ROLLING PLAINS QUAIL RESEARCH RANCH

5th Annual Field Day Abstracts

Friday, Sept. 28, 2012
9 a.m. – 3 p.m.

theme:

Useable Space for Bobwhites:

TEXAS A&M AGRILIFE EXTENSION

TEXAS A&M AGRILIFE RESEARCH

RPQRR's Vision: To sustain Texas' quail hunting heritage for this, and future, generations.

Mission statement: To provide land managers, and other stake-holders, with timely, relevant technology and management schemes for enhancing quail populations in the Rolling Plains of Texas.

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Chip Ruthven
Justin Trail
Dr. Darrell Ueckert
Mike Watson
Roy Wilson

Schedule

8:30 Registration & Refreshments ($20 at the door)
Plant ID Quiz – James Lewis & Kent Mills

9:00 Welcome & Opening Comments
Dr. Dale Rollins, Director
Rick Snipes, President, Rolling Plains Quail Research Foundation
2012 Weather at RPQRR – Lloyd LaCoste

Depart for Tour

Stop 1: Assessing Useable Space
What is Useable Space? – Dale Rollins
Assessing Useable Space via:
Helicopter counts – Barrett Koennecke
Whistle counts & trapping data – Lloyd LaCoste
Softball – Dale Rollins
Efforts to enhance useable space – brood patches – B. Koennecke

Stop 2. Quail oases
Water harvesting 101 – D. Rollins
Demo on building a spreader dam – Rory Burroughs
Ragweed seed dynamics—L. LaCoste
Collateral brush damage from cacti herbicides– B. Koennecke

Stop 3. Useable Space vs. Predators
"Storm shelters" for evading raptors—Becki Perkins)
GPS tracking of predators - D. Rollins
Coyote diets -Mark Tyson
Quail carcass longevity-Michelle Downey

Lunch at Pavilion
Updates:
Shale & Quail – Paul Melton, RPQRR Advisory Committee
Operation Idiopathic Decline – Dr. Steve Presley
QuailMaster testimonial - TBA
Bobwhite Brigade – Becca Mullin

Stop 4. Enhancing Useable Space on Post-CRP Fields
Nesting use of kleingrass CRP - B. Koennecke
Shrub plantings – L. LaCoste
Half-cutting mesquites – D. Rollins
Planned projects – D. Rollins

Return to HQ
Review Plant ID contest
Distribute CEU certificates

Students of Quail,

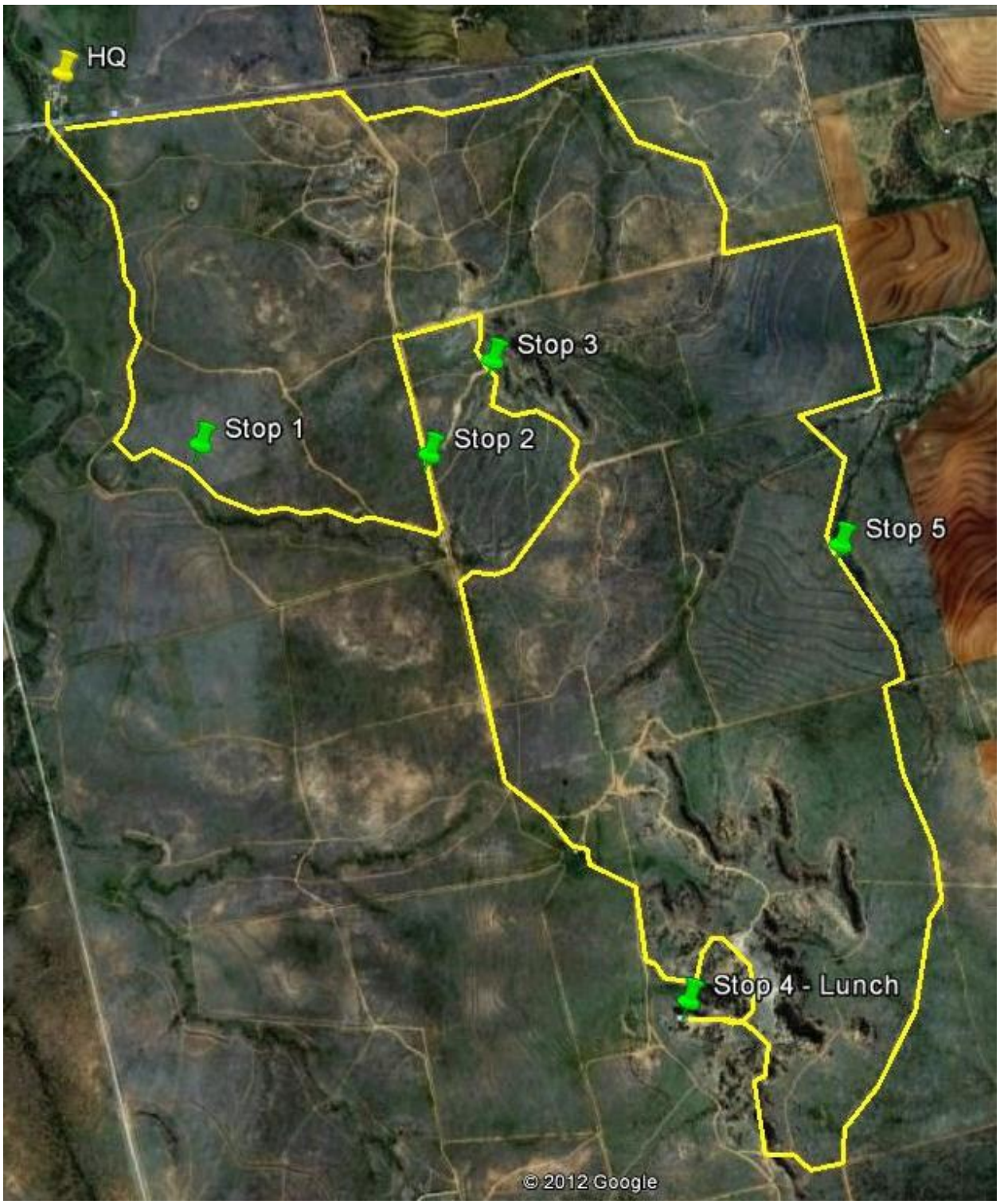
Welcome to the 5th annual Rolling Plains Quail Research Ranch Field Day.—we are excited to see you here. After two years of below average rainfall, things look rather gloomy for quail fans. However, looking on the bright side, conditions have improved some since last year. Many people are reporting seeing more quail than they did last year, but that is not really saying much given the poor quail populations last year. Rainfall drives a large portion of quail production, and timing of rainfall probably is the most important part of quail reproduction. We have suffered through two very tough years with regards to rainfall. As you know, 2011 was particularly excruciating. In 2012 we saw more rainfall, but RPQRR is still well below the 30-year average.

The way I see it we have two choices. We can pout and sing "*Gloom, Despair, and Agony on Me*", or we can get prepared for when the rainfall does return. We hope today you will learn what useable space is for a bobwhite quail, and how you can increase useable space on the property that you manage to make as much of your habitat as quail-friendly as possible.

I hope that you will take advantage of the plant quiz as well while you are here. As a student of quail, Dr. Rollins reminds us that the keys to habitat management for any species are "know your plants and how to manipulate them." Please take the opportunity to visit with our staff and students. They are excited to share their knowledge with you. As always if you have any observations about how we could be doing things better please let us know —we are always open to your suggestions.

Lloyd LaCoste
Ranch Manager
Rolling Plains Quail Research Ranch

Field Day Route - 2012

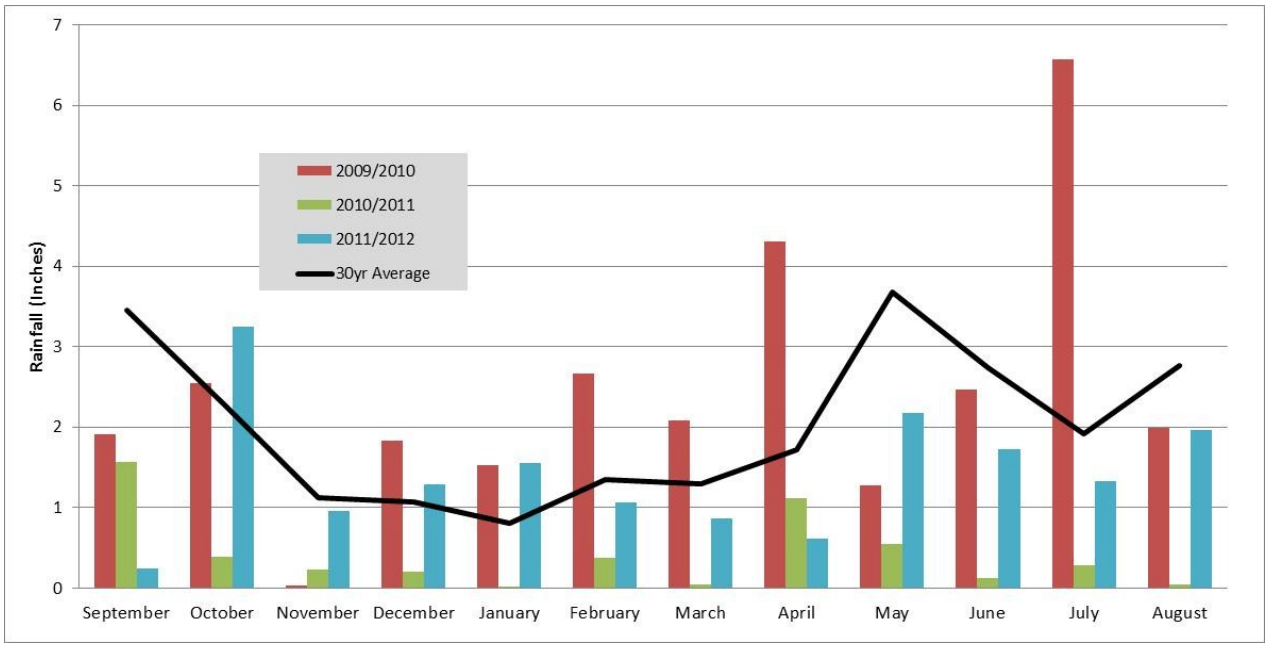


2012 Weather – The Year in Review

Lloyd LaCoste, RPQRR

Rainfall accounts for a large portion of quail production and we have been in the grips of a hot, dry weather pattern for quite some time now. The summer of 2011 was one for the record books, and not in a good way. During the summer of 2011 we had 79 days that were over 100 degrees Fahrenheit. We received 4.96 inches of rainfall from September 2010 to August 2011. The 30 year average rainfall for Roby, Texas is 24.22 inches. The 2012 summer was still a hot one. We had 38 days that were above 100 degrees Fahrenheit. Our first day over 100 was on April 25, 2012 where the temperature soared to 107 degrees Fahrenheit. From September 2011 through August 2012 we received 17.04 inches. While this is much better than the last year's total, it is still 7.18 inches below the 30-year average rainfall. With that being said we believe that we have had some reproduction this year based on our 3 days of trapping for Operation Idiopathic Decline where we saw an adult to juvenile ratio of 1 : 1.7. A forecasted El Nino weather pattern for this fall and winter would surely be appreciated.

	Days Above 100° F		
	2010	2011	2012
April	0	0	1
May	0	7	6
June	1	22	9
July	0	21	6
August	4	28	12
September	0	1	4



STOP 1

Assessing Useable Space

What is "Useable Space?"

Dale Rollins, RPQRR

The concept of "useable space" was popularized by Dr. Fred Guthery at Oklahoma State University; in its simplest terms it's defined as "suitable, permanent cover" that allows a bobwhite to call a particular site "home." Earlier, King Ranch biologists Val Lehmann said it this way "to supply most of the needs of high populations of quail, they must be assured *continuous* use of virtually every square foot of ground." You maximize space–time when every square foot is usable by bobwhites every day of the year. In west Texas, saturating a landscape with space-time typically addresses brush canopy and grass cover, be it too little or too much. At RPQRR, we can use our various count records to suggest where we have useable space, and areas where we do not. When we find "voids" we ask "what's missing here?" Generally it's areas that are too open, i.e., insufficient woody cover, or at least insufficient escape cover (including "quail houses"). Throughout today's tour, we will be discussing components, thresholds, and characteristics of useable space. In rangeland settings, useable space management boils down to 2 options: (1) add or remove woody cover and (2) increase or reduce the density of herbaceous cover. For more information on Guthery's thoughts on useable space, see http://bollenbachchair.okstate.edu/USABLE%20SPACE--LIGHT%20VERSION.pdf.

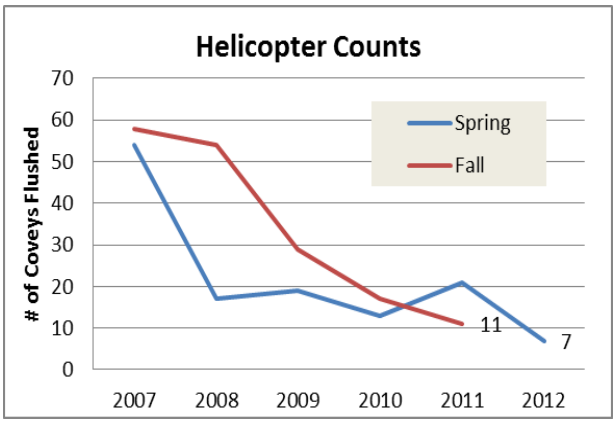
Monitoring quail abundance at RPQRR

Barrett Koennecke and Lloyd Lacoste, Rolling Plains Quail Research Ranch

Since RPQRR was established in 2007, we have implemented various ways to monitor quail abundance; these efforts include helicopter surveys, call counts (spring and fall), mark-recapture (using leg-banded birds), radio telemetry, dummy nest survival, and fall roadside counts. We seek to determine which of these provides reliable estimates relative to the time and expense of conducting the counts.

