. 1966), chicks from non-protected nests cannot match their number even if they experience 100% survival during this same time period. It seems very unlikely that chick mortality caused by RIFA is compensatory in the Texas Coastal Plains.

We detected another important relationship. Chick survival is related to the number of RIFA captured within a 30-minute period in a standardized bait cup placed in northern bobwhite nests on the day after hatch (Mueller et al. 1999). Our data indicate that when 300 or more RIFA recruit to the nest one day post-hatch, chick survival is essentially zero. If less than 300 RIFA recruit to the nest then survival of chicks is similar to that of chicks that hatched from nests protected from RIFA attack using insecticide. Thus, not all areas of the landscape harbor enough RIFA to kill northern bobwhite broods. The apparent contradiction is explained.

To apply our knowledge of this ecological relationship, we examined the use of integrated control methods for RIFA in northern bobwhite habitat where significant RIFA densities occur. Our objective was to determine if a reduced rate of insecticide and/or prescribed burning could decrease the foraging activity of RIFA below the threshold that causes mortality of northern bobwhite chicks. We tested the effectiveness of 0, 50, 75, or 100% of the rate of Amdro® previously reported to reduce RIFA foraging activity below the threshold in northern bobwhite habitat. Bait cup sampling revealed that as Amdro® rate increased, foraging activity of RIFA declined. However, the reduced rates of insecticide were as effective as the full label rate for reducing RIFA foraging activity and their impacts on northern bobwhite chicks. Burning combined with Amdro® application provided no additional benefit to Amdro® alone. Our results provide a more economical way for landowners to control RIFA impacts on northern bobwhite chicks.

Though treatment options are available, one must be careful before going to the expense and trouble of treating RIFA in the name of quail management. RIFA are an easy scapegoat for declining local and region quail populations. We do not subscribe to this paradigm, but submit that loss of suitable habitat through conversion to other uses or poor management is the overwhelming negative impact on quail populations. Quail cannot exist without suitable habitat. Many other authors in this work have described how to manage for suitable habitat conditions. We believe when managing for northern bobwhite landowners should invest first in developing suitable habitat conditions. Insecticides to control RIFA should only be applied after suitable habitat conditions exist, and when the foraging activity of RIFA is above the threshold that causes mortality of northern bobwhite chicks. We are currently involved in economic analyses to determine if the reduced rate of insecticide is an economically beneficial practice for landowners.

Selected References

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RELEASE OF PEN-RAISED BOBWHITES: HOW DO THEY IMPACT WILD BOBWHITE POPULATIONS?

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The release of pen-raised bobwhites (*Colinus virginianus*) has been a controversial topic of quail management for over the past 50 years. Initially, debates focused on the effectiveness of the practice to increase or restore depleted populations of wild bobwhites. When research demonstrated that increasing wild populations with pen-raised birds was ineffective, the practice continued but for a different purpose, to supplement commercial hunting opportunities. Discussions now began to focus on the negative impacts that releasing of pen-raised bobwhites potentially could have on wild populations. Biologists expressed concerns regarding transmission of diseases and parasites, as well as possible changes in habitat use, social and genetic structure, and survival rates of wild bobwhites.

We will not address the decision of whether or not pen-raised bobwhites should be released. That is a decision for the land steward to make. Our intent is to provide a brief summary of existing knowledge concerning pen-raised bobwhites and to present general recommendations for releases should they occur.

Effects of Pen-raised Quail on Wild Populations

Hunting enterprises often supplement hunting opportunities of wild bobwhites with pen-raised bobwhites, especially during drought when wild populations are low. Concern exists regarding the potential negative impacts that releasing pen-raised bobwhites could have on wild bobwhites. One perspective is that these concerns are somewhat irrelevant because pen-raised bobwhites experience extremely low survival and die before they have much opportunity to impact wild quail. Others counter, however, that although survival of pen-raised birds might be low, wildlife enterprises release many pen-raised bobwhites throughout the hunting season. This continued presence of pen-raised bobwhites for a prolonged period of time potentially could have negative impacts on wild populations.

Impacts on wild bobwhite survival

Studies conducted on the release of pen-raised bobwhites have shown both neutral and negative effects on wild bobwhite survival. Research conducted in Alabama reported that survival (150 days post-release) was similar between wild bobwhites on control sites (41%) and wild bobwhites on release sites (36%). However, a study conducted in Georgia reported that fall–spring survival (Nov–April) of wild bobwhites on a release area was lower (18%) than that of wild bobwhites on a control area (43%) over 3 years. More recently, a study conducted in southern Texas also showed that bobwhite survival was lower on release sites compared to control sites in 1 of 2 years.

Displacement of wild bobwhites

There is evidence to suggest that displacement of wild bobwhite occurs, although the cause(s) of the displacement are unknown (e.g., social separation, competition for habitat, etc). It has been reported that areas stocked with pen-raised bobwhites carry lower populations of wild bobwhites compared to unstocked areas. Further, these wild populations become progressively smaller each year with continued releases. These declines in bobwhite density could indicate that releases of pen-raised bobwhites either reduce survival of wild bobwhites or displace them from their established home ranges. Some researchers speculate that introduced bobwhites do not displace wild bobwhites because wild bobwhites often are found near pen-raised coveys or intermixed amongst them. However, recent research in southern Texas reported that home ranges of wild bobwhites in release areas were larger (46 acres) than in control sites (31 acres).

Predator response following releases

There is virtually no data on predator abundance in response to the release of pen-raised bobwhites. People often have reported that hawks are observed in areas immediately following release, although this response is never quantified. Only 1 study (south Texas study) has provided any type of quantitative data for predator response following release of pen-raised bobwhites. The study compared hawk and mammalian predator abundance before and after pen-raised bobwhites were released. The study observed no statistical change in predator abundance following releases of pen-raised bobwhites. However, a trend for increased predator abundance following releases was observed. Hawk abundance exhibited a 35% increase following releases in the treatment site during year 1 of the study and a 109% increase during year 2, compared to the control site which exhibited only an 11% and 52% increase, respectively, during the same time period. Abundance of mammalian predators also increased 139% following releases in the treatment site, whereas the control site only exhibited a 22% increase during the same time period.

Management Considerations for Releasing Pen-Raised Bobwhites

It is important to make the distinction between shooting preserve management techniques and population/habitat management techniques. Techniques for shooting preserve management (sometimes called “put-and-take” operations) are well established. They essentially are aimed at getting the highest return rate of released birds. However, population management techniques use habitat and harvest management to maintain or increase populations of wild bobwhites. Excelling in 1 approach does not necessarily reflect positive achievement in the other. For example, although releasing pen-raised bobwhites often is intended to offset heavy hunting pressure on wild bobwhites, the release and subsequent harvest of large numbers of pen-reared birds can be detrimental to wild gamebird populations if the manager’s attention is diverted away from habitat management. Further, there is some evidence from shooting preserves of partridge in Europe to suggest that harvest of resident birds might be increased to a level which could lead to the loss of the wild population.

Pen-raised quail are a commercially viable enterprise in Texas and will most likely persist and expand in the future. Thus, the following general guidelines are provided to potentially

minimize any potential negative impacts that pen-raised quail releases might have on wild bobwhite populations:

- conduct releases on small areas (e.g., 100–250 acres) that possess an inherent low potential as suitable habitat for wild bobwhites (i.e., naturally have low density of wild bobwhites);
- designate these areas as release sites and only conduct the practice within such areas; and
- scale the number of pen-raised bobwhites to be released to the hunting pressure for the day of hunting to help ensure a high return of pen-raised bobwhites.

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LESSONS LEARNED FROM BOBWHITE HARVEST AT SAN TOMAS

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Data on bobwhite quail harvest has been kept at San Tomas Hunting Camp since it began in 1979. Initially we hunted 10,000 acres, which we expanded to 24,000 in 1980 and to 34,000 acres in 1987. Currently we hunt approximately 18,000 acres of fairly open root-plowed (1969) pastures and about 16,000 acres of chained regrowth mesquite.

Initial harvest records dealt with numbers of birds harvested, age, weight, and sex of birds. Since 1983, we have kept data on # hunters, number of hours hunted, and # coveys found. Heavy shooting pressure (280-340 outings per season existed from 1980 thru 1993. Shooting pressure has been reduced though the 90's to a ten year average of 220 (1994-2003). The harvest lessons discussed are the result of 25 seasons of harvest and harvest manipulation we have enacted to achieve sustained hunting recreation for our guests.

Returns on Quail Banded in 1980-1986

From 1979-1984 we banded and released on site, from 300-1000 wild bobwhites (captured under a Scientific Permit from the State) per year. We used the harvest return on banded birds to determine survival and harvest pressure on quail in various pastures. A quick summary of the results showed that when we harvested 25% or less of the banded birds in a year, we saw little to no effect on the quality of the hunt that season or the next. In 1985, we returned 48% of the bands from a 6000 acre pasture which resulted in poor hunting by the end of that season and a very poor season in 1986. After 1985, hunting areas were assigned to dog handlers with a two week rest between hunts, and a strict 3 bird per covey harvest was imposed on guests to assure that no area would be overhunted.

Controlling Quail Hunting Pressure

Good guides and dog handlers want every hunt to be the best. They tend to take groups to the easiest areas to shoot and work their dogs. Using this methodology, they quickly over-hunt the more open root-plowed pastures and under-hunted the brushier chained pastures. Eventually, I took over the decision making process and started assigning areas to hunt. This assures that no area gets overhunted and that all your quail acreage is used.

When a group of guests arrives at the camp, we try to hunt our poorest areas first and graduate to better areas with each hunt, ending in what we think will be the best areas we have on the final morning of the hunt. This quickly eliminates the fly by night quail hunter and allows guests to have their best shoot the day they go home. If our trucks hit 12 coveys the first outing, 12 coveys becomes the standard for a good hunt. If they hit 8, then 10, then 12, then 14 coveys, then each hunt was better than the last and they go home satisfied with their hunt.

Hunt Your Entire Lease

Over the years, we have opted to have 30 quality quail hunts a year, rather than 45 hunts on often shot, wild birds. We lease a very large acreage compared to many other camps in order to keep light shooting pressure on the birds. It is important to have the discipline to hunt the entire lease to keep quality areas available at the end of the season.

At the beginning of the season we hunt root-plowed areas about 75% of the time and chained pastures about 25% of the time. By December, when the leaves fall off the mesquites, we hunt root-plow and chained areas about 50-50. By January and February, sunflowers, croton, and cow-pen daisy have fallen and we can hunt our chained pastures 75% of the time. Late in the year, we save open root-plowed areas for older, less mobile hunters and take the youngsters to the brush.

In this 2003/04 season, we have had great success in recently (January and February of 2003) chained pastures. Although we tend to average fewer birds per covey in the brush than we do in open pastures, we find more coveys in the brush by spending less time chasing singles. Harvest per acre pretty well balanced out over the 2003/04 season. It is much more difficult to overshoot brushy pastures than it is to overshoot open pastures.

Feeding and Hunting

We seldom hunt roads or “feed-strips” in the open root-plowed pastures. Guides are given a map (aerial) of an area to hunt and stay in that area. All coveys located are marked on the map. By studying the mapped concentrations of coveys, we determine how big an area is necessary to cover for a hunt. In open areas, we concentrate our hunt on a small acreage by hunting it very thoroughly. The smaller the area hunted, the less often we return to an area during the season. In 2003/04, we may get a hunt from 200-300 acres when we need 600 or more on a bad year.

In heavier brush, we normally have specific roads that we hunt through the area. Since it is impossible to drive to all coveys we bring them to the roads using feed. Often the brush debris left from chaining will still restrict truck movement in these areas, although the chaining makes it much easier to shoot and keep up with bird dogs.

I have heard the arguments against feeding quail (increased predation due to concentrating birds; and the chance of aflatoxin poisoning from grain) and find them to have been without merit for 25 seasons. In a “real” pasture situation where the goal is to make use of areas that would otherwise not be hunted due to their restrictive nature, feeding has been an integral part of our overall management program. To report that this is a detrimental practice is shortsighted and failing to look at all aspects of managing the quail population and achieving successful hunts. After 25 seasons, I have seen no downside to feeding, only the positive benefit of making use of all the coveys in the pasture, rather than overhunting those coveys that are easily accessible.

