ROLLING PLAINS QUAIL RESEARCH RANCH

6th Annual Field Day Abstracts

Friday, Sept. 27, 2013

Best Management Practices for

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

ROLLING PLAINS QUAIL RESEARCH RANCH
WWW.QUAILRESEARCH.ORG

Welcome Students of Quail!

"*Education is a lifelong process.*" - Anonymous

Li'l Annie, 1998-2013

We're glad you joined us for our 6th annual field day at the Rolling Plains Quail Research Ranch. This year's theme is "Best Management Practices for Quail." Hopefully you'll glean some ideas for how to improve your rangeland as quail habitat and increase your personal knowledge of quail and quail habitat.

This year's field day is dedicated to the memory of "Li'l Annie." For fifteen years she was a faithful and productive "student of quail." Without a doubt she was the best "dead bird" dog I've ever seen. During her prime I expected her to get two-thirds of the covey finds and most of the dead birds regardless of what other dogs were on the ground. She did her part to secure the funding that allowed for the procurement of RPQRR. For the last ten years, every time she delivered a bird to hand, I'd pat her on the head and say "gonna miss you someday baby." December 9, 2012 was that day. Good dogs die way too young. To her tribute, the "Annie Pasture" is typically our best quail pasture at RPQRR.

The weather has surely been better this year than the previous two, but it's still not the recovery we need or had hoped for. The Ranch looks pretty good, but our quail numbers are still suffering from the past two years (i.e., low breeding capital) and perhaps other factors [e.g., internal parasites]). The low numbers are disheartening for all of us, especially when we think we're doing all the "best management practices" for quail. Some of you have seen nice rebounds, so we rejoice with you in that. Hopefully the worm has turned.

The western portion of the Rolling Plains is on the verge of an oil and gas boom with development of the Cline Shale. Some speculation I've heard say the Cline could dwarf the Eagle Ford Shale play in south Texas—having driven through south Texas I don't see how that could be possible. The shale play will bring along both opportunities and concerns. We're likely to see more pumpjacks here at RPQRR (we've had 3 installed since last year). Just what the future holds, or how further development impacts our mission is yet to be resolved.

We always value your feedback, formally (via the evaluation for today's tour) or informally, so please share your ideas with me or one of the RPQRR staff. Enjoy your day, make some new friends, enhance your plant ID skills, and make progress towards becoming a better "Student of Quail." If you're not a "friend" on our Facebook page or subscriber to e-Quail Newsletter, I encourage you to sign up for both (see www.quailresearch.org) for details.

Dale Rollins

Executive Director

2013 Field Day Agenda

8:30 Registration & refreshments
CEU paperwork
Test your knowledge of key plants for quail (R. Linex and K. Mills)

9:00 Welcome and Introductory Comments – D. Rollins
2013 Year in Review – L. LaCoste
Bermudagrass renovation for bobwhites – D. Rollins

9:30 **Stop 1**
Brood patches for bobwhites – B. Koennecke
Cactus: a prickly paradigm for quail managers – D. Rollins
Sculpting prickly pear – B. Koennecke

10:15 **Stop 2**
Results of 3-year study on prickly pear control and collateral damage to shrubs and forbs – L. LaCoste
Cost considerations for prickly pear control – R. Porter
Shale & quail – considerations for a pending oil boom – P. Melton

11:00 **Stop 3**
Quail oases – D. Rollins & B. Koennecke
Ragweed seed dynamics – L. LaCoste
Carcass longevity study – B. Ruzicka

11:30 **Stop 4**
Guzzlers and water management – D. Rollins
Camera trapping in quail management - L. LaCoste
What is "useable space?" – D. Rollins
Play ball for bobwhites – the SHET model – D. Rollins
Enhancing useable space on former CRP contracts – B. Koennecke