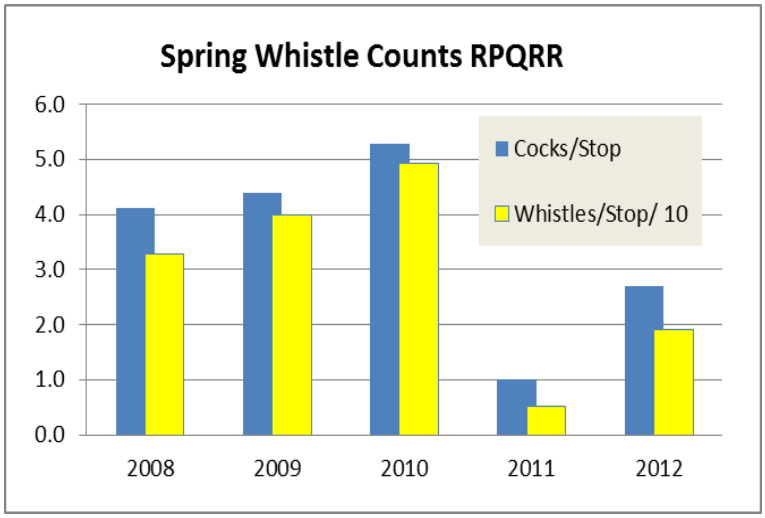
Helicopter Counts

Every year we conduct two helicopter surveys, one in the fall (November) and one in the spring (March). We fly the same transects each year with a total sampling effort of 52 miles. The fall 2011 and spring 2012 surveys, recorded 11 and 7 coveys, respectively. These counts are the two lowest ever recorded at the quail ranch. We will be conducting the fall 2012 helicopter count again this November.

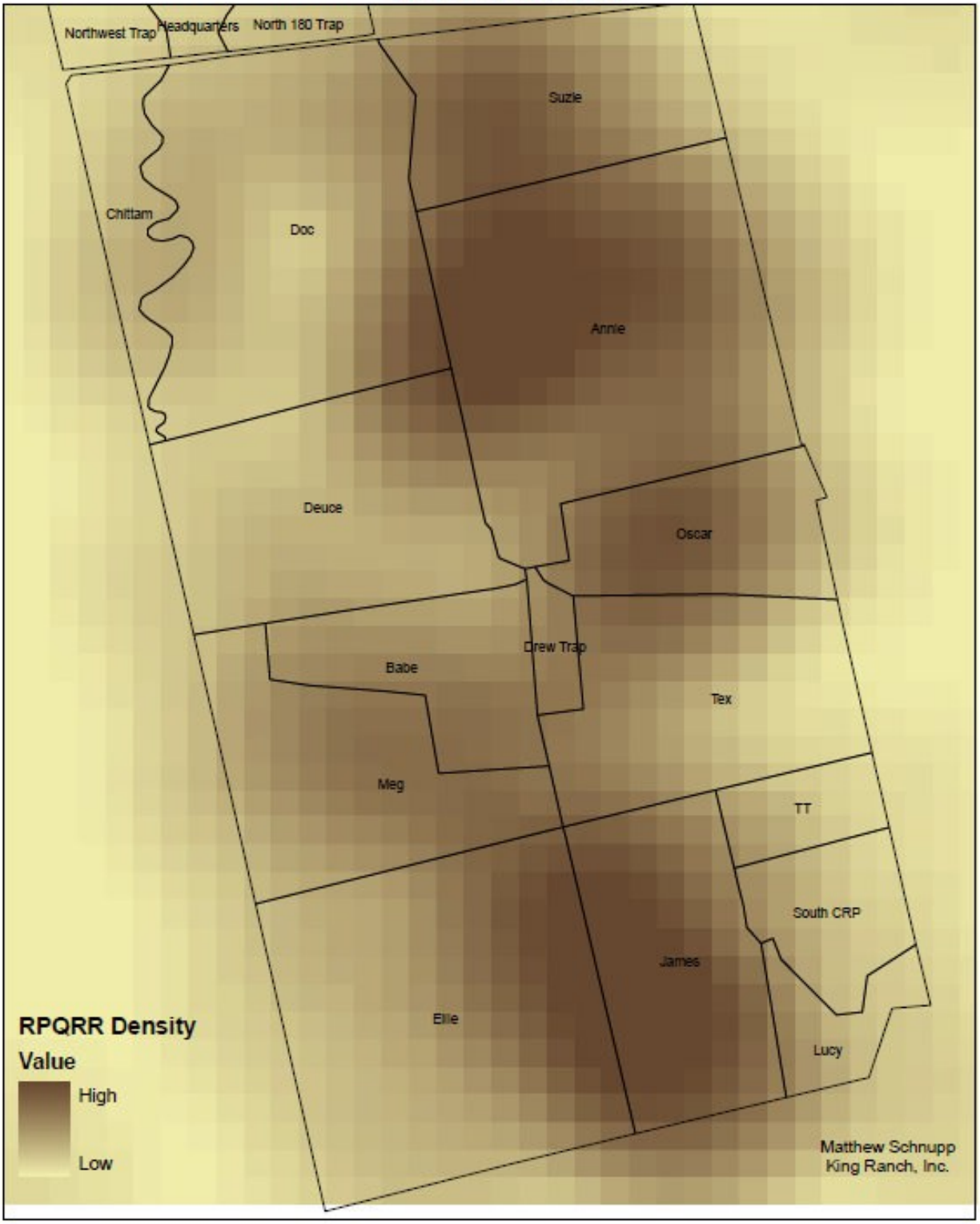


Spring Whistle Counts

Spring whistle counts are conducted at 25 "mile markers" that are spread out across the ranch. The ranch is divided into an east and a west transect. The west line contains 13 mile markers and the east makes up the additional 12. This year counts were conducted twice weekly starting May 17, 2012 and continued until July 26, 2012. Looking at the call counts over time, it shows that the drought of 2011 had a large impact on number of whistles heard. This year showed an increase over last year; we heard an average of 2.7 cocks per stop with an average of 19.1 whistles per stop. Over a 5 min period, it is a good rule of thumb that you can divide the total number of whistles heard by 10 to obtain an estimate of how many birds are calling.

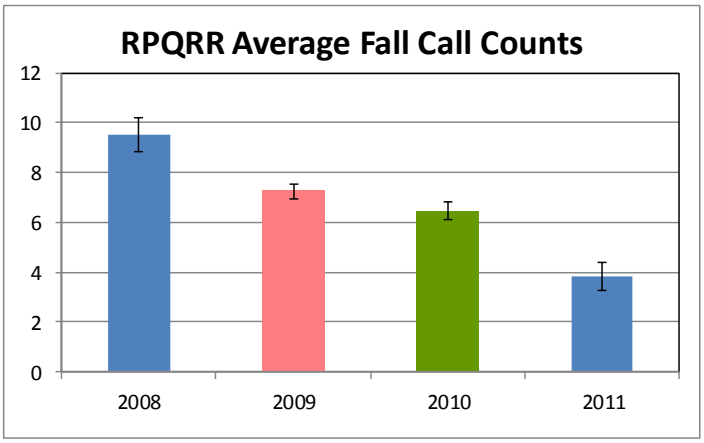


Fall 2007 & 2008 Bobwhite Quail Density
RPQRR Ranch



Fall Covey Call Counts

We conduct fall covey call counts as another way to index quail abundance over time. Fall covey call counts are conducted during October. We monitor fall covey call counts at each of our odd numbered "mile markers." The total number of coveys counted divided by 10 is a crude index to quail density, for example: the average fall covey count for 2011 was 3.8 coveys – this would equate to about 0.38 quail per acre. This is down from .65 birds per acre for 2010. We will begin 2012 fall covey call counts next month (October).



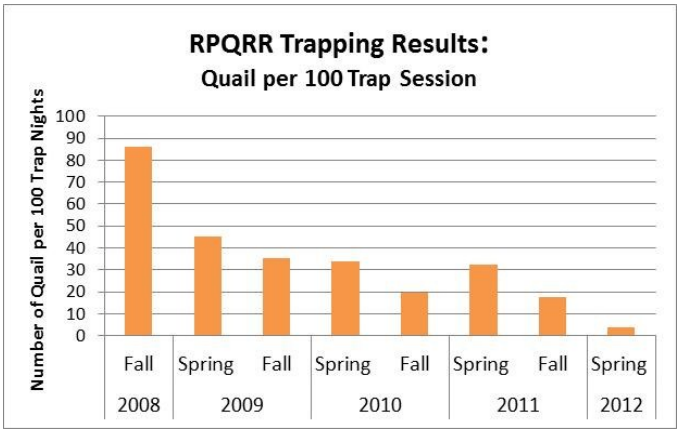
Roadside Counts

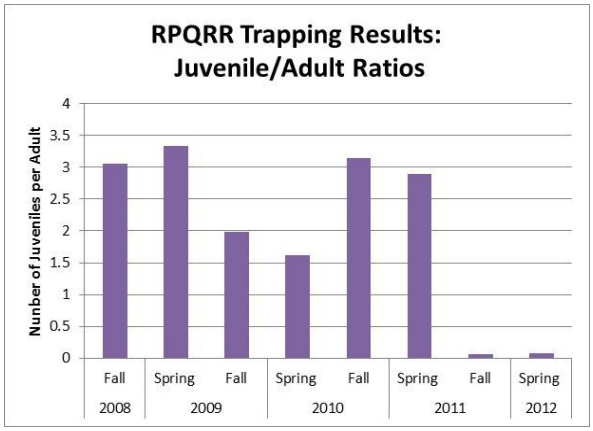
Roadside counts are easy to conduct—you simply drive a prescribed route during early-morning or late-afternoon hours and count the number of quail observed. We repeat our counts four times during September; two during morning hours and two during afternoon hours. The number of birds observed per mile is an index to quail abundance. Each year during August, Texas Parks and Wildlife Department biologists conduct roadside counts on 20-mile routes across much of west and south Texas. The table below compares TPWD'S mean number of quail per 20 mile route to RPQRR's. estimates.

Mean Number of Quail Observed per 20-mile Route		
Year	**TPWD**	**RPQRR**
2008	18.7	96.0
2009	6.6	25.2
2010	8.0	29.0
2011	5.3	8.8
2012	3.5	5.5

Trapping

Our primary purpose for trapping quail is to attach radio collars, but we also use the information collected during trapping as an index of quail abundance and to assess Juvenile:Adult ratios. Trapping is conducted in the spring and fall of each year.





Play Ball for Bobwhites: the Softball Habitat Evaluation Technique (SHET)

Dale Rollins, Rolling Plains Quail Research Ranch

Sometimes biologists confuse land managers with their jargon, e.g., "edge effect," or "useable space." The game of slow-pitch softball offers many analogies for quail managers to assess useable space and paints a vivid mental picture of what a desirable landscape for bobwhites should look like. The softball represents a quail given its dimensions and its dilemmas (i.e., every time it's exposed someone/something is trying to either catch it or whack it). In the field I will demonstrate how the SHET affords an easy way to envision/analyze/assess various components of quail habitat, especially desirable thresholds for brush density and nesting habitat. For more details see http://www.livestockweekly.com/papers/99/06/24/scrollins.asp or watch the webisode at http://www.texas-wildlife.org/resources/webcasts/softball-habitat-evaluation-technique.

STOP 2

Quail Oases

7 Oct 2011

8 Oct 2011

Water Harvesting 101 for Creating Quail Oases

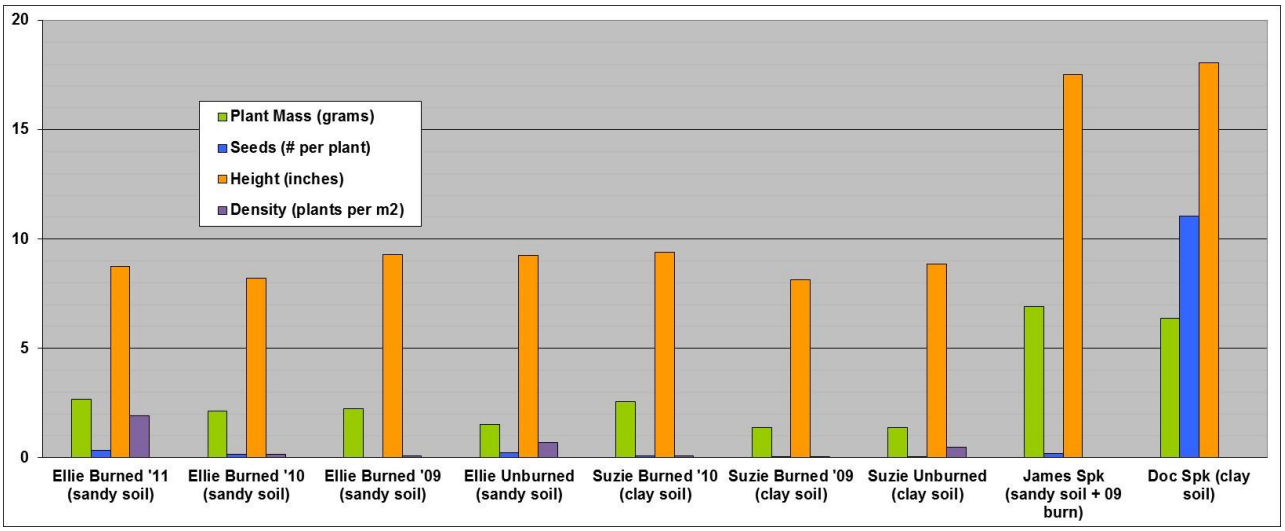
Dale Rollins, Rolling Plains Quail Research Ranch

The climate of west Texas is sometimes characterized as "continuous drought interrupted by periodic flooding." Much of our annual rainfall comes in intense thunderstorms which results in much water being lost via runoff, accompanied by attendant erosion. The late Sherman Hammond of Ft. Stockton influenced me years ago with his water harvesting strategies to enhance habitat in the Chihuahuan desert for blue quail. His philosophy was simple: "I want to keep every inch of rain that falls on my property, and every inch my upstream neighbor sends to me." He used "spreader dams " *aka* check dams, speed bumps, water bars) to divert runoff from his ranch roads into divots. Note his idea was not to provide drinking water for animals, but to create more mesic microclimates, or what I've coined "quail oases." At Hammond's ranch, these oases grew 24 times more grass and 5 times more arthropods than the adjacent uplands. We began installing spreader dams at RPQRR in November 2010, but didn't receive appreciable rain until a year later (8 Oct 2011). We plan to increase our number and coverage of spreader dams over the next year. Some will be used to enhance survival of woody plants (e.g., skunkbush) and others to promote various seeded forbs (e.g., American basketflower). Natural succession occurs nicely on these sites as evidenced by annual sunflowers. We will monitor forb and arthropod abundance over the next several years.