Handling Shooting Pressure on the Bad Years

The cyclic nature of quail populations (our harvest has been from a bird to 3.1 acres to a bird to 72 acres over the years) requires quail managers to learn what I call “tap-dancing” or learning how to keep hunters entertained, without hurting the breeding population. A camp with small acreage should either quit hunting on a bad year, or use alternative forms of entertainment. On a poor year, I have the option of canceling 50-60% of my hunts, or allowing the same number of hunts and holding shooting pressure on wild quail to a minimum. We have had as many as 340 wild quail outings in a season and as few as 76. To reduce shooting pressure on bad years, we have employed these techniques 1) we required guests to shoot pheasants and chukars for half the morning and then hunt wild birds after that 2) One evening is spent hunting released bobwhites 3) another evening is spent on a flighted mallard shoot and the last hour and a half is spent hunting wild quail 4) We have a “quail walk” we shoot in the afternoons keeping hunters occupied until 3:30 rather than having them go quail hunting immediately after lunch 5) We designate, heavy brush areas (500-600 acres) and hunt them more often than once every two weeks. Birds here become virtually unkillable 6) We limit the number of trucks and encourage guests to hunt large game. 7) We put three or four guests on a truck and have them rotate 2 at a time. This reduces the number of outings and the frequency of hunting an area.

I am aware of the arguments against using released birds in wild bird habitat (introduction of disease, social pressure, attracting predators, yadda, yadda, yadda!), From my experience of using released bobwhites, in 1990, 1991, and 1998, I have seen no merit to the arguments or long term detrimental effects. Releasing birds on a limited amount of land (three 200 acre areas) may cause wild birds to move away because the area is getting shot 3 times per week. On years following the release of pen-raised birds, I have seen no decrease in wild bird numbers. We see limited carryover and reproduction from released birds. To say that any release of pen-raised birds is detrimental to wild quail on 600 acres, without looking at the overall aspect of reduced shooting pressure on the wild population on 33,400 acres is very shortsighted. If I ran 3 wild quail trucks on those evenings when I shot released birds (80-90 outings), I would have harvested an additional 640-720 birds. On 600 acres, I may be increasing the predation on a limited number of birds, but **the big picture here (700 birds harvested versus 30 depredated) is self-explanatory.**

UNDERSTANDING PREDATION AS A POPULATION PROCESS

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The vast majority of quail mortality is due to predation. Despite this fact, how predation influences quail populations as process is probably the most poorly understood, and maligned, aspect of how humans understand the life history of wild quails. This is because humans tend to view predation as an event, rather than a process. A predation event is dramatic: life and then death. Furthermore, to understand predation as a process, we need to accumulate data from a large number of events, so that patterns can be observed and predictions can be made.

Until recently, most quail predation events, especially those of nesting quail, were difficult or impossible to observe and document. To add to this problem, it has been impossible to obtain a complete inventory of all the predators that prey on quail nests, which is the basic information needed to understand how the basic predator context varies by location and region.

The recent availability of infrared recording technology now allows researchers to obtain a complete inventory of all predators that attack quail nests on a localized management area. The first application of this technology in Georgia and Florida showed that rat snakes were a much more significant predator than was originally thought. That study also showed that armadillos were significant quail nest predators, a conclusion that changed the prevailing wisdom about this animal as a quail predator. During the past two breeding seasons, infrared cameras in South Texas have attributed more than 90% of the bobwhite nest predation events to a suite of mammalian predators. The predator context in South Texas is vastly different than the bobwhite predator context in Georgia-Florida. Thus, management solutions to mitigate nest predation losses in South Texas will likely be quite different from what works in Georgia-Florida.

Information on the predator context can be combined with other factors such as habitat, weather, behavior, etc. to develop descriptive and predictive models. We are currently at the beginning stages of developing such models in the research process.

Another overlooked aspect of quail predation is hunting. Hunting is predation. Why such a simple, obvious fact eludes many quail hunters and managers is perplexing. Perhaps this is because humans, predators, and prey share a deep and ancient evolutionary relationship. Nevertheless, hunting is one element of predation that can be most easily and directly managed.

The recent development of Hunter-Covey Interface (HCI) models provides quail managers with a tool to manage the predation pressure of hunting. By combining the speed and distance that dogs roam during a hunt, with other basic variables, it is possible to obtain a precise estimate of daily harvest, and use this information to obtain a targeted breeding density for a managed quail population while also maximizing opportunities for people to hunt.

Understanding predation is probably the most challenging aspect of research on wild quail. While we know a great deal about habitat requirements, and other aspects of quail life history, how the process of predation influences quail population remains a major challenge. If nothing

else, we know that the sporting qualities of quail that we enjoy, such as their explosive flight, cryptic coloration, and other evasive behaviors, are the result of predation on an evolutionary scale.

NORTHERN BOBWHITE MANAGEMENT IN THE PINEYWOODS OF EAST TEXAS

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The northern bobwhite, also known as bobwhite quail or partridge, thrived in the Pineywoods of East Texas for thousands of years. However, for many reasons, bobwhite populations have declined drastically in recent years. Although there are no data about populations prior to the late 1960s, inferences can be made based on knowledge of habitat conditions. The primitive agriculture practiced by American Indians and their sedentary nature probably created scattered, weedy fields in which bobwhites thrived. Likewise, regular burning of the forest benefited the species.

Little changed as European settlers replaced Indians. Agricultural practices produced weedy fields and the tradition of burning the forest continued. Bobwhite populations probably peaked between World War I and World War II. By World War I, much of the virgin timber had been harvested, cutover areas were regularly burned, cattle ranged free, and agricultural practices were still relatively primitive. These conditions created vast areas of early successional habitats which were ideal for bobwhites. During that period, the Pineywoods was known as the quail hunting capital of Texas.

The objective of bobwhite management in the Pineywoods is to recreate these conditions. The keys to doing so are the use of fire and the creation of food plots; livestock grazing may also be an option. Landowners whose primary emphasis is timber production can maintain bobwhites by incorporating some relatively inexpensive practices into their management regime. When harvesting a timber stand, the clearcut or seed tree regeneration method should be used. Regardless, most logging debris needs to be removed, preferably by windrowing it along with sheared residual vegetation. Windrows may be burned, but some portions should be maintained for escape cover. Some areas where windrows are burned should be used for food plots.

When planting the tract, the rows of seedlings should be 10-12 feet apart. If it is necessary to use herbicides to control competing vegetation, the widely spaced rows will allow the landowner to band spray over the pines while maintaining residual vegetation between rows. Likewise, the spacing will allow disking between rows. Until the planted pines are large enough to withstand fire, it will be necessary to do some disking. As soon as it is safe to do so, the stand should be burned and burning should continue at regular intervals. Generally, food plots and escape cover should be protected. Finally, the stand should be thinned early and often. Maintaining basal area value of the residual pines below that of the site index will result in an open canopy, which is necessary for bobwhites. Using similar techniques, a southern Nacogdoches County landowner increase his bobwhite population from virtually zero to a bird per 40 acres in five years.

If the seed tree regeneration method is used, the seedlings should be precommercially thinned as early in the life of the stand as possible. This can be accomplished while removing the seed trees or using a tractor-operated mower or shredder to cut strips in the regeneration (i.e., corridor thinning). Regardless, some corridors should be disked until the use

of prescribed fire is feasible. Thereafter, the stand should be burned and thinned in a manner similar to a planted plantation.

Landowners managing primarily for bobwhites with timber as a secondary product will use a somewhat different approach. Harvesting should reduce basal area of overstory pines to 30-60 square feet per acre (e.g., 30-60 trees 13-14 inches diameter at breast height per acre). Ideally, the residual trees should be in small groups of six to eight trees. Virtually all midstory hardwoods should be removed and the area should be burned with a hot fire, then food plots and, if necessary, escapes cover blocks established.

If the landowner elects to harvest pines at some future date, the group selection regeneration technique should be used. With this technique, some groups are harvested and others are reserved to provide a seed source for regeneration and perhaps to be harvested at a later date. Regardless of the species, young pines will have to be protected from fire. Loblolly and shortleaf pines will need protection for five to ten years. Longleaf pine seedlings require fire while in the grass state but then should be protected for several years after they emerge from the grass stage.

The frequency and intensity of prescribed fires is dependent on soil fertility and previous land use. On low fertility soils, it might not be necessary to burn but every second or third year. However, on fertile soils which had previously supported a mixed pine-hardwood forest, even hot annual burns may not control sprouting hardwoods and turf grasses (e.g., bermudagrass and bahiagrass). In such cases, the landowner should consider herbicides and/or livestock grazing.

Food plots are extremely important. Hens will rapidly move newly hatched chicks to warm-season food plots where the chicks feed on insects. Adults will use the plots and associated escape cover throughout the fall and winter. Food plots should be up to an acre in size, long and narrow, and visible from at least one other plot. Each plot should have a warm-season and a cool-season portion, and have escape cover associated with it. Warm-season species planted could include browntop, Japanese, and pearltop millets, Egyptian wheat, American jointvetch, kobe lespedeza, partridge pea, cow pea, and Florida beggarweed. Cool-season portions could contain winter wheat, rye grass, hairy vetch, kobe lespedeza, partridge pea, and crimson and red clover.

Escape cover is generally not lacking in the Pineywoods. It may be necessary to protect it from prescribed fires, however. Within the legal framework, predator control may be an option. Rat snakes are serious predators on bobwhite nests and nesting hens. Raccoons, skunks, opossums, and other mammals depredate nests and occasionally capture adults. All birds of prey are protected, but the elimination of snags and hardwood will reduce perch sites for such species.

In summary, by creating and maintaining early successional habitats, bobwhite populations can be sustained in the Pineywoods of East Texas.

MANAGING FOR BLUE QUAIL IN BOBWHITE COUNTRY

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Why Would You Want To?

When I was asked to address this topic, my thoughts were “why would anyone want to manage for blue quail if they have bobwhites?” Blue quail don’t endear themselves to classical quail hunting, i.e., behind pointing dogs. But as a student of blue quail for the past 35 years, I appreciate them. When I say “appreciate” the implication is not only that I “value or admire them highly”, but also that I “judge with heightened awareness” and “be cautiously or sensitively aware of” their sporting qualities.

Blue quail were a good third of my memories of hunting quail in my teenaged haunts in southwestern Oklahoma during the 1970s. During the dry years, blues would make up 75% of the quail we shot, during “boom” years, perhaps 30%. Accordingly, I submit there are at least 3 reasons to consider blue quail in your management plans. These include (a) they provide a measure of “drought insurance”, (b) they offer a variety of hunting situations, and (c) perhaps you just have an affinity for blue quail, as I do.

Quail Life in the Sympatric Zone

Blue quail are sympatric (i.e., their ranges overlap) with bobwhites over much of the western one-third of Texas, generally west of the 100th meridian. They share the same diet as bobwhites, but typically occupy more “open” habitats than bobwhites, at least in the Rolling Plains. In south Texas, blue quail (the chestnut-bellied subspecies) occupy more inhospitable habitats (from our perspective at least) than bobwhites, e.g., dense prickly pear flats and blackbrush thickets.

Blue quail tend to be better survivors than bobwhites in the same range. I think of them as Spanish goats whereas the bobwhites tend to be more akin to Angoras, i.e., the blue is a better “hustler.” A blue quail will almost always have some food in its crop, and generally it will contain 2-4 times more food than a bobwhite taken at the same time of the day. Spring and summer survival of blue quail west of San Angelo was about thrice that of bobwhites during one study. More recent studies in the Trans-Pecos region suggest that blue quail survived at rates (e.g., 80%) typically higher than those reported for bobwhites. Lehmann considered scaled quail to be “somewhat more intelligent than bobwhites.” A. S. Jackson (working in the Rolling Plains during the 1940s) reported that evidence of predation on scaled quail was “light” and that scaled quail were apparently less vulnerable to avian predation than were bobwhites.