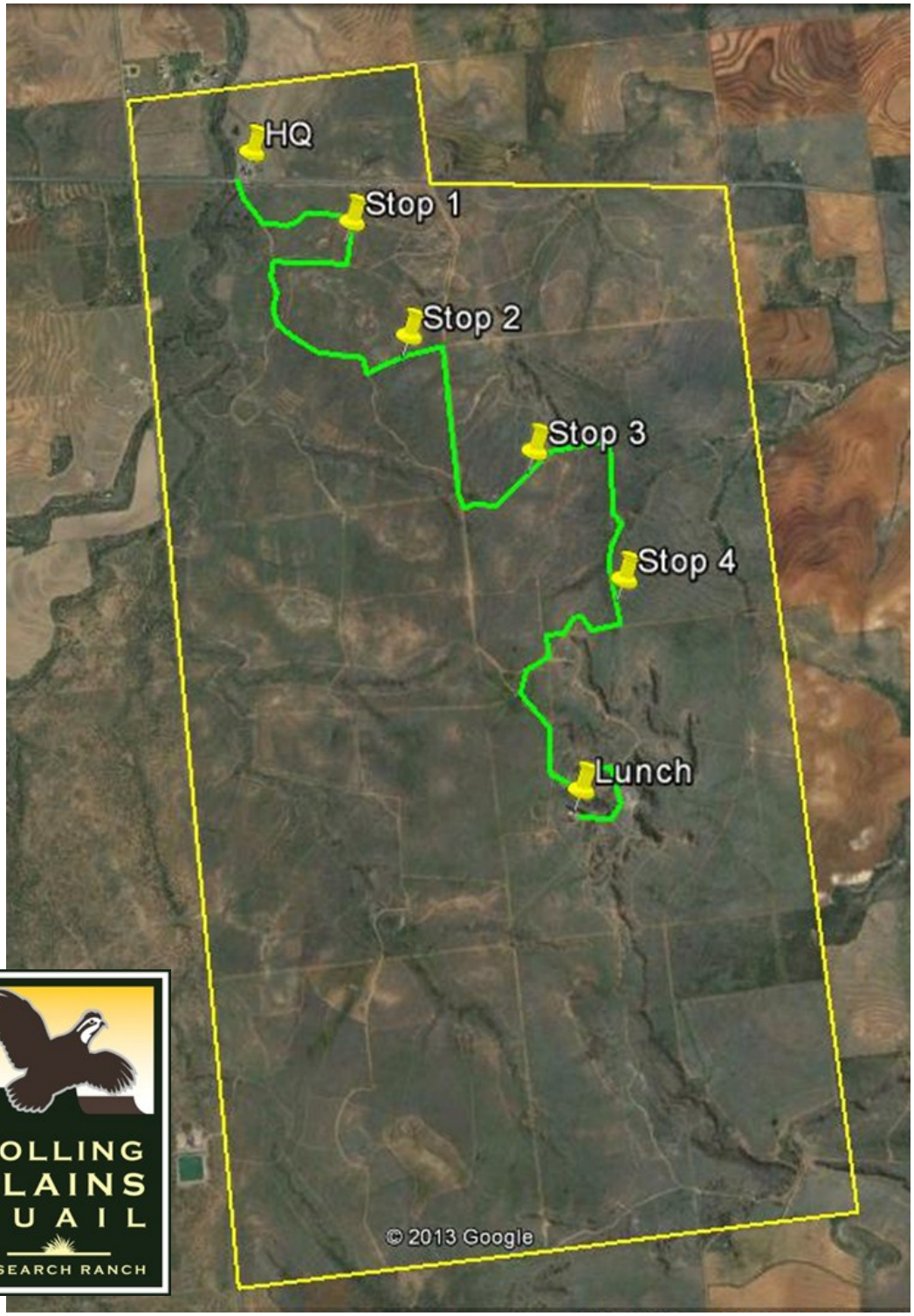
12:15 **LUNCH at Pavilion – Recognition of Sponsors**

1:00 **Research Updates**
Operation Idiopathic Decline – B. Ruzicka & C. Baxter
- Plans for "Phase III" – D. Rollins
Operation Transfusion – B. Kubecka & M. Downey
New funding initiatives for quail restoration – D. Rollins
Complete evaluation

2:15 Depart for HQ

2:30 Results of Plant ID contest – R. Linex
Distribution of CEU certificates – T. Roberts
Adjourn