Ragweed Seed Dynamics

Lloyd Lacoste, Dale Rollins, and Dave Barre, RPQRR

Seeds of western ragweed (*Ambrosia cumanensis)* are a major component of the winter diet of bobwhite quail. We measured seed yields of western ragweed at RPQRR to determine whether dormant-season burning or irrigation stimulates seed production, as it can do for other plant species. We sampled western ragweed plants every November starting in 2009 through 2011 using a stratified random design on two rangeland sites burned in March, and from two adjacent unburned control areas. During 2009 and 2010 analysis we discovered that the burned areas produced two to three times the number of seeds per plant compared to the adjacent unburned areas. When we sampled the plants in 2011 there were virtually no seeds produced in either burned or unburned areas. The only area we saw significant amount of ragweed seed production was from an area that we used an oscillating sprinkler to demonstrate how we could create a favorable microhabitat and create a "quail oases".



Assessment of Collateral Damage to Non-Target Brush and Forbs from Prickly Pear Herbicides

Barrett Koennecke, Rolling Plains Quail Research Ranch

Dense stands of prickly pear occupy several pastures on RPQRR. Various herbicides were applied for cacti control using a helicopter in April 2010. The objective was to determine the "collateral damage" to desirable woody shrubs such as hackberry and lotebush. A total of 500 acres were sprayed in three different pastures, with eight treatment strips (four herbicides at two different rates) in each pasture crossing areas of prescribed burning to see the combined effects of prescribed burns and herbicide. These treatment strips have been evaluated each year for shrub, forb and grass dynamics. Control (untreated) areas are sampled around the perimeter of the strips treated. Brush species (a total of 2,800 plants) were tagged with ID numbers and GPS points for future location and subsequent monitoring. This year (2012), prickly pear and yucca density were measured using length-wise transects in each treatment strip to identify which herbicides can effectively manage prickly pear and yucca while causing the least amount of damage to other quail friendly plant species. Tasajilla, wolfberry and hackberry were affected the most by the treatments, while ephedra and catclaw spp. were affected least. Surmount at the higher rate affected the most species, while Chaparral and Tordon at the lower rates affected the least number of species. Our preliminary findings (2 growing seasons post-treatment) suggest that if prescribed burning is an option for a land manager, the best herbicide to use for prickly pear management would be Tordon 22K at 1 pt per acre, or Grazon Next at 2.6 pts per acre. If prescribed burns are not an option, the recommended herbicide to use would be Chaparral at 3.3 oz per acre. None of the herbicides proved to be an effective management technique for yucca. Additional evaluations will take place in 2013 for the third (and final) year.

Percent Response From Nonburned and Herbicide Application @ 2 Years Post Treatment

Treatment	Western Ragweed	Field Ragweed	Sun-flower	Broom-weed	Croton	Bluestem	Winter-grass	Prickly Pear
Control	-7.8%	-3.3%	-4.5%	11.1%	-1.6%	-61.0%	-18.8%	6.6%
Tordon 2 pts/Acre	10.4%	0.0%	1.3%	18.6%	7.3%	-66.7%	0.0%	-44.1%
Tordon 1 pt/Acre	11.8%	0.8%	0.0%	33.7%	11.5%	-40.0%	0.0%	-7.1%
Surmount 4 pts/Acre	11.3%	0.0%	-1.1%	32.7%	-1.5%	-69.9%	-16.7%	-17.5%
Surmount 2 pt/Acre	6.7%	1.0%	-5.3%	25.8%	-11.9%	-36.6%	0.0%	-0.4%
Grazon Next 2 pts/ Acre	1.3%	0.0%	0.0%	32.6%	11.6%	-69.0%	0.0%	-15.2%
Grazon Next 2.6 pts/ Acre	2.9%	0.0%	0.0%	32.2%	3.6%	-74.1%	-21.3%	-6.7%
Chaparral 3.3oz/Acre	11.2%	0.0%	0.0%	29.8%	2.4%	-63.4%	-9.4%	-12.0%
Chaparral 3.3oz + 2,4 -D Ester 1lb Active/ Acre	1.5%	0.0%	0.0%	27.8%	2.3%	-79.1%	0.0%	-12.9%

Forb measuring was conducted at the same time as the brush mortality. Any changes more or less than 15% have been highlighted. The most dramatic effect in the data appears to be the reduction of bluestem but when compared to the control, there seems to be little difference for both burned and unburned. This strange result can possibly be explained by the drought of 2011. Broomweed however appears to be thriving and shows a positive response of more than 15% except for the controls. Field Ragweed and Sunflowers appear to have the least response to any of the treatments. No one treatment stood out from the rest as far as promoting forb growth but as far as reduction of prickly pear the Tordon @ 2 pts./Acre seemed to be the most effective.

Forb Percent Response From Burned and Herbicide Application 2 Years Post Treatment

Treatment	Western Ragweed	Field Ragweed	Sun-flower	Broom-weed	Croton	Bluestem	Winter-grass	Prickly Pear
Control	-11.2%	-5.2%	-7.9%	9.9%	-12.7%	-49.9%	-23.2%	-1.1%
Tordon 2pts/Acre	4.1%	-10.6%	0.0%	32.2%	19.3%	-74.3%	-4.7%	-27.5%
Tordon 1 pt/Acre	8.6%	0.0%	0.0%	20.6%	13.6%	-42.3%	-3.8%	1.8%
Surmount 4 pts/Acre	3.9%	0.0%	0.0%	28.6%	-19.9%	-65.8%	-12.1%	-12.8%
Surmount 2 pt/Acre	6.5%	0.0%	0.0%	26.1%	6.2%	-62.0%	0.0%	-5.2%
Grazon Next 2 pts/ Acre	0.8%	0.0%	0.0%	34.3%	-15.7%	-55.2%	-17.2%	-16.5%
Grazon Next 2.6 pts/ Acre	3.9%	0.0%	0.0%	36.2%	-5.4%	-64.4%	-14.3%	-13.8%
Chaparral 3.3oz/Acre	3.0%	0.0%	-1.2%	29.1%	-7.5%	-52.1%	-9.3%	-16.5%
Chaparral 3.3oz + 24D Ester 1lb Active/Acre	0.0%	-10.0%	0.0%	21.7%	-4.7%	-20.0%	-30.0%	-10.0%

STOP 3

Useable Space vs. Predators

Threat Avoidance by Northern Bobwhite in the Texas Rolling Plains

Rebecca Perkins[1], Clint Boal[2], Dale Rollins[3], and Robert Perez[4]

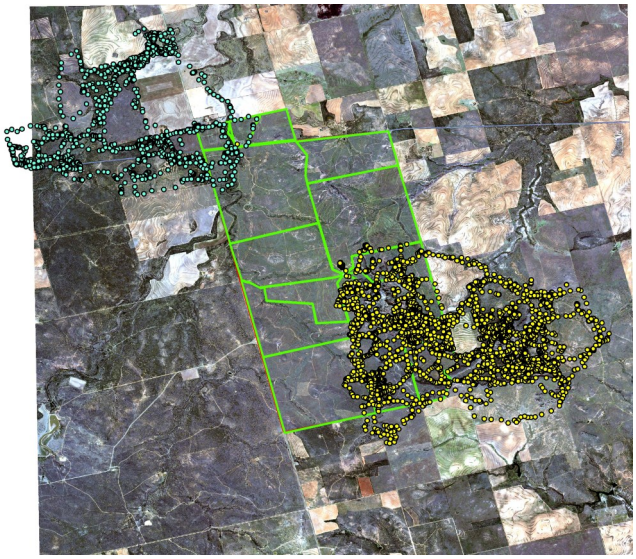
[1]Department of Natural Resources Management, Texas Tech University
[2]U. S. Geological Survey, Texas Cooperative Fish and Wildlife Research Unit, Texas Tech University
[3]Texas Cooperative Extension, Texas Agrilife Research and Extension Center, San Angelo, TX
[4]Texas Parks and Wildlife Department, La Vernia, TX

Although flight behavior and cover use patterns of northern bobwhites under threat of predation have been examined in several studies, these studies addressed only human threats and did not include natural threats. Through the winter months of 2009-2011 we examined aspects of bobwhite behavior in response to 4 threat categories: researcher, hunter, raptor, and mammalian at the Rolling Plains Quail Research Ranch in Fisher County, Texas. During field trials we homed in on and subsequently flushed radio-tagged coveys of bobwhite with each threat type. After each field trial we examined vegetation height and shrub density at flushing and landing points as well as random locations along the flight paths. In total we conducted 222 field trials. Bobwhites flushed by the hunter and raptor treatments selected landing sites with significantly higher vegetation than at random points along flight paths. Raptor-flushed bobwhites selected for significantly denser shrub cover and we observed 15 instances of raptor-flushed bobwhites escaping into burrows under shrubs. In the process of data collection, we also found bobwhite roost locations have lower visual height obstruction and lower shrub density than bobwhite diurnal locations. Our results verify that bobwhite escape strategies and cover use vary among threat types. These results also support current management recommendations, specifically of creating a patchwork of vegetation covers for bobwhite. Managing landscapes for patches of dense shrubby cover for escape from raptors, as well as open areas with shorter vegetation heights or even bare ground for roost locations would improve bobwhite habitat in relation to predator avoidance. In addition, the use of subterranean refugia that bobwhites exhibited when pursued by a raptor indicates that maintaining a population of burrowing animals, i.e. wood rats (*Neotoma* spp.) or badgers (*Tasidea taxus*), may increase bobwhite survivorship. Our findings are limited to the Rolling Plains ecoregion within Texas but suggest that a more complete range-wide understanding of the complexities of bobwhite behavior and cover selection in response to predators would increase the quality of habitat management recommendations for bobwhite.

GPS study of nocturnal predators of quail

Shesh Jhala, Department of Wildlife and Fisheries, Texas A&M University
Susan Cooper, Texas AgriLife Research, Uvalde, Tx

Bobwhite quail (*Colinus virginianus*) populations have experienced sharp declines in the last few decades. Our study was aimed to explore one potential cause – mammalian predation during nesting season. In this study, we looked at nocturnal movement patterns of mammalian predators of quail at the RPQRR. Our study has three main objectives: (1) determine the habitat use of predators of quail on RPQRR, (2) investigate characteristics of the nocturnal foraging paths of these predators and (3) assess landscape factors influencing the distribution of predators and, hence, risk to quail. We placed GPS collars on 4 bobcats (*Lynx rufus*), 6 coyotes (*Canis latrans*) and 11 raccoons (*Procyon lotor*). Collars were programmed to record 1 location every 5 minutes throughout the night for at least one month during quail nesting season. We described habitat use and movement patterns of these predators using ArcView and related them to quail nesting habitat determined from locations of quail nests discovered by RPQRR staff and interns from 2009-2011. To assess the use of roads, water, and quail feeders by the mesopredators, we will compare real and random distribution of locations on a distance surface grid. Both coyotes and nesting bobwhites were found predominantly in grassland areas and neither showed much selection for any particular ecotype of grassland. Bobcats and raccoons had greater need for cover. They spend much of their time in riparian areas along the creeks, these treed areas are not nesting habitat for bobwhites and constitute only a small portion of the ranch. Spatial overlap of nesting quail and these two predator species occurred mainly in the sandy loam areas which support a mixture of grass and shrubs which provide cover for the predators. Bobcats, but not raccoons, used the more productive grasslands on loamy prairie soils to a limited extent and would come into contact with nesting quail in these areas. Several of the raccoons restricted their activities to the rocky hillsides, these areas are not used by nesting quail. Thus, based on their distribution preliminary analysis indicates that coyotes are most likely to locate nesting quail, followed by bobcats and lastly raccoons. However there are many other factors that will affect the likelihood of nest predation by these species. We expect that further examination of nocturnal hunting paths and the distribution of roads, water and feeders will influence predator and quail interactions and will produce more definitive results regarding effects of predator presence on usable space for bobwhites.