And yes, bobwhites and blue quail can and do hybridize. The resultant “blobs” are true hybrids, i.e., they are sterile. Blobs are rare, but most hunters who’ve spent years hunting in the sympatric zone have either seen, or at least heard of, such hybrids. I know one hunter in Fisher County who has killed 11 blobs during his hunting career.

Population trends of blue quail in Texas exhibit the irruptive patterns characterized by bobwhites. For whatever reason, blue quail abundance declined significantly in the late 1980s (circa 1989) and their populations stayed at low levels until they finally began to rebound about 2002. Figures are attached depicting population trends (as determined by Texas Parks and

Wildlife Department for August roadside counts) for Rolling Plains, South Texas Plains, Edwards Plateau, and Trans-Pecos ecoregions. They have returned with a vengeance over the western portion of the Rolling Plains, south Texas, and the Trans-Pecos since that time. This past season was blue quail hunting akin to that observed in the 1970s over much of west Texas.

Habitat Preferences

Blue quail tend to prefer more xeric sites on the landscape than do bobwhites. They tend towards the more gravelly soils with pear flats/blackbrush ridges in south Texas. They will be found more often on the more heavily grazed and/or shallower sites in the Rolling Plains and Edwards Plateau. As Ty Bartoskewitz (TPWD biologist in Hebronville) related (paraphrased), “if you see jackrabbits you’re more likely to see blue quail, if you see cottontails, you’re more likely to see bobwhites.”

Management Practices

Again, I see relatively few of you interested in making your bobwhite range more hospitable to blue quail. To do so would mean heavier grazing to create more open country, a problem I hesitate to recommend. Manage your property for bobwhites, and then appreciate the idea that you’ll have more scaled quail in the droughty years.

Blues readily accept supplemental feed; whether the feeding actually produces any more quail is debatable (as it is with bobwhites). They will also use water if available, but again, adding water has not been proven to increase blue quail abundance. Feeders will concentrate blue quail for hunting purposes. If you use feeders in sympatric areas, I would be concerned about overshooting of bobwhites, as I believe they are more vulnerable to hunting than blues.

Establishing “spreader dams” to harvest runoff water has been purported to increase blue quail abundance in the Trans-Pecos, but recent studies there by Scott Lerich and Bobby Buntyn failed to document differences in survival or nesting success in areas influenced by spreader dams. The moist-soil sites created by spreader dams did increase herbage by about 24-fold, and arthropod biomass by 6-fold. Accordingly, the sites may be important brooding habitats, or for seed production during fall and winter.

Making Blues More Huntable

The problem with blue quail isn’t so much in producing them, it’s in hunting them successfully. Depending on where you’re at, hunts may be behind pointing dogs, on a dead-out run, or atop a jeep or dune buggy. To enhance hunting behind dogs, keep in mind that blue quail are a product of their environment. Don’t expect them to hold for dogs if the country looks like pavement.

I’ve enjoyed excellent dog work on blue quail in the Rolling Plains, especially under two situations. First, the day after a significant snowfall (e.g., 3 inches) affords excellent dog work as it precludes the blue quail from running. Second, using a “divide and conquer” technique in an area that has sufficient grass cover to hold the birds once they’re scattered. The former is impossible to plan, while the latter hinges on conservative grazing.

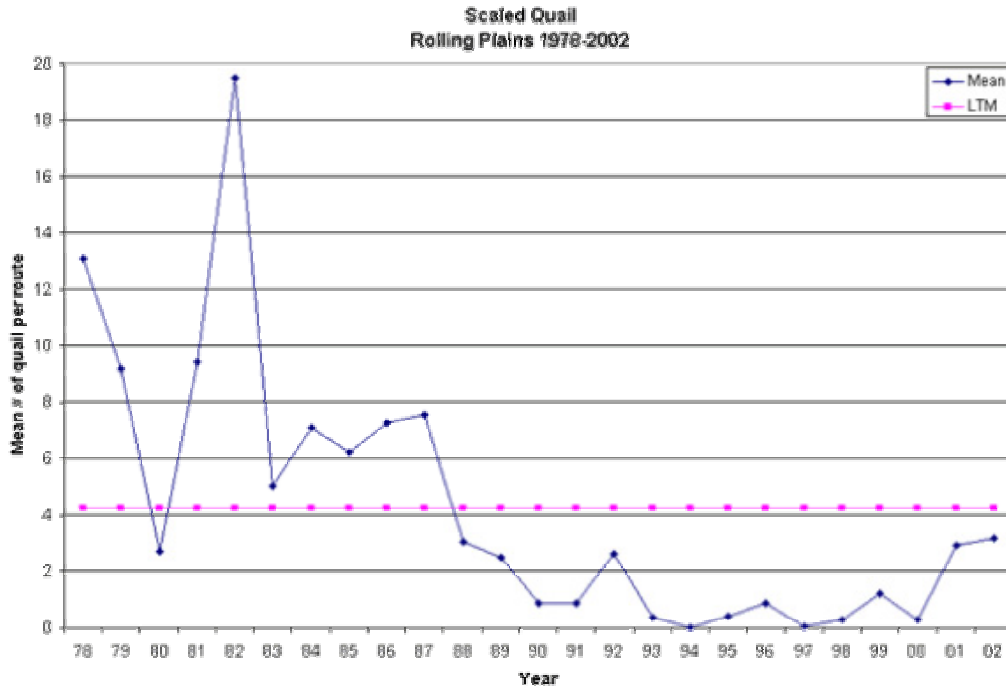


Figure 1a. Scaled quail abundance in the Rolling Plains as gauged by August roadside counts (Texas Parks & Wildlife data).

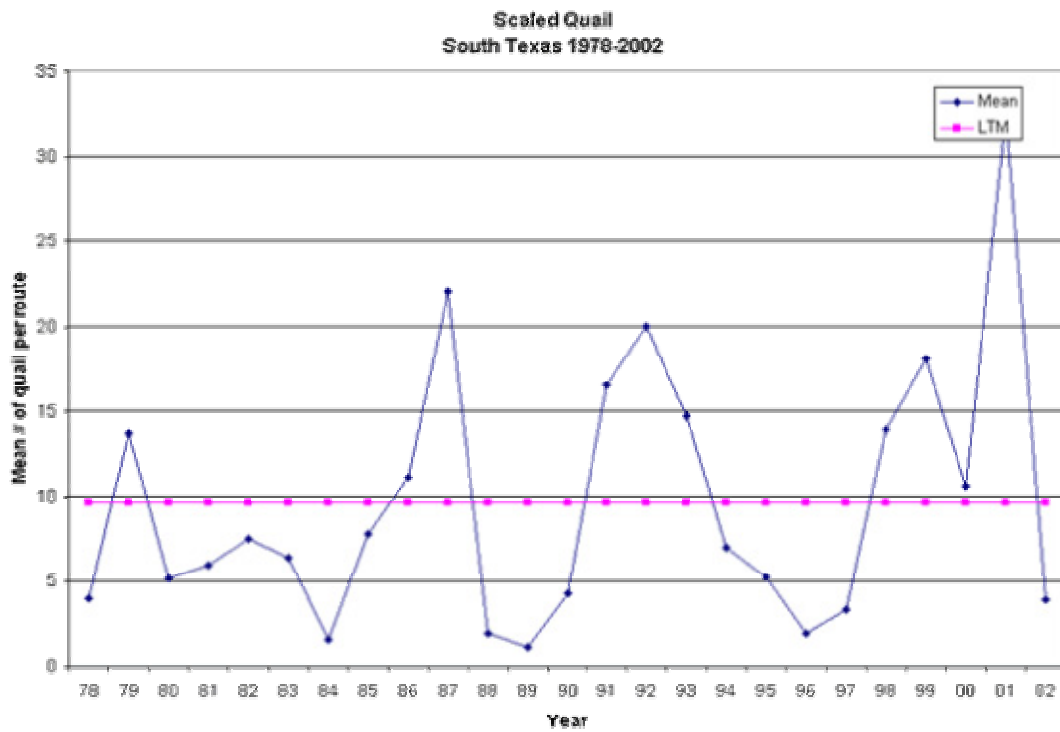


Figure 1b. Scaled quail abundance in the South Texas Plains as gauged by August roadside counts (Texas Parks & Wildlife data).

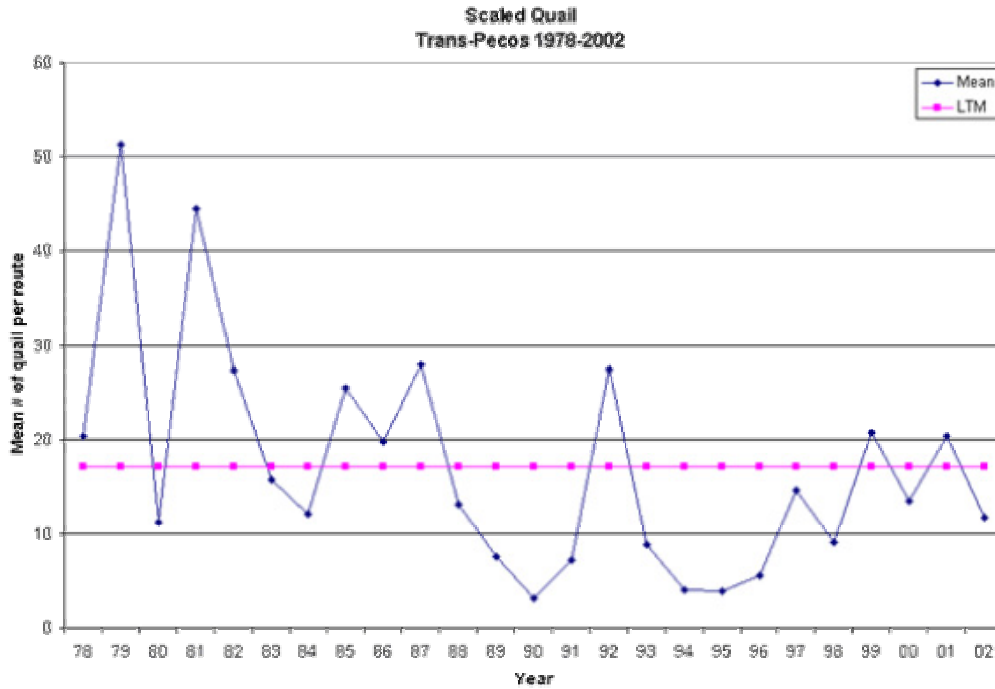


Figure 1c. Scaled quail abundance in the Trans-Pecos as gauged by August roadside counts (Texas Parks & Wildlife data).

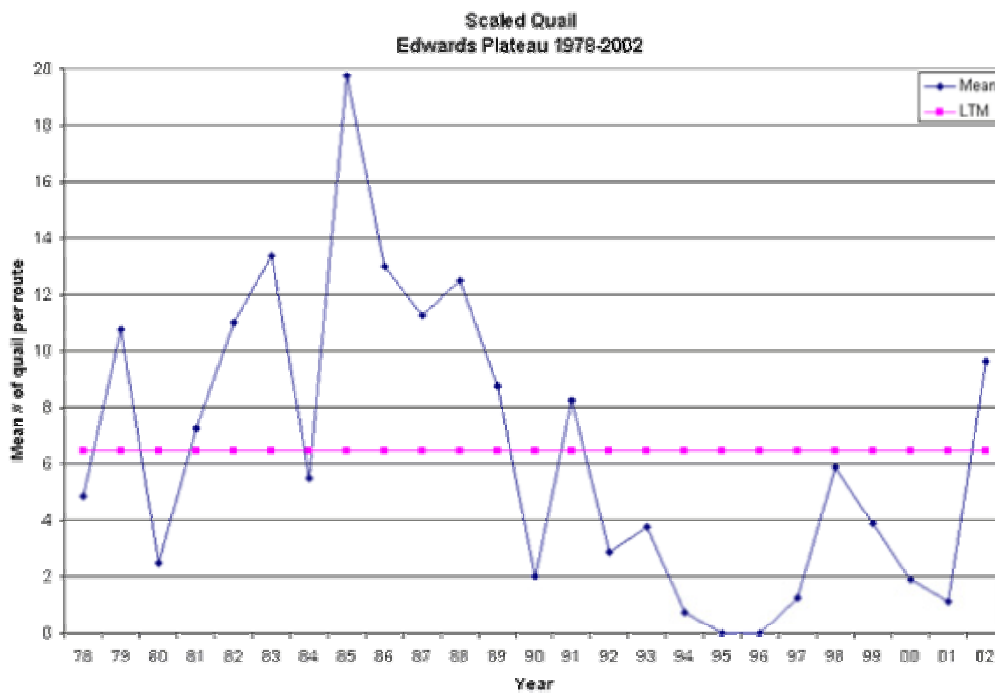


Figure 1d. Scaled quail abundance in the Edwards Plateau as gauged by August roadside counts (Texas Parks & Wildlife data).