Field Day Route - 2013



ROLLING PLAINS QUAIL RESEARCH RANCH

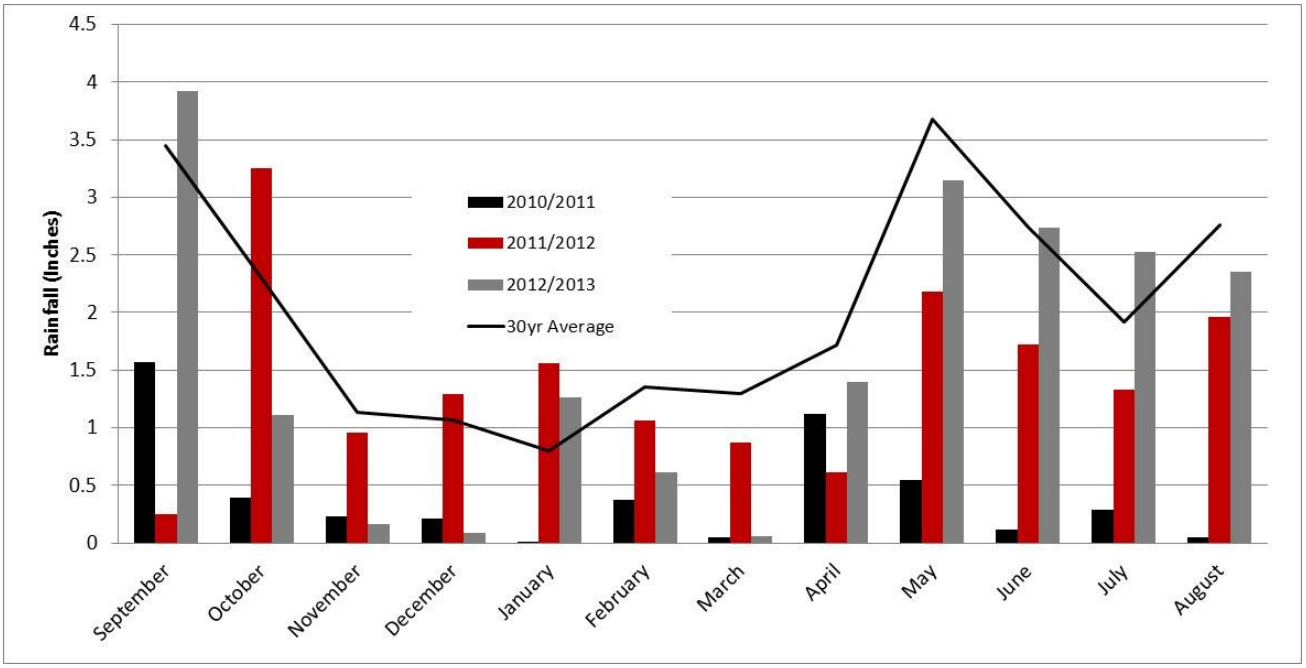
2013 Weather – The Year in Review

Lloyd LaCoste, RPQRR

When quail country experiences a cool wet spring and summer it is usually a prelude to good quail numbers in the fall. This summer at RPQRR we had half of that equation. Compared to the last two years temperatures were down a great deal. In 2011 we had 79 days where the temperature soared above 100 degrees Fahrenheit. During 2012 there were a total of 38 days above 100 degrees Fahrenheit, and in 2013 we had only 13 days in which the mercury topped the 100 degree Fahrenheit mark. While the temperatures were more cooperative this year we ended up a little below the 30-year average for rainfall. The 30-year average rainfall for Roby, Texas is 24.22 inches. From September 2012 through August 2013, RPQRR received a total of 19.38 inches of rain; which is 4.84 inches below normal. Timing of rainfall is at least as important as the amount of rainfall during the year. The months of April through August are the most important rainfall months in our area to promote quail reproduction. April and May of 2013 were below the 30-year average for those months. June and July were slightly above average, but the rains came in early June and late July. From June 18th through July 15th we received less than half an inch of rain. The conditions that looked so promising in early June quickly browned up and only partially recovered when the rains came again in mid July. August rainfall once again was below the 30-year average. During the year we received two small hail events in which there were no radio collared bird mortalities related to these events. Continued cooler weather with additional rainfall next breeding season would be greatly appreciated!

Days above 100 degrees F

	2011	2012	2013
April	0	1	0
May	7	6	2
June	22	9	5
July	21	6	1
August	28	12	4
September	1	4	1



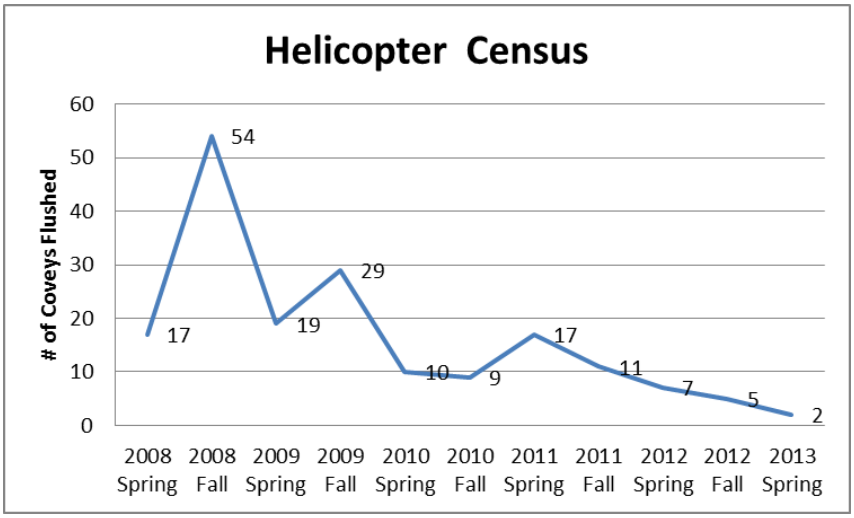
Monitoring quail abundance at RPQRR

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 over time; these efforts include helicopter surveys, call counts (spring and fall), mark-recapture (using leg-banded birds), radio telemetry, dummy nest survival, and fall road-side counts. We seek to determine which of these provides reliable estimates relative to the time and expense of conducting the counts.