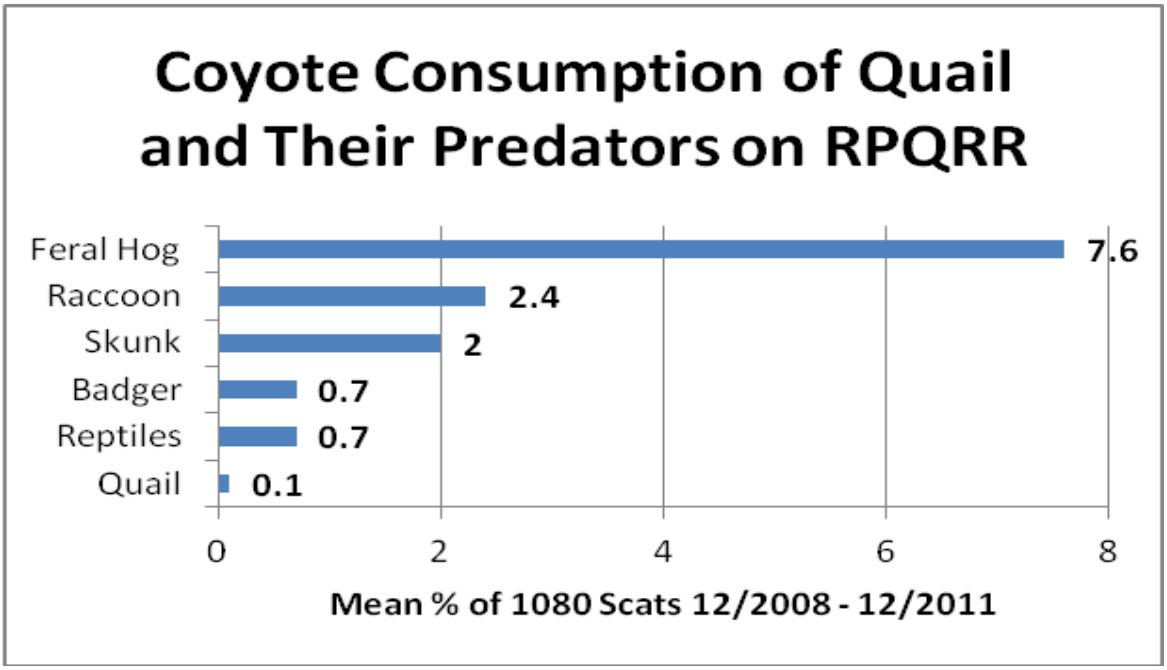
Food habits of coyotes on the Rolling Plains Quail Research Ranch

Mark A. Tyson[1], Dale Rollins[2], Philip Gipson[1], John Baccus[1], Warren B. Ballard[1,4], and Lloyd LaCoste[3]

[1] Department of Natural Resources Management, Texas Tech University, Lubbock, TX
[2] Texas AgriLife Research & Extension Center, San Angelo, TX
[3] Rolling Plains Quail Research Ranch, Roby, TX

Coyotes (*Canis latrans*) are common mesocarnivores in Texas and have typically been considered as important predators of quail. Incidences of predation by coyotes on quail can be difficult to assess because little evidence of the predation event is left behind. Few studies have evaluated the diets of coyotes on a landscape specifically managed for northern bobwhites (*Colinus virginianus*). The purpose of our study is to describe the seasonal and annual diets of coyotes on the Rolling Plains Quail Research Ranch, Fisher County, Texas. We collected a total of 1080 coyote scats along 2, 18-km transects from December 2008 to December 2011. We analyzed scats macroscopically to identify food remains; the percent of the scat made up of each food item was then estimated. Rodents were the most commonly eaten food, occurring in 44.1% of scats. Mast from 7 unique plant species occurred in 55.6% of scats, with mast of prickly pear (*Opuntia* spp.) and mesquite (*Prosopis glandulosa*) assuming special importance. Various mammal species that are documented predators of quail were found in 13.4% of scats, while quail occurred in <1%. Coyotes were not important sources of mortality for quail during the period of our study. Our results suggest that mast consistently played an important role in the diets of coyotes and that coyotes consumed more known predators of quail than quail themselves. Managers should recognize the importance of mast-producing shrubs and limit their removal; their importance to quail may far outweigh their potentially negative impacts to forage plants for livestock.

[4] *Deceased*.



Digestibility of Bobwhite Quail and Their Eggs Eaten by Coyotes

Mark A. Tyson[1], Philip Gipson[1], Rhonda Votino[2], Dale Rollins[3] and John Baccus[1]
[1] Department of Natural Resources Management, Texas Tech University, Lubbock, TX
[2] Amarillo Zoo, Amarillo, TX
[3] Texas AgriLife Research & Extension Center, San Angelo, TX

Coyotes (*Canis latrans*) are considered to be an important mammalian predator of northern bobwhites (*Colinus virginianus*), yet most studies on coyote diets via scat analysis conclude that quail comprise only minor items on a seasonal or annual basis. However no published research exists examining the digestibility of bobwhite quail or their eggs, i.e., their detectability when ingested by coyotes. Is it possible that quail (or their eggs) are consumed more regularly, but not detected in scat analyses? We devised a study to feed known quantities of quail and their eggs to coyotes and determine the quantity and types of quail tissue that occur in the coyote's feces. We plan to conduct a series of feeding trials in collaboration with the Amarillo Zoo. This study will provide a basis for evaluating the results of previous coyote diet research with regard to the quantity of quail and their eggs consumed.

Lunch Stop

Lunch provided by Rough Creek Catering.

Please take this opportunity to visit with RPQRR staff, graduate students, QuailMasters, and Bobwhite Brigade cadets.

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Operation Idiopathic Decline Update: Summary of 2011 and 2012 Findings

Steven M. Presley, Ph.D., The Institute of Environmental and Human Health, Texas Tech University

Operation Idiopathic Decline (OID) is a consortium of research scientists focused on gaining a better understanding of the influence and effects of disease-causing organisms and toxicants on the Northern Bobwhite quail populations in the Rolling Plains of Texas and western Oklahoma. Funded fully by the Rolling Plains Quail Research Foundation, sample collection and analyses for OID was initiated in August 2011, and is currently in its second year. The OID research consortium principal includes Dr. Alan Fedynich (Caesar Kleberg Wildlife Research Institute), Dr. Ron Kendall (The Institute of Environmental and Human Health, Texas Tech University), Dr. Blanca Lupiani (Veterinary Pathobiology, Texas A&M University, College Station), Dr. Markus Peterson (Wildlife and Fisheries Sciences, Texas A&M University, College Station), Dr. Steven Presley (The Institute of Environmental and Human Health, Texas Tech University), Dr. Shuping Zhang (Veterinary Pathobiology, Texas A&M University, College Station), and Dr. Guan Zhu (Veterinary Pathobiology & Faculty of Genetics Program, Texas A&M University, College Station).

Table 1. Summary of overall 2011 (August & October) Bobwhite trapping success by team, including breakout by sex and age of birds.

Trapping Team	Birds Sampled	Males	Females	Adults	Juveniles
OK NORTH	**119**	53%	47%	38%	62%
OK SOUTWEST	**123**	56%	44%	51%	49%
TX NORTH	**99**	54%	46%	72%	28%
TX CENTRAL	**33**	64%	50%	97%	3%
TX SOUTH	**219**	57%	43%	81%	19%
Total / Average	***593***	***57%***	***43%***	***68%***	***32%***

Table 2. Summary of August 2012 Bobwhite trapping success by team, including breakout by sex and age of birds.

Trapping Team	Birds Sampled	Males	Females	Adults	Juveniles
OK NORTH	**25**	52%	48%	4%	96%
OK SOUTHWEST	**37**	57%	43%	48%	52%
TX NORTH	**24**	65%	35%	50%	50%
TX CENTRAL	**18**	50%	50%	17%	83%
TX SOUTH	**174**	54%	46%	26%	74%
TX BLUE	**10**	40%	60%	10%	90%
Total / Average	***288***	***53%***	***47%***	***26%***	***74%***

Bobwhite quail and potential arthropod vectors of pathogens (i.e., mosquitoes and ticks) were collected at 33 different locations throughout the Rolling Plains regions of northern Texas and western Oklahoma. Quail trapping efforts during August and October 2011 resulted in the collection and sampling of 593 total Bobwhite (Oklahoma trapping teams submitted samples from 242 quail, while Texas teams submitted samples from 351 quail). Table 1 provides a summary of the number of Bobwhite sampled, and a breakout of their respective age and sex distribution during 2011. Specific disease-causing organism and toxicant screening findings from 2011 sample analyses are reported separately by the respective OID principal investigators. The second year (2012) of OID field research efforts were initiated in August and have resulted in trapping and collecting samples from a total of 288 Bobwhite (note: a sixth trapping team was added for 2012, the Texas Blue Team). Table 2 provides a summary of the number of Bobwhite sampled, and a breakout of their respective age and sex distribution during August 2012.

Operation Idiopathic Decline Update: Summary of 2011 and 2012 Findings

During processing and necropsy of quail specimens collected during 2011, and in August 2012, the nematode eye worm (*Oxyspirura petrowi*) was found infesting up to 49% of the birds collected. Figure 1 illustrates the geographic distribution of northern Bobwhite found to be infested with the eye worm during 2011 and in August 2012. The overall eye worm infestation rate during 2011 (August and October specimens) was 49.04% (77 of 157), while infestation rate in birds collected during August 2012 was approximately 25% (18/72).

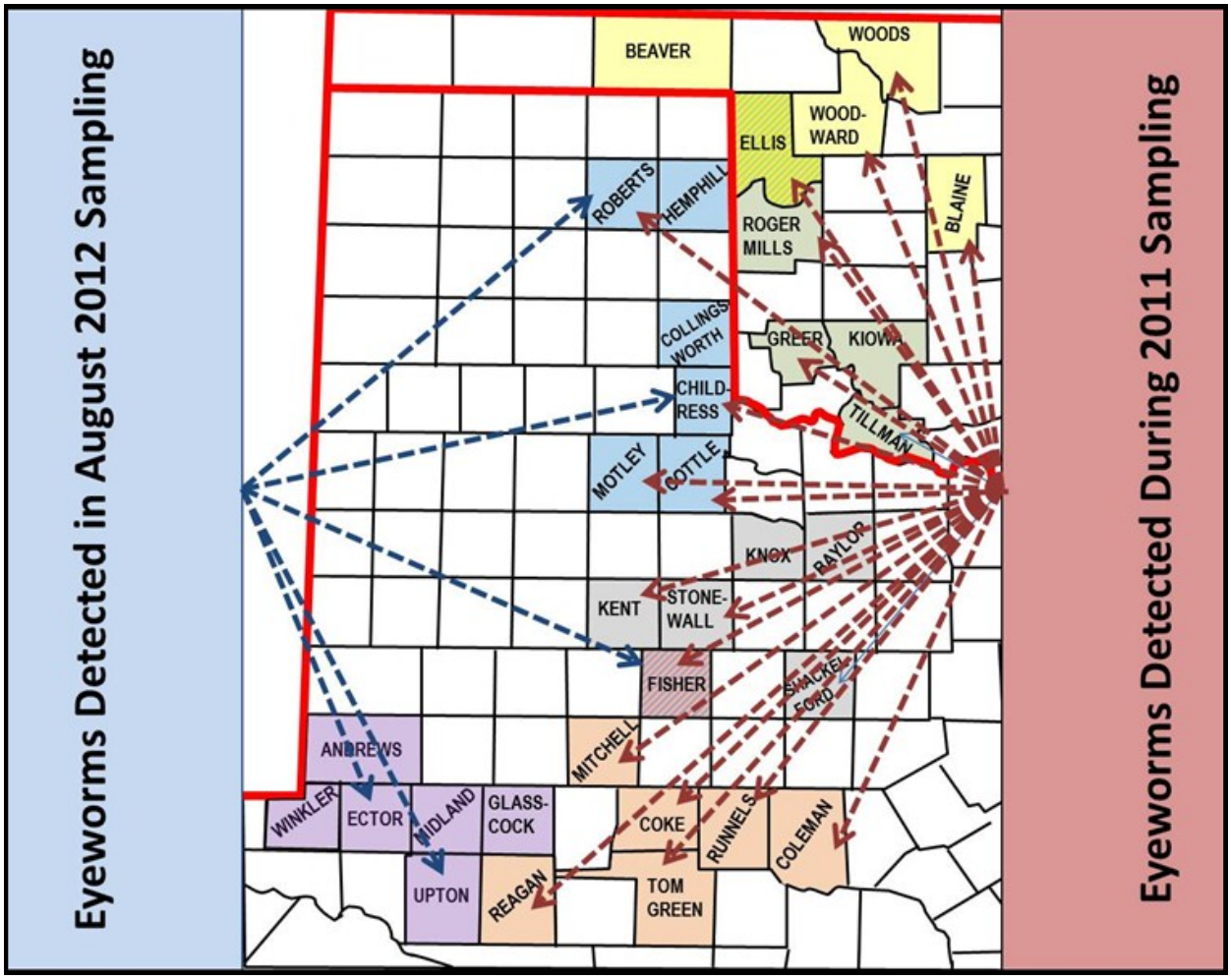


Figure 1. Geographic distribution of bobwhite quail infested by the eye worm (*Oxyspirura petrowi*), August 2011 - August 2012.

Funding provided by the Rolling Plains Quail Research Foundation.

STOP 4

Enhancing Useable Space on Post-CRP Fields

Shrub seedling survival

Barrett Koennecke, RPQRR

Woody coverts often limit useable space for bobwhites on CRP contracts. During a volunteer day on 3 Mar 2012, some 800 seedlings of Fourwing Saltbush and Aromatic Sumac seedlings were transplanted into the spreader dams to create "quail oases". Due to insufficient rainfall this summer the survival rates of these seedlings were not as high as anticipated. Overall survival rate at 3 months post-transplanting was 71%. The percent of seedlings alivewas higher with those planted inside of weed barriers with a rate of 89% over the non-weed barrier's survival rate of 75.5%. The percentage of living Sumac on the ranch totaled at 61%, while the survival of Saltbush was 77%. Hot, dry weather after our assessment (i.e., July-Aug) appears to have reduced survival considerably.

Half-cutting Mesquite Trees to Enhance Useable Space on CRP Sites

Dale Rollins, RPQRR

Most CRP contracts across west Texas lack sufficient woody cover to provide useable space for bobwhites. Succession of woody plants occurs quite slowly and takes >15 years to grow sufficient woody cover for quail at our latitude. To fast-forward the process, we use "half-cutting" of multiple-stemmed mesquites to enhance their utility as quail coverts. I suggest half-cutting 5 – 15 trees over an area the size of a football field. Half-cutting can be done anytime form April – June. For more information see http://texnat.tamu.edu/library/symposia/brush-sculptors-innovations-for-tailoring-brushy-rangelands-to-enhance-wildlife-habitat-and-recreational-value/half-cutting-mesquite-trees-to-enhance-loafing-cover-for-quail/ or the webisode on the subject at http://www.texas-wildlife.org/resources/webcasts/half-cutting-mesquite-for-quail-habitat.