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ECOLOGY AND MANAGEMENT OF WEST TEXAS QUAIL

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Texas is one of the most “quail-diverse” states in the nation, where 4 species of quail can be found: the northern bobwhite (*Colinus virginianus*), scaled quail (*Callipepla squamata*), Gambel’s quail (*Callipepla gambelii*), and Montezuma quail (*Cyrtonyx montezumae*). Bobwhite and scaled quail have received much attention in the past century, however little is known on the ecology and management of Gambel’s and Montezuma quails in Texas. As populations of and hunting opportunities for bobwhites decline throughout the southeastern United States, more emphasis will be placed on the ecology, conservation, and management (e.g., hunting) of Gambel’s and Montezuma quails. Thus, my purpose is to introduce you to Gambel’s and Montezuma quails by providing a general overview of their life history and management in Texas.

Gambel’s Quail

Ecology

Gambel’s quail occur in the Mojave, Sonoran, and Chihuahuan deserts of the southwest and are strongly associated with riparian habitats. In west Texas, Gambel’s quail can be found along the dry washes and major drainages that feed into the Rio Grande.

Like other gallinaceous birds, Gambel’s quail are primarily granivorous where legumes (e.g., *Acacia* spp.) are an important component of their diet. With the onset of spring and breeding season, their diets shift to invertebrates which provide a much needed source of energy and protein. Although Gambel’s quail readily drink, they do not require free-standing water if lush vegetation (grasses, forbs, fruits) and insects are available.

Gambel’s quail form relatively large coveys, ranging from 10-50 birds. Coveys in excess of 200 birds are frequently reported. Covey composition is composed of multiple adults and their respective young of the year.

Coveys of Gambel’s quail begin to break in late winter. The onset of breeding season is marked by males crowing from elevated posts. Nests occur in a variety of substrates including shallow depressions, shrubs, or grasses. Almost all nests are located in shade. Following pair formation, females begin laying eggs (1/day) until the clutch (~12-14 eggs) is complete. Females (and sometime males) incubate the clutch for 3 weeks. Under favorable conditions, females will attempt a second clutch while the male rears the first brood. Mixed brood sizes are commonly seen in summer coveys. Chick survival is low.

Gambel’s quail populations are subject to the same “boom-bust” phenomenon as other quail. In general, wet years produce more quail (boom) and dry years result in fewer quail (bust). Additionally, recruitment of Gambel’s quail is hampered by excessive temperatures during nesting and brooding. Although Gambel’s quail are not monitored annually, their populations in Texas appear to be on the increase.

Management

No studies have evaluated management strategies on Gambel's quail in Texas. However, some information is available from other western states that may have bearing on Gambel's quail populations in Texas. Landowners and managers in west Texas should: (1) promote forb production with conservative grazing pressure, (2) conserve riparian areas and native vegetation using fencing, (3) increase water infiltration by creating various water catchments and diversions, (4) enhance forb production by disking sandy soils (parallel to land contour), and (5) allowing water sources to overflow during dry periods.

Montezuma Quail

Ecology

In Texas, Montezuma quail are classified as a game bird with a closed season (e.g., no hunting). Because of this status, Montezuma quail are more commonly thought of as a nongame bird rather than a game bird. Montezuma quail are restricted to desert grassland and woodland communities of the mountains of the Trans-Pecos region and portions of the eastern Edwards Plateau. Montezuma quail have been extirpated from much of their former range in Texas because of overgrazing.

Montezuma quail are habitat specialists. They require an abundance of standing biomass (e.g., grass cover) and are strongly associated with oak-juniper habitats. Without adequate grass cover, Montezuma quail become highly susceptible to predation by raptors and subsequently, populations decline. Montezuma quail are also foraging specialists. They have long claws and strong feet to help them dig for their food. Subterranean foods (e.g., tubers, corms, and bulbs) are their primary diet and are also an ample source of water. Invertebrates are consumed as they become more available during spring and summer months.

Pair formation in Montezuma quail commences as early as February but reproduction does not occur until the monsoonal season (late summer). Nests are "domed" and primarily occur in bunchgrasses. Six to 16 eggs are laid and incubated in 3-4 weeks by the female. Hatching dates range from July-October and are directly tied to rainfall. Males assist female Montezuma quail in brooding responsibilities. Fall covey sizes of Montezuma are the lowest for all North American quails and average 6-8 birds/covey. Larger aggregations have been reported, but likely represent multiple coveys congregating at abundant food sources.

Montezuma quail occur at relatively low densities, in sometimes inaccessible habitats, are reluctant to flush, and are very cryptic. These traits have hampered biologist in their ability to gather reliable information on Montezuma quail. Annual changes in Montezuma quail populations are especially explosive. Hunting, overgrazing, or severe drought can lead to drastic declines or local extirpation of Montezuma quail populations.

Management

Conservative management practices are instrumental to the viability of Montezuma quail populations in Texas. Overgrazing has been shown to reduce population levels and has led to the range-wide decline of Montezuma quail in Texas. Of the Montezuma quail habitat that remains in Texas, almost all occurs in fragmented islands (e.g., mountains). Habitat management practices for grazing or prescribed burning should be prescribed conservatively. Namely, stocking levels should be light and burning programs should ensure a patchy effect on the landscape.

Previous reintroduction attempts of Montezuma quail in Texas have not been successful. However, as technology advances and as we learn more about this elusive species, restocking programs may be a practical alternative to natural recolonization of historic Montezuma quail habitats.

With conservative habitat management practices, Montezuma quail populations should respond favorably. Opening a hunting season on Montezuma quail may be a viable option. However, with little known on the population dynamics of Montezuma quail, resource managers should precede cautiously in implementing a harvest on Montezuma quail. This is especially true given that Montezuma quail are a flagship species for the ecotourism industry based in the desert mountain of Texas.

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USING LIVESTOCK AS A BOBWHITE QUAIL MANAGEMENT TOOL

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Are livestock and bobwhite quail compatible? The answer to this question depends on how well the livestock are managed and how much consideration is given to quail during the management process. Because of frequent overuse of rangelands by livestock, a widespread perception has developed that livestock and wildlife are not compatible. This perception of incompatibility has led to a great number of ranches totally de-stocking for the benefit of wildlife. Although it is not possible to optimize quail and livestock production at the same time on a given piece of property, management for both is possible and may afford the opportunity to optimize the total ranching enterprise. A great deal of consideration must be given to the combinations of quail and livestock outputs that will achieve the personal and economic goals of the landowner and/or lessee. In addition, the land manager must have an intimate knowledge of quail habitat and food requirements in conjunction with an understanding of the food habitats of livestock occurring on the property.

Impacts of Excessive Livestock Use

Too much grazing or browsing by livestock impacts quail in a variety of ways. Reduction in food and cover for quail can occur from grazing and browsing by domestic animals. Excessive, uniform grazing over a large area reduces habitat quality for quail by eliminating diversity in plant height, which is important for nesting, brooding and screening cover. Continued heavy grazing over extended periods of time can reduce vegetation production and also change the combination of the different plant species that occur on the land plant, reducing, or even eliminating the most desirable plants. This loss of plant diversity negatively influences forage availability, diet quality and nesting cover for bobwhites. In addition, range stewardship that protects forage and soil resources requires a minimum stubble height of 6-8 inches on mid-grasses such as little bluestem, sideoats grama and threeawns and 12-14 inches on tallgrasses like big bluestem, Indian grass and switchgrass.

Benefits of Properly Managed Livestock

Good habitat for bobwhite quail contains a mixture of grass, forbs and woody cover. When looking at good quail country from an aerial view, it has been said that the property should look like a patch-work quilt. A mixed-up pattern of brushland, grassland and bare ground are necessary in order for quail to meet their needs for food, cover and space. Disturbance by livestock is one mechanism by which this “mixed-up pattern” can be maintained. This is especially true in areas of high rainfall, particularly where productive forage such as buffleggrass has been introduced.

Bobwhite quail number decrease if their habitat changes completely to brush, or completely to grass. Therefore, management is necessary to maintain quality quail habitat in the face of an

ever-changing environment where plant communities are constantly shifting. Bobwhite quail have the potential to benefit from well-managed livestock grazing, if the land manager is careful to consider and monitor all impacts from the livestock program.

Quail are heavily dependent upon the large seeds of forbs for food, as well as the greens they provide. Light to moderate cattle grazing can encourage such forb production. Cattle grazing, in conjunction with prescribed fire, can be used to create openings in dense tallgrass communities to enhance forb production for the benefit of quail. While properly managed livestock can be used to achieve and retain plant diversity, grazing is most likely to have a positive impact in areas that have moderate to heavy amounts of rainfall. If carefully managed, light to moderate grazing should not damage wildlife habitat in lower rainfall regions, but positive impacts are difficult to illustrate.

Appropriate Livestock Use

The term “range condition” describes the state of health for a particular piece of rangeland. Ratings of poor, fair, good and excellent are used to express range condition relative to the land’s ecological potential. Different range conditions are needed for quail depending upon geographic location. In highly productive areas that have good soils and rainfall that exceeds 30 inches annually, a range condition of fair to good would likely be most beneficial to quail. If such an area were in excellent condition, it would probably lack the bare ground for foraging, and the weed species that quail need for food. Managed grazing can be used to manipulate these condition classes for proper quail habitat. Highly productive sites can usually be grazed at moderate levels when there is 5% or less brush cover present. If the brush cover increases markedly above 5%, then the potential exists to increase grazing intensity from moderate to heavy.

Rangelands that have moderate amounts of rainfall (20-30 inches annually) will probably benefit quail if maintained in good condition. However, such areas should only be grazed lightly if there is 5% or less brush cover. Under such conditions, the grass and forb plants must provide more of the travel and escape cover that would normally be provided by a heavier brush component. As the diversity and amount of brush increases, grazing can be increased to moderate levels.

In more harsh environments where poor soils and low rainfall are the norm, it is appropriate for the range condition to be good to excellent. For the benefit of quail, particularly in regard to nesting habitat, grazing should be light in areas of less than 20 inches of annual precipitation. During drought, or in cases where range condition is fair to poor, it may be necessary to eliminate livestock grazing until conditions become more favorable for quail.

Grazing systems were developed to manage and improve: 1) intensity of vegetation use, 2) timing of vegetation use, 3) frequency of vegetation use, and 4) distribution of livestock on rangelands. Many grazing systems are highly specialized in order to meet specific goals, but no single system is capable of meeting every ecological and economic need. As a result, no single recommendation can be made as to the best grazing system with regards to its impact on bobwhite quail. Grazing systems should be selected based upon the vegetation community being used, the local climate, as well as the land manager’s goals. A rangeland monitoring program is

vitaly important for evaluating the success of a particular grazing system or strategy. Without monitoring data, perceived benefits or detriments attributed to the grazing system are simply anecdotal. Quantitative data however, can be used to make informed decisions about how a particular grazing system is affecting the vegetative resources. This information can also be used to make inferences about how the livestock program may be impacting or benefiting the local quail population.