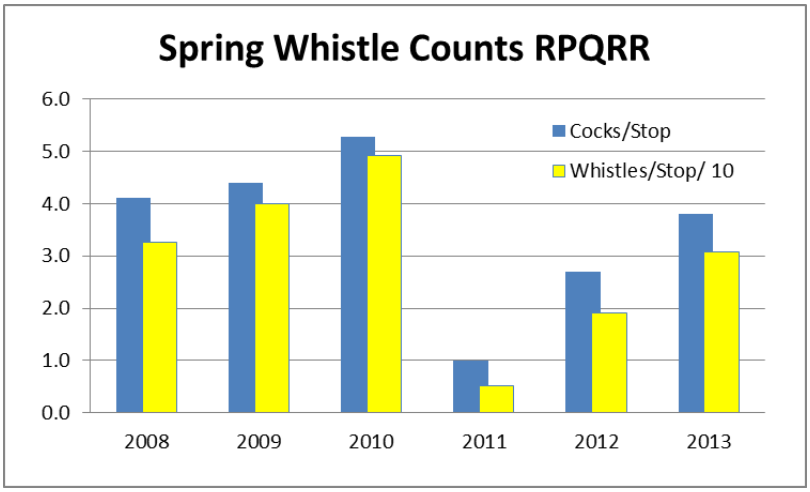
Helicopter Counts

Every year we conduct two helicopter surveys: one in the fall (Nov) and one in the spring (March). We fly the same transects with a total sampling effort of 52 miles. This year the spring survey (March 6, 2013), recorded a dismal 2 coveys and the fall 2012 count (Nov. 12) revealed only 5 coveys. The last 3 counts are the three lowest counts ever recorded at the RPQRR. We will be conducting the fall 2013 helicopter count this November and we hope to see an increase.



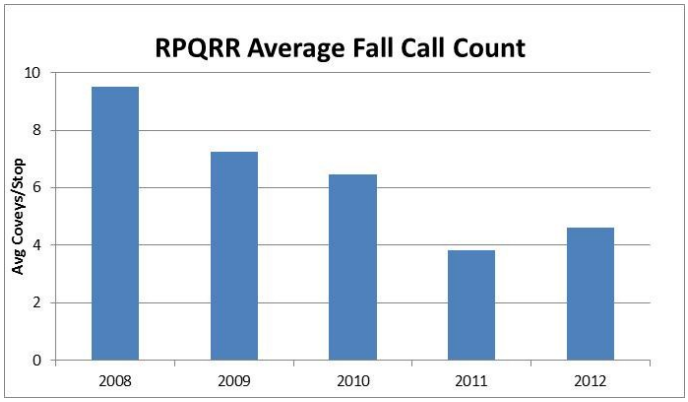
Spring Whistle Counts

Spring cock call counts or "call counts" can be used to index abundance of quail over time. Spring call counts are conducted at 25 "mile markers" that are spread 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 a week starting May 21, 2013 and continued until July 25, 2013. Looking at the call counts over time, it shows that the drought of 2011 had a large impact on number of whistles heard but numbers appear to be trending upwards over the last 2 years. This year we heard an average of 3.8 cocks per stop with an average of 30.8 whistles per stop.



Fall Covey Call Counts

In October we measure covey abundance by listening at dawn for "covey calls". Due to the small window of opportunity our researchers can only listen at one site per day so we listen at all of our odd numbered mile markers for a total of 2 counts and record number of different coveys heard. As this does not take place until October, the most recent data is from fall 2012. There is a general trend across the years that quail are declining at the RPQRR and in 2011 we hit an all time low with 3.8 coveys per stop. The 2012 data, like some of the other census techniques, shows a slight improvement to 4.6 coveys per stop. However, that is still just under half of our average in 2008 with 9.5 coveys per stop.