Nesting of Northern Bobwhites in Relation to CRP on the Rolling Plains Quail Research Ranch

Dale Rollins and Barrett Koennecke

Conservation Reserve Program (CRP) contracts account for about four million acres in Texas, and are often touted as habitat for upland game birds. We compared nest site locations, hatch rates, and arthropod abundance for northern bobwhites on CRP versus rangeland habitats at the Rolling Plains Quail Research Ranch (RPQRR), Fisher County, Texas from 2008 to 2011. Nest sites were monitored via radio-marked females. Simulated nests (n = 144/yr) were used to evaluate hatch rates between the 2 habitat types. Arthropod abundance (as an indicator of brood habitat) was measured annually in August using sweep nets and pitfall traps. We documented 103 nest sites, 14% were in CRP while the remaining 86% were in rangeland; bobwhites neither selected nor avoided CRP as nesting habitat. 'Survival' of simulated nests (i.e., percent intact at 28 days exposure) across the 4 years averaged 63.2% for CRP and 74.4% on rangelands. Arthropod availability was greater in rangeland in 3 of the 4 years studied. CRP pastures dominated by kleingrass (*Panicum coloratum*) were used for nesting in proportion to their availability, but rangeland provided better brood habitat.

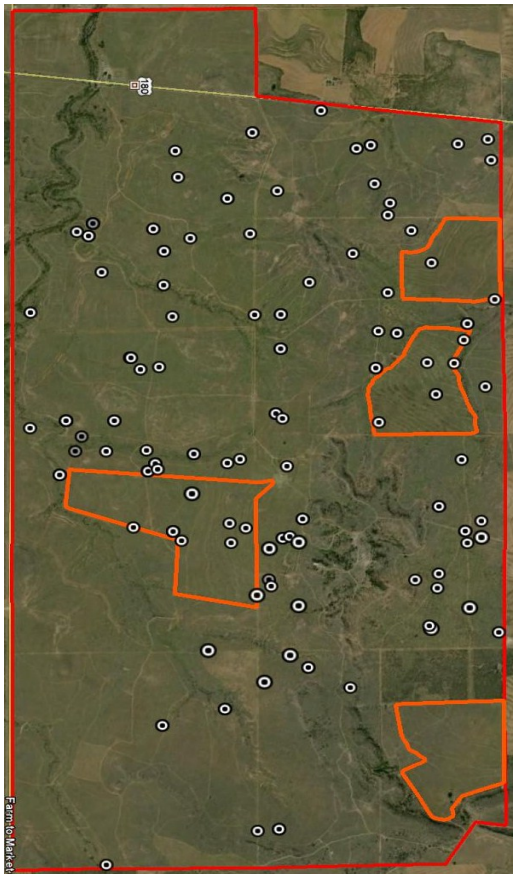


Table 1. Nesting locations of northern bobwhites on kleingrass (CRP) and native rangeland RPQRR, 2008-2011.

			Nests recorded									
Vegetation	Area available		2008		2009		2010		2011		Totals	
	ha	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
CRP	216	13	6	29	3	7	3	17	1	9	13	14
Rangeland	1633	87	21	71	41	93	18	83	10	91	90	86

Other Research at RPQRR

Nesting Success

Year	% Hens Attempting Nest	% Hens Attempting 2nd Nest	# Hens Alive May 1	Total Nests Attempted
2009	36%	11%	89	43
2010	36%	4%	50	20
2011	14%	0%	73	10
2012	73%	27%	11	14

Radiomarked hens are followed throughout the spring and summer to for the purpose of determining nesting success. This year we had only 11 marked hens alive on May 1. Of those 7 of them attempted a nest and 3 attempted a second nest. Out of a total of 14 attempted nests, 10 atched and 4 were destroyed. However, brood survival was only fair. After 3 weeks post-hatch, we checked on the brood and only 3 of the 10 had chicks remaining.

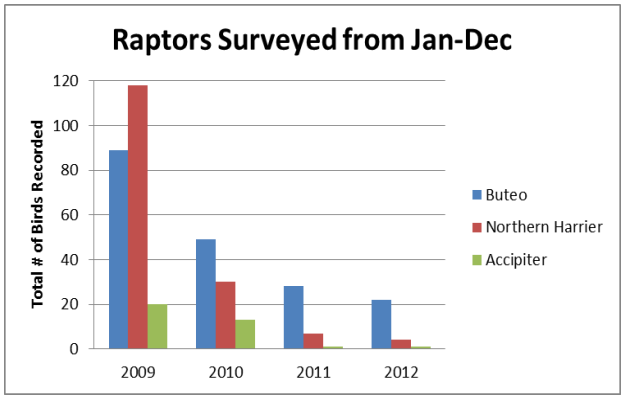
Dummy Nests

We use dummy nests to better understand trends in actual bobwhite nest success. This year we created 71 nests in CRP and 70 nests in rangeland habitat. Our success rates were higher than last year. We had 80 percent survival in rangeland compared to 56 percent last year. CRP survival rates were also up to 54 percent this year compared to 31 percent from 2011. Both of these numbers are still less than 2010 where we recorded 87 and 64 percent survival in rangeland and CRP respectively.

Year	Rangeland Habitat	CRP Habitat
2012	80%	54%
2011	56%	31%
2010	87%	64%

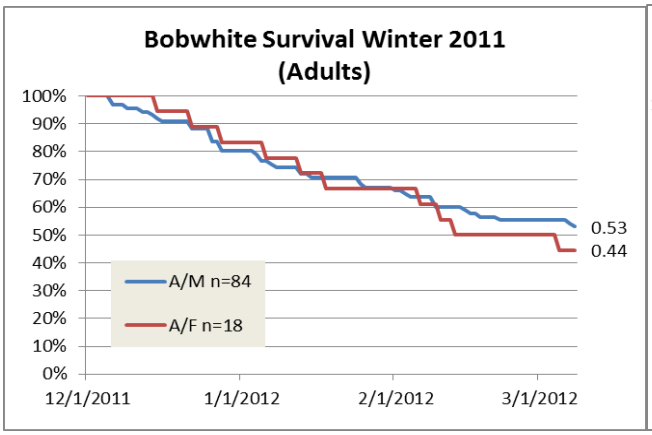
Raptor Surveys

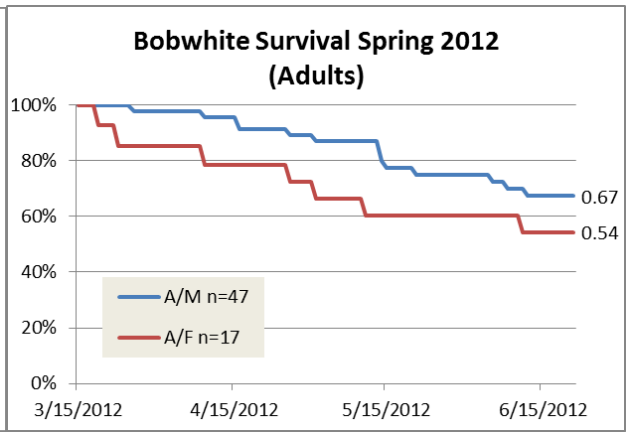
We conduct weekly surveys along two, 10-mile routes on the RPQRR and record each raptor's location, species and what they are doing (perching, soaring). The chart is showing total number of raptors observed from January 1 through December 31. Every year since 2009 the number of raptors seems to be dwindling following the decline of both small mammals and quail. This data suggest that if prey abundance is low in this area, raptors are moving to other areas to search for prey.



Survival

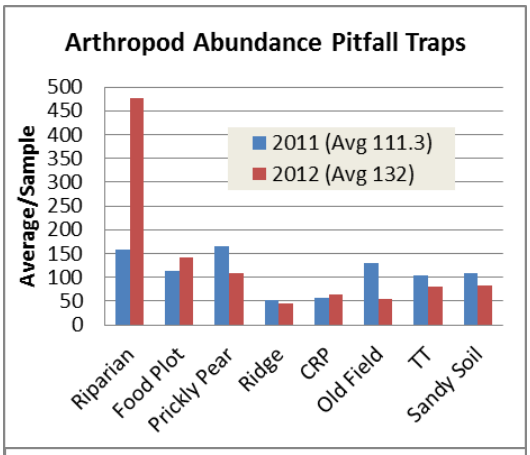
We use radio telemetry in several aspects of our research. These objectives include monitoring survival rates, determining cause-specific mortality, documenting movements and spatial use of habitat, and nesting success. We radiomark males during our fall-trapping effort and females during our spring trapping effort. Due to the poor nesting attempt and recruitment of juveniles into the population, we were unable to capture enough juvenile males in the fall for study and in the spring we had trouble catching any bobwhites for study. We defined last year's winter survival period as December 1 - March 8 (99 days). Survival of adult males was estimated at 53% compared to winter 2010 survival at 41%. Due to the lack of juvenile males to study we estimated female survival over the winter and found it to be similar at 44%. The spring survival period went from March 15 - June 21 (99 days). Adult females had a survival rate of 54% compared to spring 2011 at 67%. The lower survival likely reflects the survival costs associated with nesting (low nesting effort in 2011).

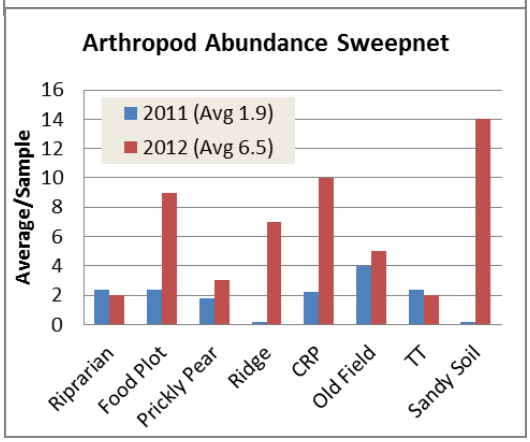




Arthropods

Arthropods (e.g., insects) are very important to brooding chicks along with adults. We conduct annual arthropod surveys to estimate overall abundance of arthropods. Our surveys include sampling from 8 different habitat types across the ranch using pitfall traps and sweep net methods. The 2012 sweep net collection yielded a ranch-wide average of 6.5 insects per sample. Compared to 2011 (average 1.9/sample) there was almost 3.5 times more insects per sample. The pitfall traps for 2012 showed a moderate increase with a ranch-wide average per sample of 132 insects compared to 2011 with 111.3 insects per sample. Riparian habitat yielded more insects than other habitats according to pitfall traps while Food Plot, CRP, and Sandy habitats yielded greater numbers based on sweepnetting.





Small Mammal Abundance

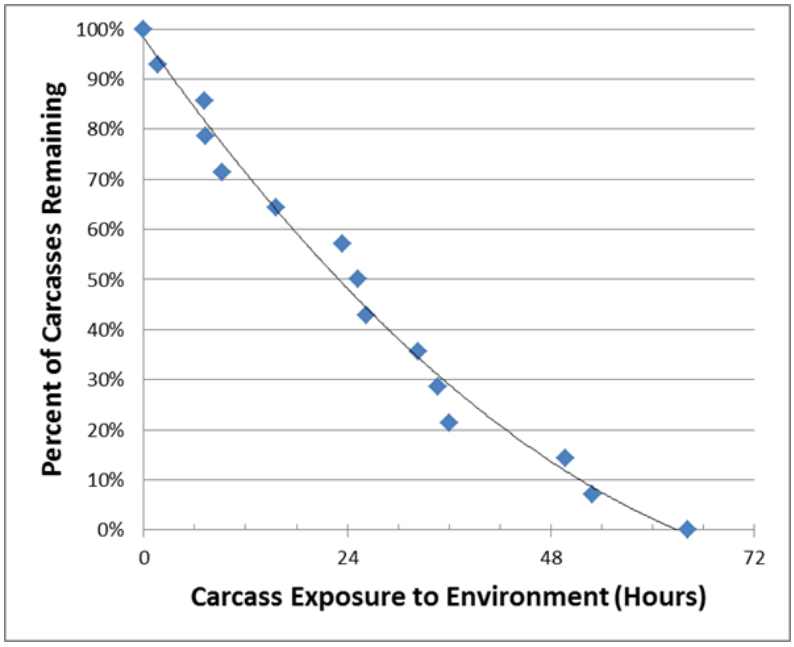
Mariah Box, RPQRR

Small mammals serve as a "buffer species" for bobwhite quail because they absorb or deflect predation by carnivores (bobcats, raptors, etc.). Here at the RPQRR we conduct a biannual survey in January and July to determine species diversity and relative abundance of small mammals (rodents) across the ranch. We trap in 7 different habitat types: Riparian, CRP field, Prickly Pear, Rocky Ridge, Old Cropland, Mesquite Woodland, and Sandy Soil. We use 25 Sherman Live Traps in a 5x5 grid, with 5 grids in each habitat type. We leave the traps out for 4 nights; this gives us 500 trap nights per habitat type, and a total of 3,500 trap nights for the entire season. Past trapping surveys have concluded that the Northern Pygmy Mouse *(Baiomys taylori),* and the Hispid Cotton Rat *(Sigmodon hispidus),* have been the most populous species on the RPQRR. However, this year we determined that the Hispid Pocket Mouse *(Chaetodipus hispidus)* was overwhelmingly the most abundant species on the ranch.

Factors affecting scavenging and quail carcass persistence rates in the Rolling Plains of Texas

Rebekah Ruzicka, Michelle Downey, Aaron Rives, and Dale Rollins, RPQRR

To support ongoing disease research (i.e., Operation Idiopathic decline), we need information about the opportunity for hunters/researchers to find quail carcasses, as finding dead quail in the field is a rare occurrence. The objective of this study is to determine bobwhite carcass persistence rates in the Rolling Plains of Texas and the factors affecting those rates. We will be examining the effects of weather (e.g. temperature, humidity, dew point, barometric pressure change, wind speed, wind direction, and standard deviation of wind direction), season (summer, fall, winter), carcass distance from road, relative predator abundance, and cover type (grass, shrub, bare ground/ basal forb). Carcasses will be placed in the field at similar densities across three sites and will be attached to a timing device that records the exact minute that the carcass is removed. At this time we have completed two trials of 18 carcasses each for a total of 36. No carcass lasted more than 65 hours and approximately 50% of the carcasses were consumed after 24 hours. We plan to complete 7 more trials of 18 carcasses each over the next year to assess seasonal trends..