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PLANNING BRUSH MANAGEMENT FOR BOBWHITES IN SOUTH TEXAS

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Despite the extensive knowledge base that exists for northern bobwhites (*Colinus virginianus*), we have little to no knowledge concerning habitat selection by bobwhites. Biologists are capable of identifying the specific habitat features that comprise bobwhite habitat, but can only speculate on how much of a habitat feature is needed. The amount of brush needed by bobwhites is one such instance.

Early biologists recommended 5–15% woody cover for bobwhites. However, recent research suggests that bobwhites select points with >20% woody cover. This discrepancy between early recommendations and recent data might result from a difference in perspective. Early recommendations were speculative and for the entire pasture, whereas recent studies are based on empirical data and based on a point-of-use (e.g., flushing point or whistling post).

Our discussion of brush management for bobwhites is based on the concepts of usable space and “slack”. Usable space can be viewed as habitat that is compatible with needs and adaptations of bobwhites. Slack is a term used to describe the concept that different arrangements of habitat patches (e.g., herbaceous cover, woody cover) may result in equally valuable habitat for bobwhites. Slack partly arises because the adaptations of bobwhites allow them to use habitat over a broad range of values for specific features. These 2 concepts have important management implications. First, bobwhite populations are maximized when 100% of the area is usable by bobwhites at all times. Second, ideal bobwhite habitat is not a single arrangement but rather many different habitat arrangements each of which is fully usable by bobwhites. Management could result in a habitat configuration that is of equal value to the habitat that existed prior to management. Thus, the goal of management should be to recognize the conditions when management can be applied with reasonable expectations of a positive response

Brush Management Considerations

In selecting a brush management practice for bobwhite management, it is important to recognize that there is no single best practice to manage bobwhite habitat and that various practices can achieve similar results. Identifying the appropriate brush management practice requires knowing how much brush cover is present on the rangeland relative to the needs of bobwhites. For example, in areas with high brush cover (e.g., dense stands of regrowth brush), practices such as rootplowing or reclamation fires can be used to create usable space for bobwhites. However, in areas exhibiting the appropriate amount of brush cover, rootplowing or reclamation fires would not be advisable because they probably would result in the loss of usable space (i.e., result in too little brush). Rather, in these situations, other practices such as rollerchopping or maintenance fires could be applied as needed to help maintain usable space.

Mechanical Methods for Brush Management

Brush can be managed using either mechanical, chemical, or pyric methods. Landscape application of chemical methods generally have limited applicability in management of bobwhite habitat in southern Texas. However, chemical methods can be effective in other parts of the state or through other application methods (e.g., individual plant treatment). For example, in the Rolling Plains of Texas, the herbicide picloram (spike) is an effective way to convert large areas of shinnery oak into usable condition for bobwhites in the Rolling Plains of Texas. For the sake of brevity, we only will discuss mechanical methods because they are the most common method in South Texas.

Mechanical methods of brush management can be categorized into 3 general classes based on the resulting degree of soil disturbance (i.e., high, moderate, and low soil disturbance). A mechanical method resulting in relatively high soil disturbance is rootplowing. Rootplowing achieves high mortality of woody plants and often causes long-term reduction in species diversity. For example, mesquite (*Prosopis glandulosa*) and huisache (*Acacia smalli*) comprised about 95% of the woody plants on rootplowed rangeland compared to 25% in non-treated rangeland. Rootplowing also generally destroys a high percentage of perennial grasses in the near term and disturbs the soil to a degree that reseeding may be necessary to reestablish herbaceous vegetation. Because perennial grasses represent important nesting cover for bobwhites, we generally would not recommend rootplowing as a mechanical method for bobwhite habitat management. However, rootplowing might be the only feasible method of habitat management in mature, dense stands of brush.

Mechanical methods resulting in moderate soil disturbance include rollerchopping, aerating, and disking. These methods reduce the height of brush but do not result in high brush mortality as compared to rootplowing. The growth form of resprouting brush species also is affected, changing from single- to multiple-stem shrubs. Further, the density of mesquite and other woody legumes may increase following rollerchopping. Despite the low mortality in brush, these methods probably are more appropriate mechanical methods for management of bobwhite habitat when the goal is to maintain usable space. These methods (i.e., rootplowing, rollerchopping, aerating, and disking) also might increase rainfall infiltration, especially when applied on compacted soils.

Mechanical methods of brush management resulting in the least amount of soil disturbance include shredding and chaining. Shredding reduces height of woody plants but alone does not control sprouting species. Shredding can result in a relatively level plant height, thereby reducing structural (vertical) diversity. A relatively uniform plant height might be of no concern to bobwhites if shredding results in a plant height that falls within the bounds of acceptable habitat structure. Chaining generally uproots mature, single-stem woody plants but not small plant or plants with limber stems. Chaining therefore does result in low-level soil disturbance and represents an appropriate practice to manage bobwhite habitat, especially in areas containing mature brush.

Brush Management Considerations

When planning brush management for bobwhites using mechanical methods, it is important to remember that brush represents an important component of bobwhite habitat. Bobwhites use shrubs such as granjeno (*Celtis pallida*), brasil (*Condalia obovata*), and lotebush (*Ziziphus obtusifolia*) as coverts for resting during the midday inactive period and for thermal protection. Woody cover is important escape cover and reduces vulnerability to predation. Bobwhites also use the mast of woody plants for food.

The optimal amount of brush required by bobwhites is both broad and variable (i.e., has slack) and probably is a function of amount and height of herbaceous cover. To an extent, purposes served by woody plants are interchangeable with tall, robust herbaceous cover. Therefore, the amount of brush required on a landscape is inversely related to the amount of tall herbaceous cover.

Brush management should be conducted in a manner such that the remaining brush cover falls within the range of percent cover used by bobwhites. We recommend about 15-25% brush cover at the pasture scale. Untreated areas should be in the form of brush mottes (about 20-30 ft. diameter) instead of individual trees because bobwhites prefer areas (55 yds. from points-of-use) with greater brush coverage than the surrounding landscape. Tall, mature brush also should be preserved. Bobwhites use loafing coverts averaging 10-15 feet in height during the summer. Bobwhite males prefer to display from perch sites 5-10 feet above ground that have overhead protection.

Regarding the interspersation of woody cover, woody cover needs to be arranged such that no point is more than 55 yards away from escape cover. Bobwhite flights typically are less than 80 yards, with an average flight distance of 50 yards. Thus, a maximum distance of about 100 yards from cover to cover should be compatible with typical flight behavior of bobwhites.

Concluding Remarks

Brush management for bobwhites can be an effective means for increasing or creating usable space. However, managers need to be able to recognize when “slack” would result in no habitat improvement for bobwhites. Research needs to provide data to assist in defining these bounds of habitat suitability for bobwhites.

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THE IMPACT OF QUAIL MANAGEMENT ON ASSOCIATED WILDLIFE SPECIES IN TEXAS

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Quail can be considered a keystone species in many parts of Texas today because of their economic importance to landowners who often derive substantially more income from leasing quail hunting to sportsman than they do from raising livestock (Ryne 1998). Moreover, wealthy quail enthusiasts have begun to purchase property that was formerly used for cattle or timber production, for the express purpose of maximizing quail production. A variety of habitat management techniques are being applied on these properties to create vegetation communities preferred by bobwhites. Land management for bobwhite production is fast becoming a reality throughout Texas, which should be embraced by individuals who are interested in other non-target wildlife species that share landscapes with quail.

Bobwhite Habitat

Webb and Guthery (1983) and Gruver and Guthery (1986) concluded that bobwhite habitat management applied to Texas rangelands also improved habitat for nongame birds. Other quail habitat management studies have also provided reasonably strong evidence that habitat management performed for quail production benefits both small and large wild mammal populations (Scifres 1980, Rollins 1983, Guthery 1986, Brennan et al. 1995, Provencher et al. 2002). Therefore, carefully planned quail habitat management that is applied in the appropriate manner will probably benefit native flora and fauna communities in most parts of Texas because quail management emphasizes maximizing habitat diversity. Self-sustaining nongame bird and small mammal communities, as well as large wild mammal populations should all flourish on rangelands managed for quail.

Bobwhites are grassland birds that require habitats composed of about 65-75 % herbaceous habitat and 25-35% woody cover. The herbaceous plant community should be composed of a diversity of forbs and grasses that provide sufficient food as well as foraging, nesting, brooding, escape and thermal cover. Similarly, the woody plant community should also be composed of a diversity of plants that provide additional food in the form of mast as well as thermal and escape cover. Woody cover should be interspersed through herbaceous plant communities in a manner that ensures that a quail does not have to move more than 60-to-80-m to find woody cover. These vegetation conditions will provide habitat that will generally support diverse and abundant native bird and small mammal communities, as well as healthy populations of predators and popular game mammals such as white-tailed deer, javelinas and feral hogs.

Rangeland Habitat Management

Quail habitat requirements can be provided on rangelands by applying a number of habitat techniques. Research has demonstrated that mechanical techniques such as roller-chopping and chaining, herbicide applications, prescribed fire as well as grazing can all be utilized to provide

good quail habitat conditions on rangelands (Scifres 1980, Lehmann 1984, Guthery 1986, Scifres and Koerth 1986, Scifres and Hamilton 1993). In fact, a combination of these techniques such as roller-chopping followed by prescribed burning or herbicide treatment followed by prescribed fire will usually create and maintain better habitat conditions for quail than a single technique alone. Ranchers and quail managers therefore have a great deal of flexibility in choosing habitat management techniques that will provide the best quail habitat conditions for their individual operations. Fortunately, numerous research projects have indicated that most of the habitat improvement techniques utilized to improve landscapes for quail also benefit non-target wildlife populations (Guthery 1986). Grassland birds in particular represent a declining avian guild that could benefit significantly as quail habitat management continues to increase on Texas rangelands.

Forest Habitat Management

Quail management in the forests of east Texas will also likely benefit non-target wildlife populations. Recent research has demonstrated that midstory hardwood removal techniques such as thinning and girdling and herbicide application followed by prescribed burns ignited in the spring 2-to-3-yr post-treatment can be used to restore longleaf pine forests in a manner that benefits native bird populations (Provencher et al. 2002). Other studies have shown that native wildlife populations can also benefit from efforts to improve pine forest composed of fast-growing species, though the composition and abundance of bird communities remains different from the native bird communities of longleaf pine forests (Brennan et al. 1995, Engstrom and Baker 1995). Nevertheless, the commercial pine forests that dominate most of east Texas are capable of supporting diverse native fauna communities when they are managed for bobwhites. The local and regional abundance of numerous species of neotropical migratory birds that have been declining in recent years could improve if more acreage in east Texas and the Southeast are managed for bobwhites. In addition, small forest mammal communities would also probably benefit from bobwhite management of pinelands, as would white-tailed deer and feral hog populations.

Negative Effects

Non-target wildlife species that require woody cover would likely decline on rangelands and forests that are managed for quail production. Anytime vegetation communities undergo dramatic alteration, populations of a few species suffer and decline. Tradeoffs are inevitable! However, most of the bird and mammal species that decline as a result of quail management applied to Texas rangelands and forests, are species that responded positively to destructive land management practices that ruined the native rangeland and forest ecosystems in Texas. Restoring these ecosystems by applying habitat management that creates vegetation communities preferred by quail simultaneously encourages restoration of native fauna populations, which generally results in a more diverse and abundant vertebrate community.

Conclusions

Most of the rangeland ecosystems in Texas that support or historically supported quail populations, have deteriorated over the past 150-yr due to overgrazing, exotic plant invasions

and urbanization as well as other disturbances. Similarly, the longleaf pine forests that once dominated the uplands of east Texas are now reduced to small, highly fragmented remnant stands. They have been replaced by commercial forests composed of fast-growing pine species that are managed in a manner that maximizes profits for timber companies at the expense of wildlife. Native bird and mammal abundance and diversity in these commercial forests are poor and generally remain in this condition as long as traditional silviculture is observed. Consequently, good quail management of rangelands and pinelands is a superior alternative to traditional land management practices because the vegetation communities created and maintained for quail support more abundant and diverse wildlife communities than overgrazed, brush and exotic grass-infested pastures and intensively managed commercial pine plantations. The increasing popularity of quail in Texas represents a genuine blessing to non-target wildlife species in Texas because as more of Texas is improved for quail, more of Texas will be improved for native wildlife communities.