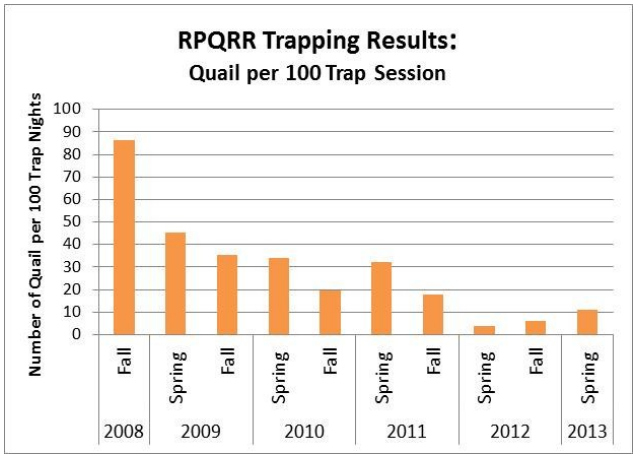
Roadside Counts

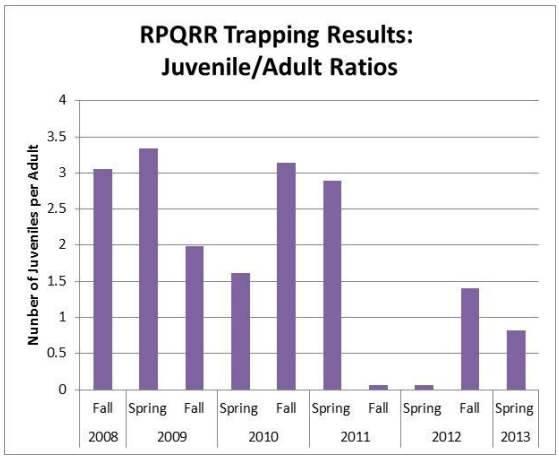
Roadside counts are easy to conduct—you simply drive a prescribed route during early-morning or late-afternoon hours and count the number of quail observed. We repeat our counts four times during September; two during morning hours and two during afternoon hours. The number of birds observed per mile 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.

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

At RPQRR 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.





Nesting Success

Radio-marked hens are followed throughout the spring and summer to document nesting attempts and success. On May 1 we had 27 radio-marked hens. Of those 55% attempted a nest—only 1 hen attempted a second nest. Out of a total of 16 attempted nests, 9 hatched. After 3 weeks post-hatch, we flush and count number of chicks in the brood, but only 3 of the 9 broods had chicks remaining with an average of 3 chicks per brood.

	% Hens Attempted Nest	% Hens Attempting 2nd Nest	Total Nests Attempted	# Hens Alive May 1
2009	41%	13%	43	79
2010	36%	4%	20	50
2011	14%	0%	10	73
2012	73%	27%	11	11
2013	55%	4%	16	27

Dummy Nests

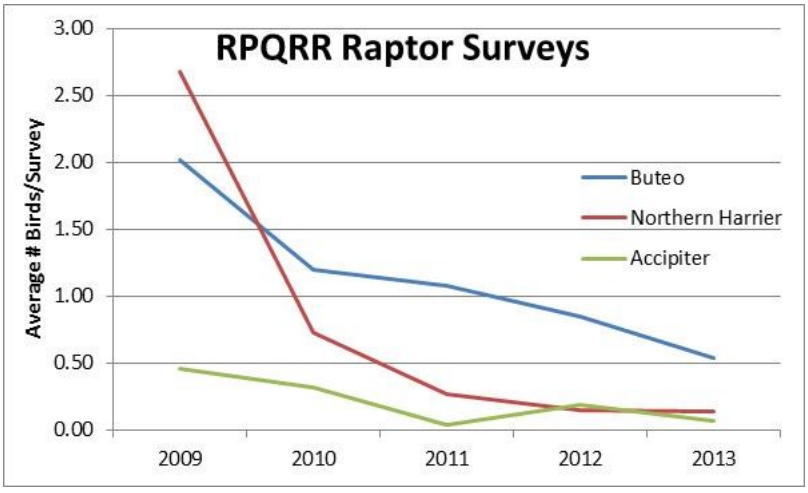
This summer was the sixth year for the "dummy nest" study. The project involves setting out 144 "dummy nests", which are constructed with 3 chicken eggs. These nests are made to resemble a quail nest in bunchgrass, prickly pear, and yucca. There were 12 transects of 6 nests in CRP areas, and 12 transects of 6 nests in rangeland areas. Each nest was placed 50 paces between each other along these transects. These nests were checked twice in a 4 week time period, and the nest survival was recorded. Fate of dummy nests tends to mimic hatch rate of actual nests quite well in both CRP and native range (Table 1).