OID: Prevalence of Arboviral, Infectious and Zoonotic Pathogens

Steven M. Presley, Ph.D., The Institute of Environmental and Human Health, Texas Tech University

Various investigations have attempted to identify the cause or combined factors that may be contributing to Bobwhite quail population decline, but to date have not clearly determined those factors responsible. Extensive field and laboratory research studies related to environmental and anthropogenic factors have been undertaken, but very limited research on the role that diseases and combinative stress factors associated with internal and external micro- and macro-parasites may be playing in quail population decline has been accomplished. To determine if disease and parasitic organisms are primary or contributing factors to the decline of Bobwhite quail populations in the Rolling Plains Region of Texas, an intensive region-wide field survey is being conducted. Ongoing efforts are focused towards identifying and determining the prevalence of any micro- and macro-parasites occurring in wild Bobwhite quail populations. Based upon the results and findings of this regional survey, future research efforts to further assess the influence of micro- and macro-parasites in wild quail populations can be developed and implemented. The primary objective of this component of the Operation Idiopathic Decline program is to survey tissue samples and specimens for infectious and zoonotic pathogens, including arboviral encephalitides (i.e., West Nile virus, St Louis encephalitis virus, Western equine encephalitis virus), Quail pox, Q-fever, Fowl cholera, and *Francisella tularensis*.

Results of analyzing samples from 2011 found that of 153 brain tissue samples and 216 blood samples screened for *Flaviviruses* (i.e., WNV and SLEV), all tested negative. Additionally, 60 mosquitoes were collected, processed and tested negative for *Flaviviruses*. Cloacal swabs from 166 birds were screened for Q-fever (*Coxiella burneti*) and for fowl cholera (*Pasturella multocida*) and were determined to be negative for both pathogens. All whole-body quail specimens received at the lab were necropsied and thoroughly examined for pox-type lesions, however none were observed. Additionally, we thawed and screened 157 quail heads archived from 2011 necropsies and found that 50.3% (79/157) of consumptively collected birds were infested with eye worms.

Funding provided by Rolling Plains Quail Research Foundation

OID: Major Intestinal Parasites in Bobwhite Quail in RPQRR

Guan Zhu[1], Xicheng Ding[1], Lacy Parson[1], Thomas Craig[1], Lloyd LaCoste[2], Anna Gibson[3], Steve Presley[3], Markus Peterson[4] and Dale Rollins[2,4]

[1] Department of Veterinary Pathobiology, Texas A&M University, College Station, TX

[2] Texas AgriLife Research & Extension Center, San Angelo, TX

[3] The Institute of Environmental & Human Health, Texas Tech University, Lubbock, TX

[4] Department of Wildlife & Fisheries Sciences, Texas A&M University, College Station, TX

Coccidia and *Cryptosporidium* species

Nested PCR protocols have been developed to specifically detect coccidial and cryptosporidial parasites in the feces from the wild Bobwhite quail collected in the annual trapping program at RPQRR. Presently, we have completed a preliminary study on the fecal samples collected in the fall, 2010 (32 pooled samples from 158 birds), spring, 2011 (21 pooled samples from 84 birds), summer (August), 2011 (40 pooled samples from 88 birds), and fall (48 pooled samples from 153 birds. Using a maximum-likelihood (ML) algorithm, we estimated that the infection rates among the pooled samples were ~25% to ~48% for the coccidia and ~5% to 16% for *Cryptosporidium* species (Table 1). The positive rates are lower in the first two batches, but high in the most recent two batches of samples, suggesting seasonal variations of infections between the two different generations of birds. The current methods are unable to distinguish the parasites at genus level for the coccidia or species level for *Cryptosporidium*. Therefore, we have started to clone and sequence the PCR products for speciation. Our primary study indicates that all coccidial sequences analyzed so far belong to avian *Eimeria* species. The identity of PCR products for *Cryptosporidium* is also confirmed. While more sequences are to be cloned and sequenced, attempts to clone and produce longer sequences for a better speciation of parasites are ongoing. In parallel, we have also acquired feces from a number of farmed quail, from which we may gain a more comprehensive picture on the parasite infections in Texas quail. We have observed a large number of oocysts in these samples, in which the majority appear to be *Eimeria* spp. We have amplified and sequenced a number of long 18S rRNA genes, which are the first one for quail coccidia. Sequence analysis indicates that all sequences cloned so far belong to a single *Eimeria* species.

Collection	Parasite	Infection Rate	Lower Limit	Upper Limit
2010 Fall	Coccidia	24.57	15.74	34.57
2011 Spring	Coccidia	25.90	15.85	37.87
Combined	**Coccidia**	**25.15**	**18.30**	**32.88**
2011 Summer	*Coccidia*	47.89	35.56	61.57
2011 Fall	*Coccidia*	39.64	31.25	49.64
Combined	***Coccidia***	**43.25**	**36.00**	**51.38**
2010 Fall	*Cryptosporidium*	4.29	1.39	9.94
2011 Spring	*Cryptosporidium*	5.15	1.69	11.66
Combined	***Cryptosporidium***	**4.68**	**2.20**	**8.63**
2011 Summer	*Cryptosporidium*	12.67	6.69	21.56
2011 Fall	*Cryptosporidium*	15.83	10.52	22.89
Combined	***Cryptosporidium***	**14.70**	**10.46**	**20.03**

OID: Major Intestinal Parasites in Bobwhite Quail in RPQRR (con't)

Cecal worms

It was discovered that bobwhite quails in the recently collected samples were heavily loaded with cecal worms that were identified as *Aulonocephalus pennula* based on morphological features .

	Whole gut (n=33)	Partial gut (n=11)
Total Worm Number	6391.0	206.0
Worm per Bird	193.7	18.7

We have also performed some histology analysis of quail intestines loaded with cecal worms, and observed some apparent pathology. Briefly, in the ceca and colons, we observed a slight increase of lymphocytes and plasma cells within the lamina propria. Cells are occasionally found in varying size aggregates. The epithelial lining is intact with a slight degree of goblet cell hyperplasia. Within the lumen, there is mucus admixed with bacterial colonies, plant material, scattered larvated eggs and a saggital section of a mature nematode.

Fig. 1. Heavily loaded *Aulonocephalus lindquisti* in the gut of a Bobwhite quail.

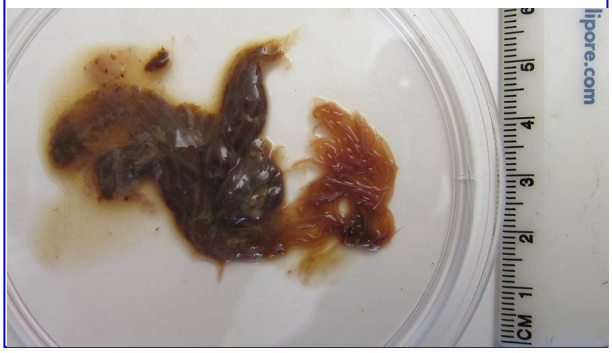


Fig. 2. Micrographs of cecal worms from bobwhite quail.

Currently, there is no molecular data available at all for any cecal worms, and their taxonomy of cecal worms is also less firmly established. To gain more knowledge on *Aulonocephalus pennula*, we have completely cloned and sequenced the small subunit of ribosomal RNA (18S rRNA) gene, plus the ITS region sequence. The sequence data will allow us to: 1) design specific primers for future molecular detection of worms in intermediate hosts; and 2) perform molecular phylogenetic analysis to elucidate their evolutionary relationship with other nematodes. Indeed, while more comprehensive analysis is ongoing, our preliminary phylogenetic analysis has shown that *Aulonocephalus pennula* is in fact more closely related to the genus of *Paraspidodera* (Ascaridida; Heterakoidea; Aspidoderidae; Paraspidodera).

Gut microsporidia and blood hematozoa

A new nested PCR protocol has been recently developed for detecting microsporidial parasites in the fecal samples. Our preliminary data showed that fecal samples from bobwhite quail collected in 2012 in RPQRR has an infection rate at ~10%, which indicates that microsporidia are less likely an group of important pathogens in quail. Additionally, a large number of blood smears were examined microscopically, but no apparent pathogens were observed. We are currently developing PCR assays for detecting hematozoan parasites in the quail blood samples collected in FTA cards.

Funding provided by Rolling Plains Quail Research Foundation .

OID: Environmental Contaminants in Quail from the Rolling Plains of Texas

Ronald J. Kendall, Ph.D., The Institute of Environmental and Human Health, Texas Tech University

The environmental contaminant study included quantitation of pesticides and toxic heavy metals, lead and mercury, in the tissues of quail. For organochlorine pesticides in quail, thigh muscle was obtained from 159 birds (154 bobwhite, 2 blue, and 3 unknown). A total of 19 organochlorine pesticides were determined in quail muscle tissue. Common toxic effects of such organochlorines in the tissues of birds could include reproductive inhibition, central nervous system disorders, weight loss, organ damage, and immune suppression. At a screening level samples generally showed low levels of pesticides. The most common contaminant appears to be DDE, which is nevertheless like most of the other pesticides found typically below 20 ppb. Other common pesticides found in the tissues of quail included lindane, endosulfan, chlordane, and dieldrin. From the observations to date, it appears that quail are exposed to recent and historic organochlorines, but their muscle tissue reflects low levels of bioaccumulation. Further data analysis is continuing to confirm amounts and identities of contaminants. The toxic heavy metals, lead and cadmium, are also being investigated. These toxic heavy metals can have effects on the central nervous system, reproduction, and immune suppression. Total mercury was quantitated in quail breast muscle tissue to determine body loading of this toxic heavy metal. The sample detection limit of mercury was at 2.2 ppb. Most of the quail reflected tissue levels of total mercury in breast muscle at the sample detection limit. However, some birds did have higher levels in breast tissue, generally from 4 – 12 ppb. Several quail had more elevated mercury residues in muscle tissue up to 82 and 25.9 ppb respectively. Analytical results for total mercury concentrations in breast muscle tissue of quail from the Rolling Plains of Texas indicate mercury exposure, although not at a high level, except for some individuals that appear to have concentrations in breast muscle tissue up to 82 ppb. Lead analysis was conducted on bobwhite quail femur bone. In the quail body, ingested lead, either through lead shot or natural lead exposure, acts as a positive cation and will be sequestered into bone tissue similar to calcium. Therefore, the femur bone makes an excellent body tissue to evaluate lead exposure in quail. In most birds, total lead concentrations in femur tissue were below 1 ppm. Several birds indicated total femur lead concentrations of 151 ppm and 113 ppm respectively, probably suggesting recent ingestion of lead shot for such elevated concentrations in the femur. However, a number of other birds indicate lead femur concentrations of approximately 10 ppm range indicating, as well, some elevated level of lead exposure. These data are being further analyzed to look at trends of lead – femur concentrations such as this could provide significant evidence for the possibility of ingestion of lead shot, as well as being exposed to natural lead in the environment. As we bring together the overall project of Operation Idiopathic Decline, the environmental contaminant work completed to date from 2011 samples indicate that quail from the Rolling Plains of West Texas do carry pesticides and toxic heavy metals in their tissues. These toxic materials can suppress the immune system, affect the central nervous system, as well as suppress reproduction, among other issues. For this reason, the overall challenge of quail to thrive again in the Rolling Plains of West Texas will require a more complete understanding of contaminants, disease, and subsequent ability of quail to survive and reproduce.

OID (Phase 2): Eye Worm Impacts on Northern Bobwhite Foraging and Flying Efficiency

Ronald J. Kendall, Ph.D., The Institute of Environmental and Human Health, Texas Tech University

As part of the Operation Idiopathic Decline initiative, Northern bobwhite sampled from the Rolling Plains of West Texas in 2011 revealed substantial infestation with eyeworms. This project will be in collaboration with Dr. Alan Fedynich of Texas A&M University-Kingsville, who reported that close to 50% of the quail sampled from the Rolling Plains revealed the presence of eyeworms in 2011, which is in total contrast to Northern bobwhites in south Texas, which showed almost no evidence of eyeworms. An exhaustive literature review has taken place, which indicates that eyeworms can negatively affect birds that ultimately become infested. Based on the impact these parasites have on other bird species, they could play a significant role in the survivorship of the Northern bobwhite throughout the Rolling Plains of Texas. To test the hypothesis if eyeworms can affect bobwhite foraging and/or flying efficiency our experiments will establish some significant data which will determine if the eyeworm infection leaves the birds visually impaired or not. Birds will be subjected to flying experiments to test navigation ability as well as other experiments to evaluate the ability to find and secure food in established time frames. Statistical procedures are being utilized to establish sample sizes and treatments in order to have sufficient power in the experiment to detect effects. An indoor aviary has been established that has 90 cages for holding quail and these

OID: Prevalence of Bacterial and Fungal Pathogens in Bobwhite Quail

Hongwen Su, Jessica McKelvey, and Shuping Zhang, Department of Veterinary Pathobiology, College of Veterinary Medicine & Biomedical Science, Texas A&M University

In an effort to understand the impact of infectious diseases on population decline, we determined the prevalence rates of potential respiratory and intestinal microbial pathogens in bobwhites in the Rolling Plain Ecoregions. Tracheal swabs and tissues, crop tissues, cecal tissues, and cloacal swabs were collected from 52 bobwhites. One set of PCR assays was performed to screen tracheal swabs and tissues for *Mycobacterium* spp., *Mycoplasma* spp., *Aspergillus fumgatus* and *Ochroconis gallopavum*. Another set of PCR assays was carried out to detect *Salmonella* spp., *Clostridium colinum*, *Clostridium perfringens*, and *Macrorhabdus ornithogaster* in cecal contents. Bacterial and fungal cultures were performed on tracheal, crop, cecal, and cloacal samples. 16s and ITS rRNA gene sequencing were used to identify bacteria and fungi, respectively. The prevalence rates of potential respiratory pathogens as determined by culture and PCR were as follows: *Pseudomonas aeruginosa*, 17.3%; *Mycobacterium* spp., 1.9%; *Mycoplasma* spp., 0.0%; *Aspergillus fumgatus*, 0.0%; and *Ochroconis (Dactylaria) gallopavum*, 0.0%. The prevalence rates of enteric pathogens were *E. coli*, 30.8%; *Clostridium sordellii*, 3.8%; *Salmonella spp*., 0.0%; *Clostridium colinum*, 0.0%; *Clostridium perfringens*, 0.0%; and *Macrorhabdus ornithogaster*, 0.0%. In addition, human commensal organisms were isolated from the cecal and cloacal samples of these bobwhites at the following rates: *Neisseria flavescens,* 7.8%; *Neisseria sicca,* 7.8%; and *Streptococcus mitis,* 17.3%. Tracheal colonization by *Pseudomonas aeruginosa* and intestinal colonization by *E. coli* and human commensal organisms warrant further investigations on the virulence properties and sources of these bacterial species.