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QUAIL MANAGEMENT IN THE WILD HORSE DESERT: A KING RANCH PERSPECTIVE

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Decades of scientific literature, ideas, observations, and perspectives have provided managers and biologist's with a plethora of tools to manipulate Bobwhite quail (*Colinus virginianus*) populations and their habitat. Despite this growing library of information, bobwhites continue to decline rapidly across most of the southeast possibly as a result of habitat fragmentation. Populations in south Texas remain stable, largely due to the vast expanses of native rangeland and economic value of quail hunting.

How can we assure that quail populations will remain stable over time? Aldo Leopold described 5 basic tools of wildlife management: the cow, plow, axe, gun, and match. Integrated together and applied properly, these tools provide the backbone to maintaining healthy quail populations. Following is a summary of how King Ranch incorporates each tool to provide economic stability as well as maintaining healthy range conditions for bobwhite quail.

The Cow: Grazing Management on King Ranch

Grazing decisions vary for native range or introduced grasses (i.e. Kleberg bluestem). If individual pastures are dominated by introduced grasses then a continuous grazing system is implemented; whereas, native range is grazed using a 3 herd, 4 pasture rotational (Merrill) system with 2 cow/calf herds and one stocker herd. South Texas is a semi-arid landscape and experiences erratic weather events; thus, having a stocker herd allows for flexibility when drought conditions persist. Our basic goal is to maintain range conditions between fair to good. Ideally, bobwhite quail best utilize poor to fair range conditions that promote insect attracting forbs (weeds). However, cattle perform best on good to excellent range conditions (grass dominated). Therefore, grazing practices are balanced to maintain range conditions between fair to good.

The Plow, Axe, and Match: Brush Management and Prescribed Fire on King Ranch

Brush management practices commenced on King Ranch during the late 1800's when brush encroachment became an issue. With wildlife and cattle now of equal importance, brush control activities are customized to each pasture in order to optimize cohabitation of both species. Each pasture is evaluated based on soil type, brush density, and priority for quail, cattle, or deer. Pastures receiving cattle and quail priority are cleared by means of 2-way chaining (sandy soils) and rootplowing (heavy soils) until an 80% open/20% brush strip motte pattern is achieved. However, the majority of pastures are managed for a combination of quail, cattle, and deer, and configured to a 65% open and 35% brush pattern. Brush clearing is a good management tool for bobwhites because it stimulates forbs and thus insects necessary for nutrition. Laid over brush creates an abundance of mini-quail shelters which provide escape cover from predators. To maintain desirable range conditions follow-up treatments must be conducted often, depending on treatment application.

Prescribed fire is very beneficial to bobwhite populations in south Texas. The most desirable prescribed burns are “dirty burns”, where patches of unburned grass and brush create mosaic growth patterns. These mosaic patterns benefit quail by creating various stages of range condition within a single area providing nesting cover, escape cover, and valuable food resources. King Ranch prioritizes fire in conjunction with brush clearing techniques. The ranch goal is to burn pastures treated by chaining or rootplowing within 2-3 years to accomplish 2 goals: clean up debris in existing cleared strips and reduce re-sprouting of brush. Most prescribed burns take place during January-February and late summer on King Ranch.

The Gun: Quail Harvest Strategies on King Ranch

Bobwhites are affected largely from small scale (pasture) versus large scale (statewide) harvests. Thus, management strategies such as maximum harvest rates and rest rotation hunting are critical when harvesting on individual pastures. Dividing pastures into sections and rotating those sections allows for reductions in hunting pressure and assumes conservative harvest rates. Limiting hunters to 3 birds per covey also reduces pressure and the risk of overharvesting quail populations within pastures. At King Ranch various harvest data such as: estimated birds per covey, coveys encountered per hour, and number of outings are collected in order to prevent overharvest within pastures. Implementing rest rotation hunting and harvest rates, as well as other harvest techniques will insure conservative estimates and preserve greater numbers of bobwhites entering into the breeding season.

Putting it All Together on King Ranch

Depending on your ranch goals, Leopold’s tools and others can be manipulated in many ways to shift the scale toward better bobwhite quail habitat. When wisely combined with cattle grazing, wildlife co-exist to maximize the economic potential from both, while maintaining suitable range conditions on King Ranch. Other techniques such as: bobwhite census surveys, juvenile per adult ratios, discing, and habitat photo point monitoring are helpful tools when putting it all together to maintain sustainable and harvestable quail populations in south Texas.

THIRTY YEARS OF MONITORING QUAIL ON CHAPARRAL WMA – WHAT HAVE WE LEARNED?

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What's the last 30 years taught us about quail population management in South Texas? Both Bobwhite and Scaled Quail populations in South Texas, notably the western portion of the Rio Grande Plains, generally demonstrate a highly cyclical trend due to the variety of habitats and extremes of climatic conditions. It remains the manager's challenge to minimize these cyclical extremes by maintaining native habitats in optimal condition.

The Chaparral Wildlife Management Area (WMA) has served as a research and management facility for the western portion of the Rio Grande Plains ecological area of South Texas for the past 30 years. During this period quail populations have been monitored for population trends, reproductive success, and harvest trends. The Chaparral practices a "holistic", diversity based approach to management. Habitats are maintained and enhanced through the use of grazing, fire, disking, and brush management (in recent years); tools that are readily available to all land managers. Harvests on the WMA are accomplished through the use of public hunters; in the case of quail, unlimited numbers of hunters on designated hunt dates. The WMA can produce high populations of quail but is a difficult place to hunt.

The following, then, are some of the highlights of what we've learned (or re-affirmed) about quail management in the western Rio Grande Plains.

Quail Population Trends

Recruitment is probably the most critical aspect of quail population dynamics in South Texas. Due to periodic and unpredictable variations in both temperature and rainfall, habitat management efforts should be geared at "leveling" out those variables that result in the "boom/bust" population tendencies that are too commonly observed in South Texas quail.

Cover is the key to quail recruitment, survival, and carryover. Western South Texas demonstrates wider variation in climatic conditions than does the eastern portion of South Texas, with timing of rainfall often more important than the amount of precipitation. The right timing of precipitation, along with proper grazing practices, produces nesting cover essential to successful nesting efforts. The High Intensity/Low Frequency stocker grazing program currently in use on the Chaparral has resulted in increased grass availability (nesting cover, brooding cover, and escape cover), increased forb abundance, and has "opened the door" for use of other management practices such as prescribed fire.

Quail population trend data tends to indicate that the ever present variability in climatic conditions is reflected in timing of quail hatches and subsequent survival, as noted in the percent juveniles observed each year and the approximate age of juveniles at the start of the quail season. It's not enough to have a good quail hatch; survival of these chicks is the ultimate test. Extreme

temperatures and lack of rainfall at the critical stage of recruitment, the first 6 weeks or so of a chick's life, dictate that management efforts strive to minimize this "limiting factor" by managing to promote an environment favorable to insect production. It matters little how many birds are hatched off if they cannot survive for lack of insects.

A look at Chaparral harvest data would indicate that during the 1988-1998 period, juveniles comprised 62 percent of the average annual harvest. Percent juveniles varied from 20 percent (1988) to 81 percent (1991, 1997). Juveniles having completed the J7 molt (approximately 107 days of age) comprised 55 percent of the total opening weekend harvest. Notable low recruitment contributions and/or late hatches in 1988 (16% juveniles), 1989 (38%), 1996 (20%), and 1998 (16%), followed low rainfall periods and notably dry springs. If one had looked at the 1970's period one would have seen a completely different scenario, as the 1970's was the wettest decade in the last century.

Juveniles that have completed the molt (JCs), that year's oldest juveniles, generally represent the highest percentage of juveniles in the harvest, averaging 34 percent of the years' total population during the 1988 – 1998 period. Notable exceptions were 1988 (3% of total harvest), 1989 (16%), 1996 (0%), and 1998 (12%). Early production was noted in 1991 (49% of total harvest), 1992 (50%), and 1997 (39%). Late hatches in 1996 contributed juveniles J8 or younger representing 68% of the total harvest that year (quail were not observed to pair up until mid-summer after a dry spring). Interestingly enough, drought cycles and lack of April-May rainfall, so critical to early hatches, have impacted hatching chronology 5 of the last 7 years in the western portion of South Texas.

Quail Harvest Trends

Currently we have a four months quail season in Texas (late October – late February). As this season progresses we see an inverse availability of birds; whether hunted or not, fewer birds are available in the latter part of the season than were at the beginning. Past research indicates that in some years as many as 80% of that year's population will not survive till the next year. That carryover at the end of the season, the "brood stock", is critical in determining the "magnitude" of the next year's population.

In a quail hunting scenario commencing mid-October and ending in early January, data from the Chaparral indicates that an average of 38 percent of the annual harvest during the 1988-1998 period were juvenile completes, the earliest hatched birds of the year. Furthermore, 55 percent were young of the year birds that were 107 days of age or older with quail less than less than 107 days of age comprising less than 10% of the harvest in most years. From this scenario, one might surmise that in years in which total harvest consists of more than 50% adults (1988), quail hunting should be very limited with some limitation placed on harvest when adults make up 40%-50% of the population. Given this scenario, since the boom year of 1987 serious consideration would have been given to limiting quail hunting pressure in 5 of 10 years represented (1988, 1989, 1993, 1994, and 1995). Fortunately, quail availability is a fairly limiting factor to quail harvest; if quail are generally unavailable hunters simply quit hunting.

Is there then a need to re-adjust our thinking on quail seasons, both timing and length of such? In many years quail populations are seen to decline before hunting season even starts, and certainly before the bulk of hunting occurs. Remember that research has indicated that 80% turnover in populations is not uncommon in some years. However, we've also seen that in years with improving range conditions we can have high survival.

In some years February harvest may be viewed as "additive" as opposed to "compensatory", impacting that spring's available brood stock. This is demonstrated by the percentage of "juvenile complete" juveniles hatched as early as mid-April to early May in some years. If one were to backdate from the observation of flying sized young of the year observed it becomes apparent that in some years adults are paired and breeding in February. Not only might we be impacting our brood stock from a viewpoint of early breeding but we also are hunting the "survivors" of that winter stress period.

Although research would indicate that birds hatched later in the summer, possible due to lack of early spring rainfall, normally stand a reduced chance of survival, this late hatch may in some years be a "mixed blessing". When most of the harvest occurs early in the season late hatched birds are often "protected" by hunters avoiding hunting these small birds. This yields a strong potential for brood stock carryover if conditions are favorable of quail survival (adequate food and favorable weather).

What Will We Learn in the Future?

Will quail remain a huntable resource? Will we learn that removal of large predators and supplemental feeding of deer increase predation on quail? Could it be that the introduction of exotic vegetation has impacted quail production? Will we find that present hunting strategies have resulted in additive rather than compensatory mortality? Will we find our "well intended efforts" to feed quail have had negative effects? Only future research will provide answers to these questions.

Notables Over the Past 30 Years

1970's

1970's Wettest decade in the last century

1972 Shift from blue quail to bobwhites on Chaparral WMA

1980's

1984 Lowest population of quail in history of Chaparral data

1984 Record low harvest- Harvested 36 quail on Chaparral WMA

1987 90 plus species of seeds represented in quail crops

Notables (continued)

- 1987 Record high quail population –Observed avg. 20 quail/mile
- 1987 Record high harvest – harvested 12,000 + quail (a quail /acre harvest)
- 1988 Documentation of 80% adults in harvest – virtually no recruitment

1990's

- 1990 Cattle grazing shifted to High Intensity/Low Frequency
- 1996 Late quail hatch. Adults did not pair up until after July rains.