Table 1. Fate of simulated bobwhite nests (at 28 days exposure) and actual nests in bunch grass (CRP) and native rangeland on the Rolling Plains Quail Research Ranch, Fisher County, Texas, 2008-2013. N = 72 simulated nests for each year in each habitat type.

	CRP				Rangeland			
	Simulated		Actual		Simulated		Actual	
Year	(%)	n	Hatched	(%)	(%)	n	Hatched	(%)
2008	77.8	6	4	66.7	80.6	21	12	57.1
2009	63.9	3	0	0	58.3	41	22	53.7
2010	63.6	3	1	33.3	86.5	18	8	44.4
2011	43.9	1	0	0	70.7	10	4	40.0
2012	53.5	3	2	66.7	80	8	6	75
2013	28.2	4	4	100	36.1	12	5	41.7
Mean	55.2	3.3	1.8	54.5	66.4	18.3	9.5	51.9

Raptor Surveys

Raptors can be an important predator of quail. We conduct weekly surveys along two, 10-mile routes on the RPQRR to record each raptor's location, species and activity (perching, soaring). The chart below shows total number of raptors observed from January 1 through December 31 for each year. Every year the number of raptors seems to be declining following the decline of both small mammals and quail. These data suggest that while prey abundance is low in this area, raptors may be moving to other areas in search of prey.



Shrub seedling survival

In 2010, we installed over 200 spreader dams in areas on the ranch where precipitation is lost to runoff. These dams function to slow runoff and create quail habitat. During a volunteer day on March 1st 2012, over 900 4-winged saltbush and aromatic sumac seedlings were transplanted into the spreader dams in an effort to "jump start" these "quail oases." Survival of the shrubs was measured in May 2013. Due to insufficient rainfall the summer of 2012, the survival rates of these seedlings were not great. The overall survival rate was 52%. On average there were four saltbushes to each sumac and typically no sumacs in weed barriers. Survival in weed barrier vs. non-weed barrier was only data from 4 wing saltbush. The percent survival of seedlings planted inside weed barriers (79%) was greater than those planted without the weed barrier (58%). Survival of sumac on the ranch was 28%, while the survival of 4- winged saltbush was 60%.

Bermudagrass Renovation for Bobwhites

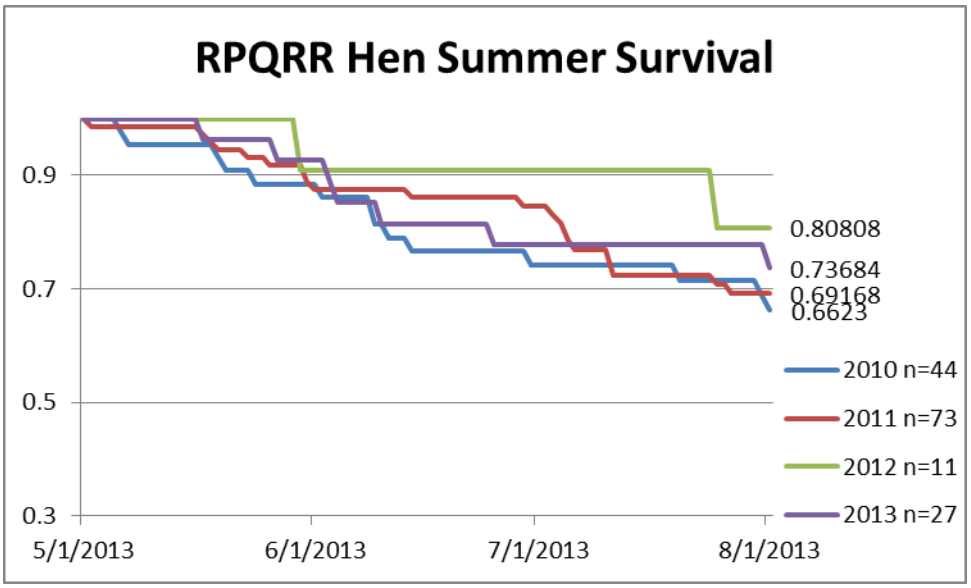
Dale Rollins and Larry A. Redmon, Texas A&M Agrilife Extension Service

Bermudagrass enjoys a Dr. Jeckyll-Mr. Hyde relationship among Texas landowners—praised as a tame pasture forage for cattle, but basically worthless for bobwhites. One of our objectives here at RPQRR is to convert a 47-acre bermudagrass field to native warm season grasses to enhance the pasture as quail habitat. Since 2007, we've disced, sprayed with glyphosate (twice) and tried planting milo. But the bermudagrass is winning. For 2014 we seek to get more aggressive. We have a proposal pending with Texas Parks & Wildlife to evaluate various strategies to facilitate such conversions. Our plans call for evaluating six treatments of various herbicides (rates and timing) followed by reseeding of grasses like little bluestem, sideoats grama, plains bristlegrass and desirable forbs. Treatments will include:

1) 5 quarts/acre glyphosate – spring
2) 5 quarts/acre glyphosate – fall
3) 5 - 6 pints/acre Arsenal
4) 5 quarts/acre glyphosate – spring + 5 - 6 pints Arsenal – fall.
5) 12 oz Plateau – fall
6) Control

Survival

We use radio-marked bobwhites for several aspects of our research. These objectives include monitoring survival rates, determining cause-specific mortality, documenting movements and spatial use of habitat, and nesting ecology. We radio collar males during our fall-trapping effort and females during our spring trapping effort. We defined the summer survival period as May 1 through August 1 (93 days). For the past 4 years summer survival of hens has ranged from 0.66 to 0.81 survival with the most recent year (2013) being estimated at 0.73 survival.



Small Mammal Abundance

We used Sherman Traps in a grid of 5x5 per location, with 5 locations per habitat type, and 8 habitat types for a total of 4 nights. Altogether we record a total of 4,000 trap nights in January and the same in July. We estimate the relative diversity of rodents in areas is to use for future data to test if there is a correlation between rodent trends and bobwhite trends. Hispid Cotton Rat, Northern Pygmy Mouse, and Fulvous Harvest Mouse have declined dramatically, while Hispid Pocket Mouse numbers have continued to increase. This trapping season showed the highest numbers of hispid pocket mice caught to date. Since we started trapping in 2008 the numbers of captured specimens have decreased. Trapping this past summer suggests a slight increase in numbers.

STOP 1

Brood patches for bobwhites

Cactus: a prickly paradigm for quail managers

Sculpting prickly pear

STOP 2

Results of 3-year study on prickly pear control and collateral damage to shrubs and forbs

Cost considerations for prickly pear control

Shale & quail – considerations for a pending oil boom

Assessment of Non-Target Brush Mortality and Forb Response from Prickly Pear Herbicides

Barrett Koennecke, Rolling Plains Quail Research Ranch

Herbicides are frequently used for management of prickly pear. Aerial spraying, typically from a helicopter, is the most efficient method of herbicide application. However, such broadcast applications can be harmful to non-target, "quail friendly" species of forbs and shrubs. The objective of our study was to determine the mortality, or "collateral damage", of desirable shrubs and forbs following treatments of frequently used herbicides for prickly pear reduction. In 2010, we used four herbicides each applied in burned and unburned areas at 2 intensity levels for a total of 16 different treatments. We monitored mortality rates of desirable shrubs and occurrence of forbs within each treatment as well as in a control (non-treated) area adjacent to the treatment areas. We also recorded the density of prickly pear within the treatments and control for three years post treatment. The drought likely had a large impact on this study as was evidenced by the high rate of mortality (~35%) amongst tasajillo, wolfberry, and hackberry in the control areas. Summarized to the right is the relative susceptibility of shrubs in this study exposed to prickly pear herbicides. The effects of the different herbicide treatments on mortality are still pending.

"Quail Friendly" Shrub Species	Herbicide Susceptibility
Ephedra	Low
Catclaw Acacia	Low
Catclaw Mimosa	Low
Littleleaf Sumac	Low
Algerita	Moderate
Lotebush	Moderate
Hackberry	High
Wolfberry	High
Tasajillo	Very High

Herbicide	Cost	Application	$ per Acre
Tordon	$66.50/Gallon	2 pts/Acre	$16.63
		1 pt/Acre	$8.31
Surmount	$55.50/Gallon	4 pts/Acre	$27.75
		2 pts/Acre	$13.88
GrazonNext HL	$44.00/Gallon	1.5 pt/Acre	$8.25
		2.6 pts/Acre	$11.55
Chapparral	$90.00/pound	3.3oz/Acre	$18.56
Chapparal + 2,4D Ester	$27.66/Gallon	3.3oz/Acre (Chapparal) +1 lb/Acre (2,4D Ester)	$23.17

*The GrazonNext formulation has been changed since the plots were put out. You can no longer buy the GrazonNext that was used in the study. The formulation was changed to GrazonNext HL (High Load) which means lower use rates.