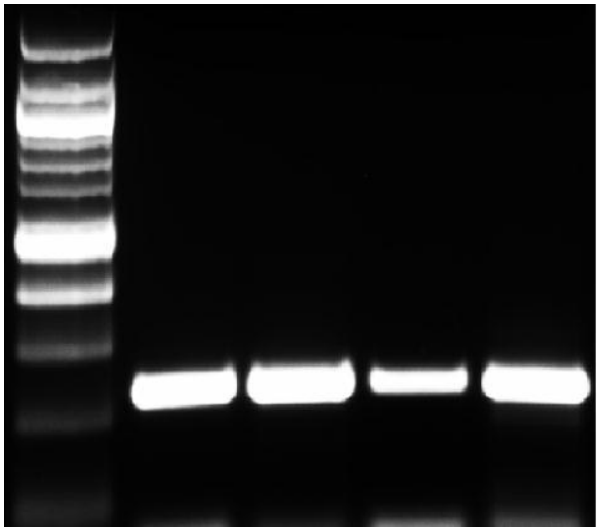


Figure 1. PCR amplification of *Mycobacteria hsp* gene from Quail 110688.

Funding provided by Rolling Plains Quail Research Foundation.

OID: Virus surveillance in wild bobwhite quail in the Rolling Plains of Texas

Pamela J. Ferro[1], Owais Khan[1], Christine Vuong[1], Sanjay M. Reddy[1], Lloyd LaCoste[2], Dale Rollins[2] and Blanca Lupiani[1]

[1]Department of Veterinary Pathobiology, College of Veterinary Medicine & Biomedical Sciences, Texas A&M University, College Station, TX

[2]Rolling Plains Quail Research Ranch (RPQRR) and Texas A&M AgriLife Research, San Angelo, TX

Bobwhite quail populations have decreased significantly in the past few years throughout the rolling plains of Texas and Oklahoma, and the cause of this drop is thus far unknown. This study is part of a large-scale cooperative effort to determine the role of infectious diseases in the population decline. The objective of this study was to determine which avian viruses are present in bobwhite quails that may contribute to the decline, either as a primary agent or an underlying factor. A total of 277 swab samples (136 tracheal swabs and 141 cloacal swabs) and 133 blood samples (FTA cards) were collected from wild captured or hunter–harvested bobwhite quail from November 2011 to April 2012 at 19 ranches across 18 counties in Northwest Texas as part of the cooperative study. Six tracheal swab samples tested positive, 34 were suspicious, and 20 cloacal swabs tested suspicious for avian influenza virus (AIV) and none were positive for Newcastle disease virus (NDV) as determined by real-time RT-PCR (rRT-PCR). Of the 60 positive and suspicious AIV samples, no viruses were isolated by inoculation of embryonated chicken eggs. No tracheal swabs and 12 cloacal swabs were positive (n=9) or suspicious (n=3) for the presence of avian adenovirus (AvAd) by real-time PCR and no viruses were isolated by inoculation of primary chicken embryo kidney (CEK) cells. All blood samples were negative for reticuloendotheliosis virus (REV) by duplex real-time PCR. The results presented here indicate the presence of AIV and avian adenovirus in wild populations of bobwhite quail. The significance of these results, particularly in relation to the population decline, remains to be determined.

Table 1. Real-time RT-PCR (NDV, AIV) and real-time PCR (AvAd, REV) results

	Positive (Ct<35)	Suspicious (Ct 35.1-39.9)	Negative (Ct>40)	Total
Newcastle disease virus (NDV)				
Cloacal swab	0	0	141	141
Tracheal swab	0	0	136	136
Avian influenza virus (AIV)				
Cloacal swab	0	20	121	141
Tracheal swab	6	34	96	136
Avian adenovirus (AvAd)				
Cloacal swab	9	3	129	141
Tracheal swab	0	0	136	136
Reticuloendotheliosis virus (REV)				
Blood (FTA)	0	0	133	133

Funding provided by Rolling Plains Quail Research Foundation.

OID: Survey of *Trichomonas gallinae* and helminths in bobwhites from the Rolling Plains ecoregion

Andrea Bruno and Alan M. Fedynich, Texas A&M University-Kingsville
Dale Rollins, Texas AgriLife Research & Extension Center, San Angelo, TX

The role parasites and diseases play in the ecology of the northern bobwhite is often overlooked or disregarded as inconsequential. However, parasites have been known to serve as population regulators in avian species. The objectives of this study are to (1) conduct a survey for *Trichomonas gallinae* (a protozoan pathogen), (2) assess helminth prevalence, intensity, and abundance, and (3) identify pathological responses attributable to parasite infection in bobwhites from the Rolling Plains ecoregion in Texas and western Oklahoma. Parasitological findings will be related to host age, host sex, year of collection, rainfall events, host body weights, and estimates of bobwhite population density. Bobwhites were collected in August and October 2011. Samples were taken from 194 live bobwhites for *T. gallinae* analysis and 43 bobwhites were euthanized for the helminth survey. All 194 samples tested negative for *T. gallinae*. Seven species of helminths were found, representing 6,233 individuals. The most commonly occurring (prevalent) species was *Aulonocephalus pennula* followed by *Oxyspirura petrowi*, *Tetrameres* sp., Acanthocephalan sp. (cystacanth of unknown species), *Physaloptera* sp., *Dispharynx nasuta*, and *Cheliospirura spinosa*. Preliminary results show that prevalence of *A. pennula* increases with host age, whereas no age related differences in prevalence occurred for *O. petrowi* or *Tetrameres* sp. Prevalence of infection was similar between host sexes. Overall mean intensity for *A. pennula, O. petrowi,* and *Tetrameres* sp. were 161.5 ± 134.0 (SD) (range 1–579); 9.0 ± 13.1 (SD) (range 1–46); and 2.2 ± 1.1 (SD) (range 1–5) respectively. Overall mean abundance for *A. pennula, O. petrowi,* and *Tetrameres* sp. were 139.0 ± 136.0; 4.4 ± 10.1; and 0.6 ± 1.1 respectively. Additional sampling periods are scheduled for August and October 2012 and 2013.

Funding provided by Rolling Plains Quail Research Foundation.

Descriptive statistics of helminths from northern bobwhites collected during August 2011 and October 2011 in the Rolling Plains ecoregion of Texas and western Oklahoma.

	Prevalence	Intensity		Abundance	
Helminth Species	*n* (%)	$\bar{x}$ ± SD	Range	$\bar{x}$ ± SD	Total
Aulonocephalus pennula (C, S, L)	37 (86)	161.5 ± 134.0	1–579	139.0 ± 136.0	5,976
Cheliospirura spinosa (G)	1 (2)	2.0 ± <0.1	1-2	<0.1 ± <0.1	2
Dispharynx nasuta (G)	2 (5)	1.0 ± 0.0	1–1	<0.1 ± 0.2	2
Oxyspirura petrowi (E)	21 (49)	9.0 ± 13.1	1–46	4.4 ± 10.1	190
Physaloptera sp. (BM)	4 (9)	4.8 ± 4.9	1–12	0.4 ± 1.9	19
Tetrameres sp. (P)	12 (28)	2.2 ± 1.1	1–5	0.6 ± 1.1	26
Acanthocephalan larva (N, CR)	6 (14)	3.0 ± 1.5	1–9	0.4 ± 1.5	18

BM= breast muscle, C = ceca, CR= crop, G=gizzard, E = eye and nictitating membrane, L =large intestine, N = neck muscle, P = proventriculus, S = small intestine

OID: A Scalar Approach to Northern Bobwhite Abundance

Markus J. Peterson[1], Kelly Reyna[2], Brian L. Pierce[3], John M. Tomeček[1]
[1]Department of Wildlife and Fisheries Sciences, Texas A&M University
[2]Department of Biological Sciences, University of North Texas
[3]Institute for Renewable Natural Resources, Texas A&M University

Northern bobwhite (*Colinus virginianus*) abundance in the Rolling Plains of Texas is known to cycle with periodic fluctuations in weather, particularly precipitation. These weather cycles influence bobwhite recruitment and thence abundance. Operation Idiopathic Decline (OID) is exploring whether infectious agents and/or environmental contaminates are associated with long-term declines in bobwhite abundance in the Rolling Plains. The role of these entities in bobwhite population dynamics can only be understood once we have accounted for the marked influence of weather on bobwhite populations. Our research focuses on the intersection of environmental variables as they affect quail species at both micro- and macro-scales. Specifically, we are determining whether temperature, relative humidity, and precipitation are experienced differently at the scale of ranches and the physiographic region. At the ranch-scale, we deployed ibuttons™ that record temperature and relative humidity hourly at varying heights off the ground across 6 OID cooperator ranches. We also collected data on quail abundance, vegetation, and soils on 12 cooperating ranches. These data will be used to account for differences in bobwhite numbers among years at the ranch scale. Regionally, we are using TPWD annual quail count data, and weather data from NOAA and the PRISM Climate Study Group to determine relationships among these data. Ultimately, we seek to understand the significance of the differences in values obtained at these 2 spatial scales and how these differences inform future management decisions. With this understanding, we plan to work with other OID researchers to elucidate epidemiological relationships among key infectious agents, or environmental contaminants and bobwhite abundance.

Funding provided by Rolling Plains Quail Research Foundation.

Monitoring Texas Horned Lizards in the Rolling Plains of West Texas

Dallas Zoo Department of Herpetology, Dallas Zoo Management, Inc.

Once extremely common throughout their range, Horned Lizards in general are now known to be in decline. The Texas Horned lizard is no exception. It is perhaps the most threatened member of this group, with estimated population declines of greater than 30% across its range (Texas, Oklahoma, Kansas New Mexico, and northern Mexico) and even higher in its population epicenter, Texas (Linam 2008, Henke 2003). Populations have disappeared in East and Central Texas, and are decreasing in North Texas as well. Such across the board declines have prompted local and state governments to provide limited protection to Horned Lizards. Currently the Texas Horned Lizard is listed by Texas Parks and Wildlife (TXPW) as a "Threatened Species". This status provides limited protection by prohibiting private ownership and/or collection from the wild without a TXPW permit and outright banning any related commercial activity. We began preliminary data collection in the summer of 2010 and continued through the 2012 active season, which is typically May through October. Our goals have been to determine Texas Horned Lizard population density estimates, determine habitat preferences, and gather basic life history traits including movement patterns, environmental preferences, behavior and spatial relationship with Harvester Ants. Our current method of collecting data consists of road surveys or "road cruising." The well established system of roads at the RPQRR allows us to efficiently sample many habitats and cover many acres in a reasonable amount of time. Once spotted, the lizard is captured by hand. GPS coordinates are taken along with environmental conditions, UVB exposure, morphometric data, behavior, and potential prey interactions. The lizards are then marked with an electronic tag (PIT Tag), a tool used to determine population density through mark and recapture. In addition we are collaborating with Drs. Dean Williams and Amanda Hale, Biology department of Texas Christian University, in their efforts to determining fine scale sex biased spatial distribution patterns of this population as well examining the overall Texas Horned lizard genetic diversity in the Rolling Plains and across Texas. This is accomplished by opportunistically taking DNA samples from capture animals with a cloacal swab. During the 2011 season we started using a newly available smaller PIT tag allowing us to permanently mark a larger number of sub adult lizards, lowering our minimum taggable size from 60mm SVL(snout to vent length) to 50mm. While this has not increased our total capture number as of yet, it allows us to expand the size of our permanently marked group which provides more potential for positive id upon recapture. To date we have spent roughly 510 hours sampling roads resulting in close to 700 captures. Approximately 340 have been PIT tagged and 80 have been recaptured at least once. We postulate weather has a significant impact on population levels. While this season has appeared on the surface to have been more favorable than last year, we are still learning what the "norm" may be for *Phrynosoma* in the rolling plains. We can say that reproduction following last year's drought has been good. We have seen more hatchlings than our previous seasons here so far. We have also seen consistently higher numbers on the west side of the property since we started in 2010.