The South Texas Quail Research Project

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The South Texas Quail Research Project (STxQRP) is a long-term (>5 years) ecological study on northern bobwhites (*Colinus virginianus*) which initiated in 1998. It is designed to collect biological data on the basic components of a bobwhite ecosystem (i.e., bobwhites, predators, habitat, and weather) using a standardized methodology with specific *a priori* hypotheses. Variables are measured year-round and examples of these variables include bobwhite survival, nest success, mammalian- and avian-predator abundance, habitat conditions, precipitation, and many others. The purpose of the STxQRP is to provide land stewards with accurate information regarding bobwhite management and life history while advancing the science of bobwhite management through publication of our data in scientific journals.

The STxQRP monitors bobwhite populations via radiotelemetry in 3 separate study pastures. Bobwhites are captured throughout the year using funnel traps. All bobwhites captured are banded, and bobwhites weighing ≥ 150 g are fitted with a radiotransmitter. Bobwhites are monitored 2–3 times weekly to document bobwhite activities (e.g., movement, nesting, etc.). We attempt to maintain at least 20 radiomarked bobwhites in each study pasture throughout the year.

Following are some generalizations of bobwhite ecology based on our finds. These generalizations should be viewed as preliminary and might change as we begin more detailed data analyses.

- **First Bobwhite Call:** 1–15 March. Although the onset of avian breeding seasons are triggered by photoperiod (i.e., day length), there can be minor variation in the timing of the first bobwhite call. We usually hear our first bobwhite call during the first 2 weeks of March, compared to the 3–4 weeks of March in the Rolling Plains. Beyond photoperiod, the breeding season can also be influenced by weather conditions. We once heard a bobwhite call in December following a light shower on a spring-like day.
- **Nest Success:** 40–50%. Nest success appears to be consistently higher on our study areas than in other areas across the US. We usually document about 40–50% nest success, compare to about 30% reported in other studies. There is no set, prescribed predator program on our study areas.
- **Brood Roosting Habitat:** Brush. We have observed that vegetation height and visual obstruction at roost sites decreases with increasing age of fall broods (i.e., hatched during Sep–Oct). These broods initially roost in tall, dense vegetation such as shrubs, but then progressively roosting in more open habitats such as grasslands as they mature. However, summer broods (i.e., hatched during May–Aug) do not exhibit this phenomenon but rather commonly roost in open habitats throughout their life regardless of age.

SOUTH VIBORAS PASTURE HABITAT & BRUSH MANAGEMENT

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Habitat and brush management practices should be implemented with specific goals and objectives. A well thought out plan will assist in the management process. Large-scale brush management practices impact the plants and animals that inhabit the treated areas, therefore, knowledge of brush treatment techniques and their effects on the range should be understood prior to initiation of the project. Brush management plans should deal with issues such as: 1.) pasture selection; 2.) goals and objectives of the treatment; and 3.) treatment patterns. While maximizing livestock and wildlife production with increased range performance is difficult, well developed brush management plans help King Ranch to manage its natural resources.

- **PASTURE SELECTION**

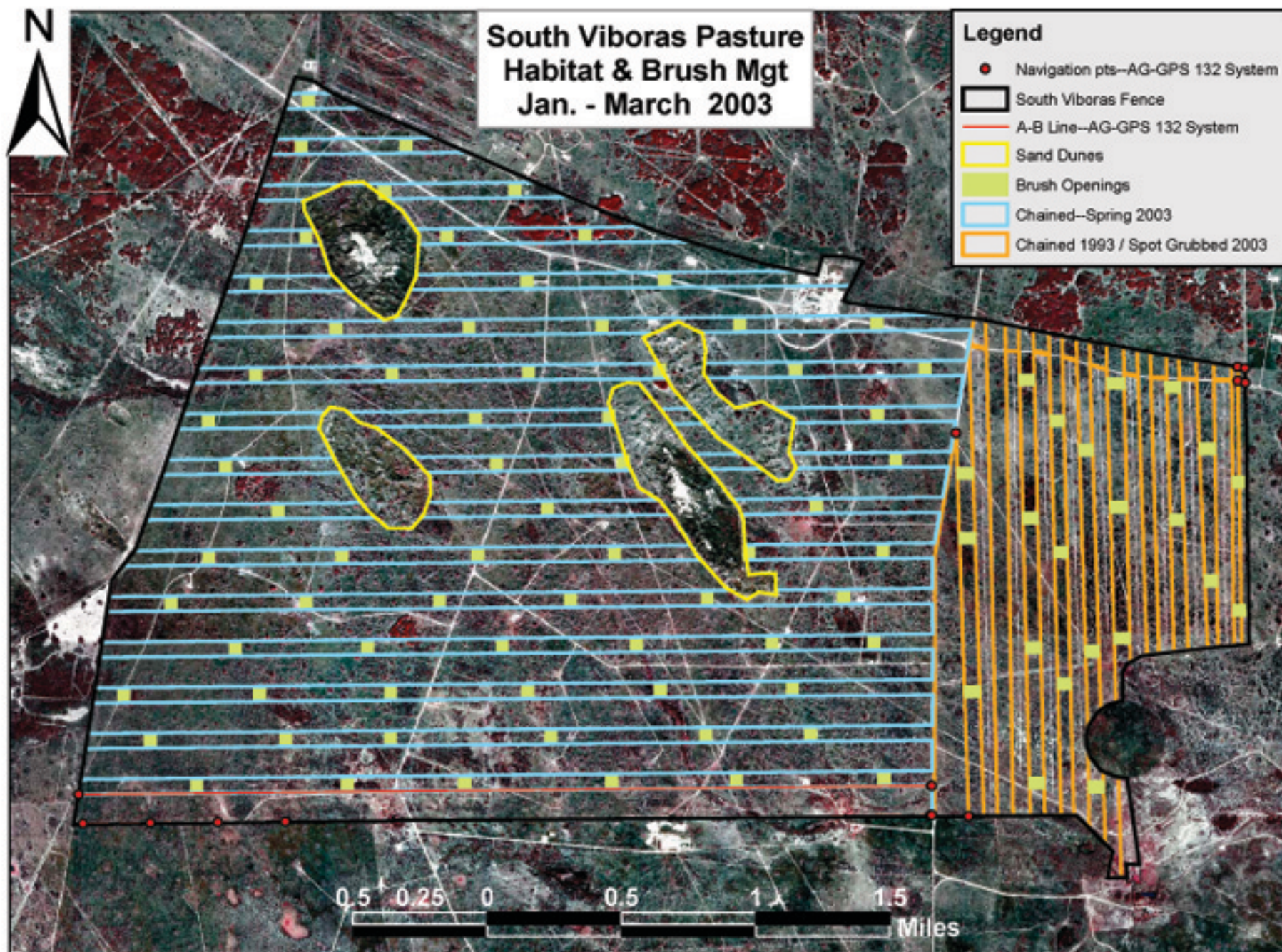
- Soil Fertility (High Productivity)
- Livestock, Wildlife, & Range Departments Input
- King Ranch Lessee's Brush Control Commitment
- Treat 10 Pastures / Year @ \$ 100,000 / Pasture

- **PASTURE GUIDELINES**

- 65% Open / 35% Brush
- 200 Yd Cleared / 100 Yd Brush with 2 openings per mile
 - 5 % Brush Mottes Remain
 - ¼ - ½ Acre In Size Approx. 100 – 150 Yds
- Buffer Sensitive Wildlife Habitat
- Clear Brush Off Fencelines
- Establish Permanent Fire Breaks

- **PATTERNS & DESIGNS**

- Production Of Livestock & Wildlife
- Gathering Of Livestock
- Huntability & Harvest Of Wildlife
- Treatment & Patterns Determine Cost / Acre
- Past History Or Area To Treat



BOBWHITE QUAIL HARVEST STRATEGIES ON KING RANCH

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Harvest strategies and hunting pressure vary across King Ranch with respect to area and pasture. Areas are treated differently due to various levels of hunting pressure. A unique situation existed on a large portion of pastures within the ranch for the implementation of harvest strategies and hunting pressure of bobwhite quail. Until the 2000 hunting season, pastures were subject to continuous hunting and received little or no rest between hunts. Growing concerns from ranch owners led to the implementation of a rest rotation hunting system within this area. The system was devised to reduce harvest and hunting pressure while allowing accessibility to those pastures to remain the same. The following are attributes of the new harvest strategies for these pastures:

Harvest Strategies:

- Maximum harvest of 3 birds per covey
- Field data collection cards to monitor : coveys per hour, number of birds per covey, total harvest of males vs. females, and length of hunt (Figure 1)
- Juvenile per adult harvest ratios
- Pastures divided into sections or quadrants large enough to accommodate a full day hunt

Hunting Pressure:

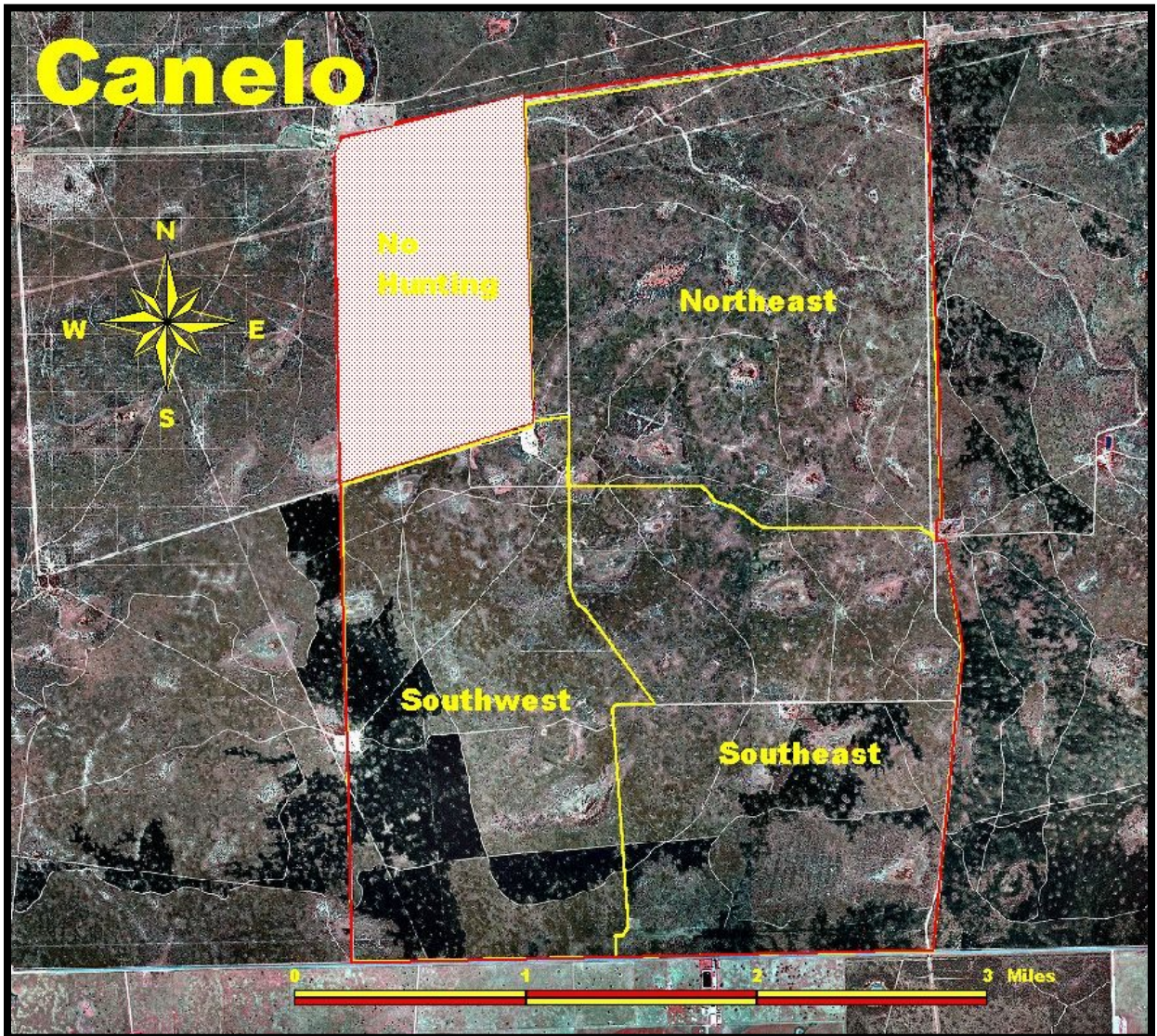
- Rest rotational system which provides a 14 day rest between hunts from beginning of quail season until December 31st per quadrant
- Seven day rest from Jan. 1st until the end of quail season per quadrant
- Pastures divided into quadrants allowed greater access and available hunting days (Figure 2)
- Less hunting days during the season allowed for reduced hunting pressure

Figure 1. Daily harvest record for individual quadrants within a pasture required to be completed during each outing.