Home Range, Spatial Use, and Sex Determination of the Greater Roadrunner (*Geococcyx californianus*)

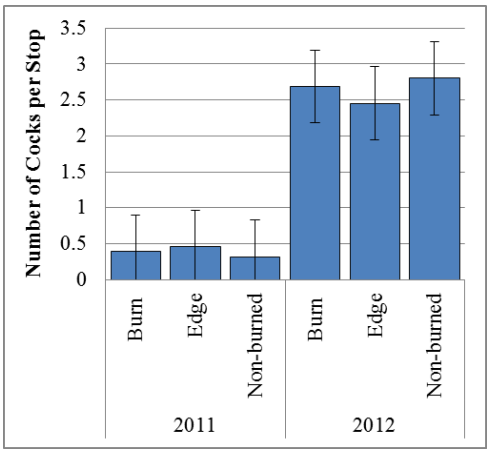
Andrea E. Montalvo[1], R. Dean Ransom[1], Roel Lopez[1,2]
[1] Department of Wildlife and Fisheries Management, Texas A&M University, College Station, TX
[2] Texas A&M Institute of Renewable Natural Resources

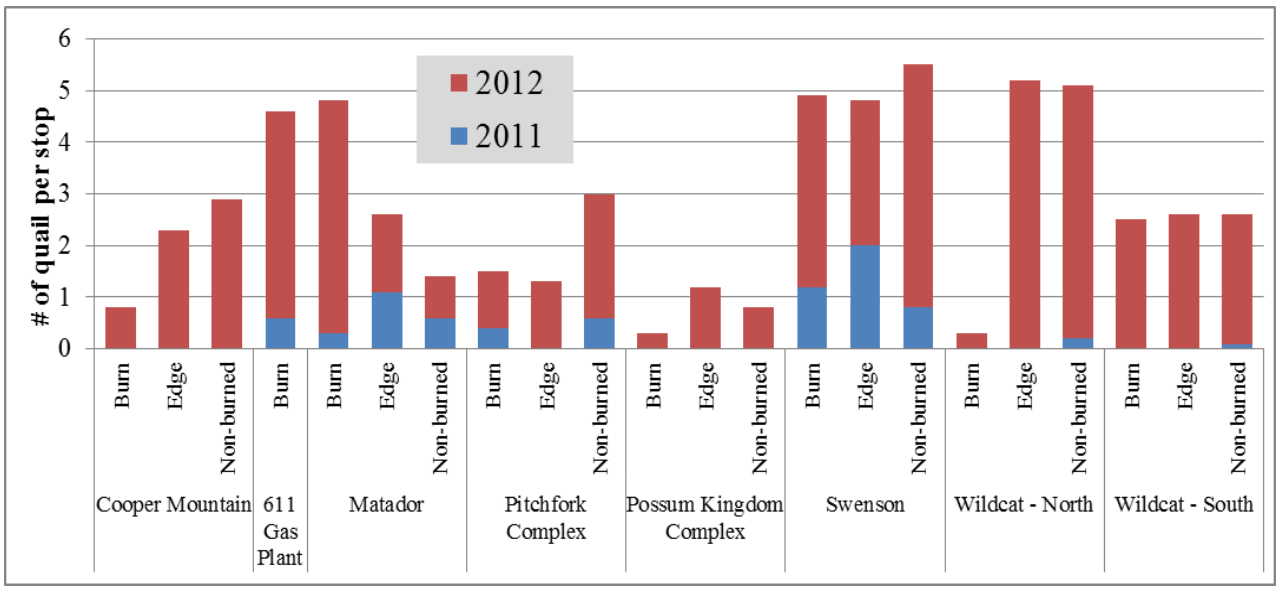
We conducted this study to better understand the greater roadrunner's (*Geococcyx californianus*) spatial use, and sexual morphometrics. Using a west Texas population, I trapped, measured them and removed feathers for sex confirmation through DNA PCR analysis. I fit the roadrunners with a radio transmitter and released them at the capture site. I captured a total of 10 birds and tracked them 2-4 times per week. My study found that in this region birds had a home range (43.01-ha), closer to previous non-telemetry studies, but maintained similar mean 50% core utilization distributions (11.88-ha) and overlap index (33.05 %). Habitat selection ratios showed a preference for ridge as well as grassland habitat and avoidance of bare ground and flatland habitats. My point-study considered both the immediate and distant characteristics of roadrunner habitat and found percent rock and litter the best parameter estimates in a predictive logistic regression model. Rock references both open area for hunting, transportation, as well as the preferred ridge habitat. Litter alludes to region below shrubs where mast was found and used by roadrunners for nesting substrate and thermoregulation. The sexing study consisted of the roadrunners from the west Texas site as well as museum specimens from across their range measured to develop a predictive logistic regression model. The strongest model consisted of bill depth and bill tip to the back of the head which were found to be larger in males. This model provides an easy, inexpensive, and field-relevant methodology for sex determination.

Monitoring Bobwhite Abundance Following Large-scale Wildfires

Rebekah Ruzicka and Dale Rollins, Texas AgriLife Research and Extension Center, San Angelo, Tx
Ken Cearley, Texas AgriLife Research and Extension Center, Amarillo, Tx

During the spring and summer of 2011 severe wildfires consumed over 405,000 ha of prime quail habitat in west Texas. We conducted call counts in 2011 and 2012 in adjacent burned and non-burned habitats in 8 different west Texas counties to gain a greater understanding of quail dynamics following a wildfire. We established transects of 11-16 km with listening stations every 1.5 km that ran perpendicular to the fire line and covered approximately an equal amount of burned and non-burned land. We counted the number of bobwhite calls heard at each listening station during a 5-min interval 3 times for each site from June through July of 2011 and May through June in 2012. The number of birds counted in 2012 was greater than in 2011. On average we heard 12 times more calls and counted 3 times more quail per listening station this year compared to last year. Call count numbers in 2011 were likely depressed at all the sites because of record drought and high temperatures observed during 2011. One year post burn there does not appear to be a difference in the number of quail counted or the number of calls heard between the burned, edge, and non-burned areas when all the sites are combined. However, this does not take into account the soil type or precipitation received at each site (both likely important factors in quail habitat recovery). Future analysis of these data will incorporate both factors to shed more light on the processes at work in recovery of quail after wildfire and severe drought. We will continue to conduct call counts for the following year (2013) as well.





Helminth Infections Across the Annual Breeding Cycle Of Bobwhites From Fisher County, Texas

Stacie M. Villarreal, Alan M. Fedynich, and Leonard A. Brennan, Texas A&M University Kingsville

Dale Rollins, Texas AgriLife Research and Extension Center, San Angelo, Tx

Assessments of parasites infecting bobwhites in Texas have not been conducted since the 1980s. Most of these studies have used bobwhites collected during the hunting season (Nov–Feb) and, as such, have sampled only "survivors" of the summer breeding season. The objectives of this study were to (1) assess the prevalence, intensity, and abundance of helminths in bobwhites from Fisher County, Texas during an annual cycle and (2) determine whether infections are related to season, host age, and host sex. Forty-five adult males, 23 adult females, 37 juvenile males, and 37 juvenile females were collected from 2 ranches in Fisher County, Texas during late winter 2010 (n = 37), summer 2010 (n = 51), and early winter 2010–2011 (n = 54) and examined for helminths. The cecal nematode *Aulonocephalus pennula* was most common (82% prevalence), followed by the eyeworm *Oxyspirura petrowi* (47%), *Tetrameres pattersoni* (26%), cystacanths (18%), cestodes (*Rhabdometra odiosa* and *Raillietina* sp., 9%), and *Dispharynx nasuta* (0.7%). Prevalence of *A. pennula*, *O. petrowi*, and *T. pattersoni* in adult bobwhites was significantly higher than in old juveniles and in young juveniles. Mean rank intensity was not significantly different for *O. petrowi* and *T. pattersoni* between adults, old juveniles, and young juveniles. However, mean rank intensity for *A. pennula* in adults and old juveniles was significantly different than young juveniles. Mean rank abundance for *A. pennula*, *O. petrowi*, and *T. pattersoni* was higher in adults than old juveniles or young juveniles. Prevalence of *A. pennula*, *O. petrowi*, and *T. pattersoni* was not significant between males and females. Mean rank intensity for *A. pennula*, *O. petrowi*, and *T. pattersoni* was not significant between host sex as well as mean rank abundance. Prevalence of *A. pennula*, *O. petrowi*, and *T. pattersoni* was significantly lower in summer than late winter and early winter. Mean rank intensity for *A. pennula* was higher in the late winter collection than the summer or early winter collection. Mean rank intensity for *A. pennula* varied by the season by sex interaction variable. However, mean rank intensity for *O. petrowi* and *T. pattersoni* was not significantly different. Mean rank abundance for *A. pennula* was significantly different among collection seasons and varied by the season by sex interaction. Mean rank abundance for *O. petrowi* and *T. pattersoni* by season was not significant. Young juveniles (6–10 weeks old) collected in the summer (August) have fewer helminth individuals and species than older juveniles (> 10 weeks old) and adults, whereas by the late winter period (February–March), helminth species richness, prevalence, intensity, and abundance in older juveniles more closely reflected that found in adults. Consequently, bobwhites collected during the hunting season may provide a snapshot of helminth species richness, prevalence, intensity of infection, and abundance in the bobwhite population. The implications of a high prevalence of cecal and eyeworms in this bobwhite population and their potential to exacerbate predation on bobwhites warrant further investigation.

Funding provided by Rolling Plains Quail Research Foundation.

Helminth Species*	Prevalence no. (%)		Mean intensity of infection	Range	Mean abundance	Total
Aulonocephalus pennula C,S,L	117	82%	134.3 ± 11.2	2 – 518	110.7 ± 10.2	15,716
Oxyspirura petrowi E	67	47%	5.6 ± 0.7	1 – 23	2.6 ± 0.4	373
Tetrameres pattersoni P	37	26%	2.9 ± 0.4	1 – 8	0.8 ± 0.1	108
Dispharynx nasuta P	1	0.7%	1	1 – 1	< 0.1 ± < 0.1	1
Acanthocephalan larvae N	26	18%	4.3 ± 1.7	1 – 43	0.8 ± 0.3	113
Cestodes S	13	9%	–	–	–	13†

*C = ceca, E = eye surface and nictitating membrane, L = large intestine, N = neck muscle, P = proventriculus, and S = small intestine.

†Cestodes were counted as present or absent and 1 per infected host.

Thanks to Graff Chevrolet of Grand Prairie for donating this 2010 Chevrolet pick-up truck. It really turns heads at the gas pump!

De novo genome assembly, annotation, and polymorphism analyses for the Northern Bobwhite

Yvette Halley[1], Eric K. Bhattarai[1], Scot E. Dowd[2], Dale Rollins[3], Paul M. Seabury[4], Christopher M. Seabury[1]

[1] Department of Veterinary Pathobiology, College of Veterinary Medicine, Texas A&M University, College Station, TX

[2]Molecular Research, Shallowater, TX

[3] Texas AgriLife Research & Extension Center, San Angelo, TX

[4] ElanTech Inc., Greenbelt, Maryland

Historically, Northern Bobwhite (*Colinus virginianus*) have ranged throughout the United States, Mexico, and parts of the Caribbean. However, over the past 30 years bobwhite populations have experienced a sharp decline across approximately 77% of their geographic range, leaving many biologists to ponder the precise origins for what has since been described as idiopathic decline. Importantly, previous studies indicate that bobwhite quail are actually superb experimental wildlife models for many avian species, and that bobwhites are well suited for a diverse range of toxicological studies. Unfortunately, for many organisms that have profound ecological significance, there is often a conspicuous lack of available genome-wide sequence and polymorphism data, which severely limits the implementation of genomic approaches for the purpose of addressing important biological questions in these species. For these reasons, we sequenced the bobwhite quail genome using the most cutting-edge technologies, thereby producing billions of sequencing reads derived from multiple sequencing libraries. Thereafter, we assembled the complete genome without a reference sequence (i.e. *de novo*; > 1.17 billion bases), thus eliminating significant bias created by using a reference-assisted approach, and performed detailed comparative genome analyses with several other avian species. The final bobwhite genome assembly comprises all nuclear chromosomes as well as a complete mitochondrion. Annotation analyses provide robust statistical support for the elucidation of ≥ 80% of the expected gene content. Further studies seeking to characterize genome-wide variation by sequencing additional individual bobwhites revealed evidence for ≥ 4Million naturally occurring genetic variants within a single bobwhite genome. Efforts are currently underway to create a comprehensive infrastructure which supports the implementation of whole genome approaches for testing hypotheses regarding idiopathic decline within and between bobwhite quail populations.

Funding provided by Rolling Plains Quail Research Foundation and Joe Crafton.

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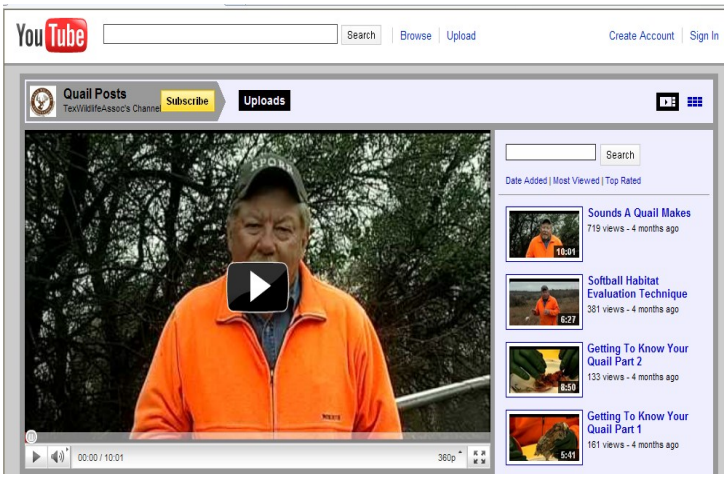
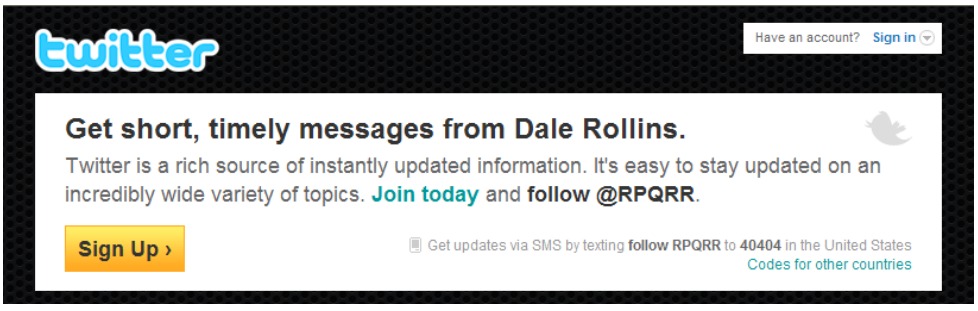
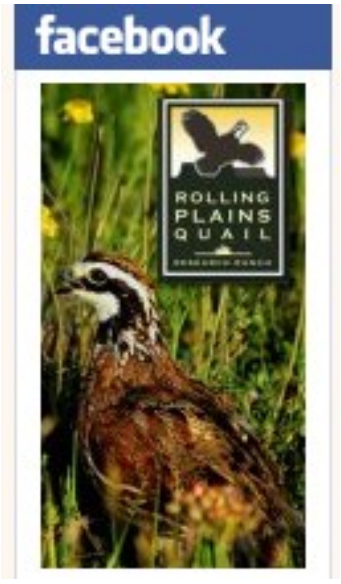


See our series of quail webisodes on YouTube.





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