Date: <u>2-29-04</u>	Start Time: <u>8:30 AM</u>
Pasture: <u>Paisano</u>	End Time: <u>12:30 PM</u>
Quadrant: <u>NW</u>	AM or PM Hunt: <u> </u>
Family Member: <u>3-Klederg</u>	Guide: <u>Charlie Barrera</u>

Covey#	Birds/Covey	# Males	# Females	Wounding Loss
1	9	2	1	
2	22	1	1	1
3	15	✓	✓	
4	14	1	2	1
5	18	✓	1	
6	11	1	2	
7	20	2	1	
8	8	✓	2	1
9	21	1	✓	
10	18	2	1	
11	15	2	2	
12	24	1	1	1

Figure 2. Canelo pasture with 3 quadrant divisions to allow rest rotational quail hunting and more hunting opportunities within a pasture.



BOBWHITE NEST PREDATION IN SOUTH TEXAS

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Introduction

Predation is the primary cause of nest failure and mortality for the northern bobwhite and can potentially limit or depress populations. Nest predation is both a behavioral act (determined by predator species and foraging strategy) and an ecological process theoretically capable of influencing prey population dynamics. Currently, little is known concerning specific nest predators of the northern bobwhite and the factors affecting their foraging effectiveness in south Texas, or the influence of nest predation on bobwhite reproductive success relative to other agents of mortality and production. Past nest predation studies of bobwhite have been limited in scope and predictive capacity. Nest predator identification has been highly suspect until the relatively recent development of photo-monitoring systems. To date, no study in south Texas has monitored natural bobwhite nests with infrared video and provided definitive documentation of actual bobwhite nest predation events and nest attendance-defense behavior. Furthermore, no studies have tested multiple competing hypotheses to determine whether factors such as nest density, predator context, predation rate, nest defense-attendance, habitat structure and composition, operative temperature, or precipitation best predict nest success.

Encino Nest Predator Study

Background: nest predation as an ecological process

- Bobwhite density and nest-site availability
- Predator context
- Habitat (nest-site & landscape)
- Weather (precipitation & temperature)
- Nest defense

Study Objectives

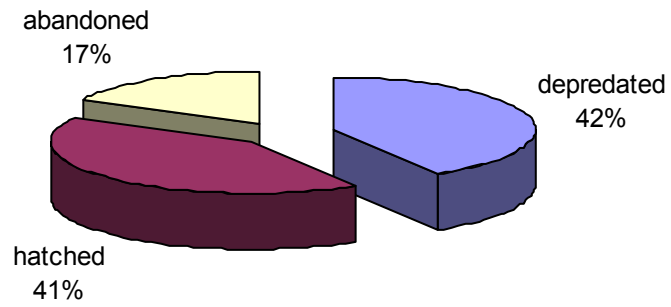
- Document bobwhite nest fates and a comprehensive inventory of nest predators characteristic of the semiarid, subtropical rangeland of south Texas
- Examine alternative factors impacting bobwhite nest success (i.e., predator context, habitat structure & composition, precipitation, temperature, and nest defense) in the coastal sand plain of south Texas
- Use project data to develop predictive models of nest success and the effect of nest predation on bobwhite population dynamics in south Texas

Methods

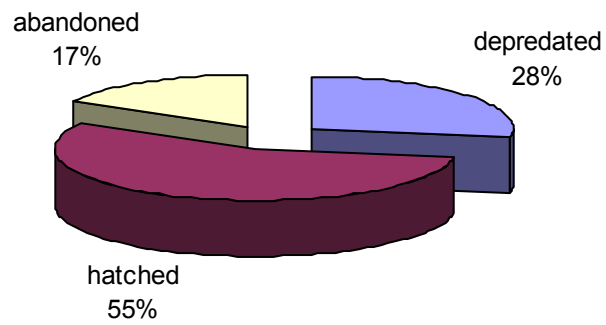
- Nest monitoring via radio telemetry and infrared video surveillance to obtain nest success, predator context, and nest-defense data
- Nest-site habitat data (i.e., visual obscurity, vegetation height, % cover, and other variables being collected by STxQRP)
- Landscape habitat data (e.g., patch size, patch density, mean nearest neighbor, % cover-type, and edge density)
- Weather data (i.e., precipitation and nest-site temperature)

Results to Date

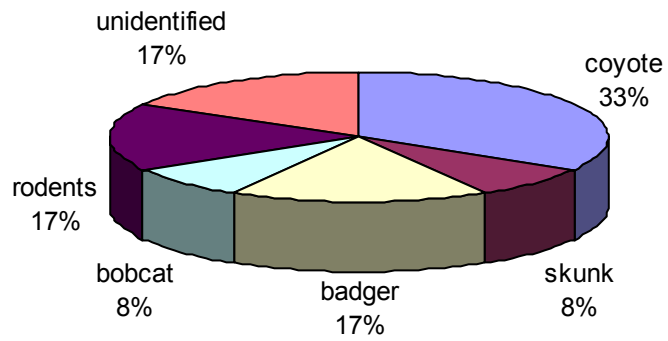
2002 nest fates



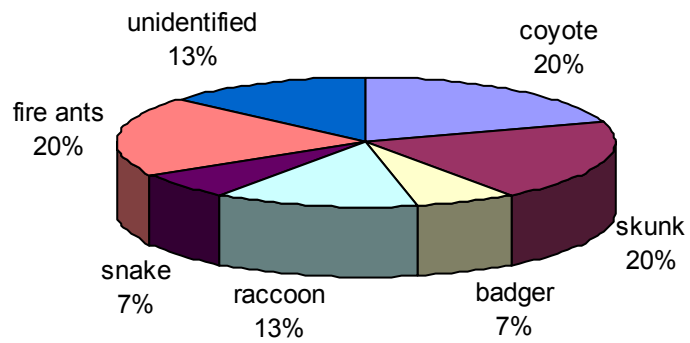
2003 nest fates



2002 nest predators



2003 nest predators



BOBWHITE QUAIL HUNTING DEMOGRAPHICS IN SOUTH TEXAS

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As quail habitats and populations shrink, it becomes increasingly important to manage hunting pressure on both private and public lands. Unfortunately, the scientific literature contains very little information on the fundamental aspects of quail hunting. For example, most of what we know about the actual process of quail hunting is based on perceptions, anecdotes, and stories. Scientific facts are few and far between on this subject. However, new technology has become available that provides quail managers and researchers an opportunity to answer questions that are fundamental to understanding the dynamics of quail hunting.

During the 2001-2002 and 2002-2003 quail hunting seasons, we monitored radiomarked bobwhite quail coveys during hunts at the San Tomas camp on the Encino division of King Ranch. We also monitored pointing dogs productivity with the use of Global Positioning Systems (Figure 1). We were able to identify the following information from the GPS and radio telemetry data. We found that:

- Approximately 56% of coveys are missed during the course of a hunt.
- For every 5 coveys encountered, one will display evasive behavior (run/flush wild) upon their next encounter with a hunting party.
- Although pointing dogs do roam out to 200-300yards from the hunting vehicle, the average distance throughout a hunt is about 50-75 yards.
- Pointing dogs hunt at about 5.5 mph in dense cover and about 6.5 mph in open habitat.
- On average, approximately 415 acres are effectively hunted during a 2½hour hunt.
- Using a GPS on pointing dogs and within a hunting truck or wagon allows managers to identify the area covered during a hunt and record individual dog productivity (Figure 2).
- GPS units can also be used as a tool for understanding how hunting pressure is distributed across a pasture or even a landscape (Figure 3).

Figure 1. Global Positioning Systems on pointing dogs allowed for monitoring of dog productivity throughout the course of a hunt.



Figure 2. Individual dog productivity and the area covered during the course of a hunt can be closely monitored with the use of GPS devices. This is a valuable tool in management hunting pressure.

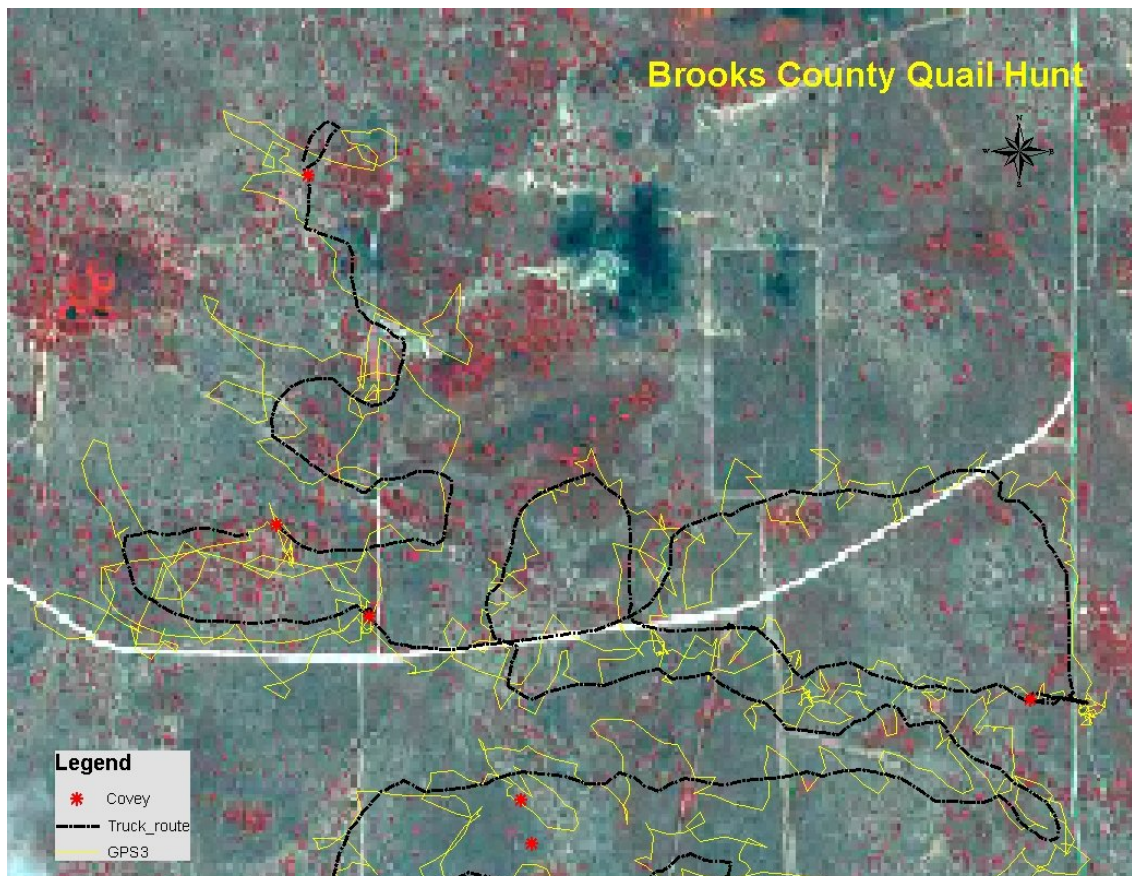


Figure 3. Compiling data from several hunts will allow the quail manager to see how hunting pressure is distributed.