STOP 3

Quail oases

Ragweed seed dynamics

Carcass longevity study

Water Harvesting 101 for Creating Quail Oases

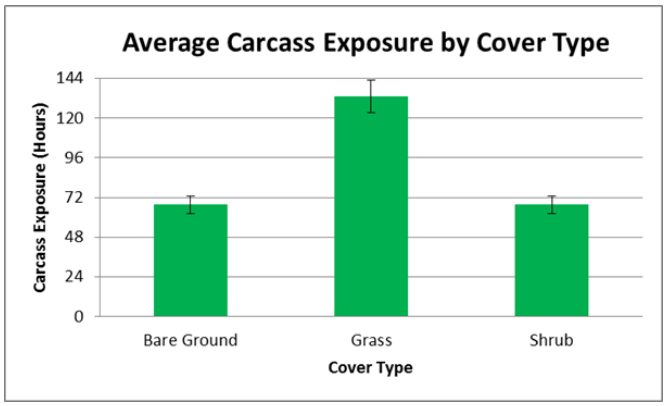
Dale Rollins, RPQRR

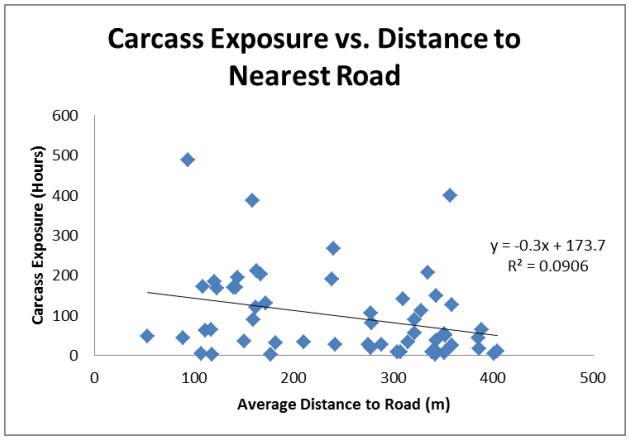
The climate of west Texas is sometimes characterized as "continuous drought interrupted by periodic flooding." Much of our annual rainfall comes in intense thunderstorms which results in much water being lost via runoff, accompanied by attendant erosion. The late Sherman Hammond of Ft. Stockton influenced 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 establishment of various forbs (e.g., American basketflower, Illinois bundleflower). Natural succession occurs nicely on these sites as evidenced by annual sunflowers. The drier the resulting landscape is the more the quail oases "shine."

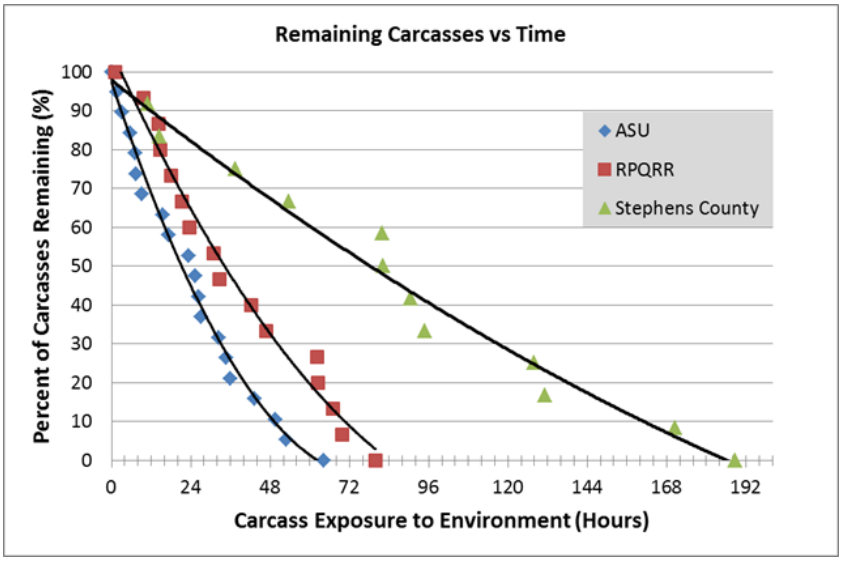
Factors affecting scavenging and quail carcass persistence rates in the Rolling Plains of Texas

Rebekah Ruzicka, Michelle Downey, 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 and precipitation), season (summer, fall, winter), carcass distance from road, relative predator abundance, and cover type (grass, shrub, bare ground/basal forb). Carcasses were placed in the field at similar densities across three sites and attached to a timing device that recorded the exact minute that the carcass is removed. Currently, only 4 carcasses have survived longer than 10 days (N=93) and approximately one-third of carcasses were scavenged within 24 hours. The average exposure length of carcasses is 89 hours or 3.7 days. Carcasses placed in grass have a longer exposure rate when compared with carcasses placed under shrubs or on bare ground. Also, contradictory to our hypothesis average distance to road does not seem to have a strong effect on exposure time.



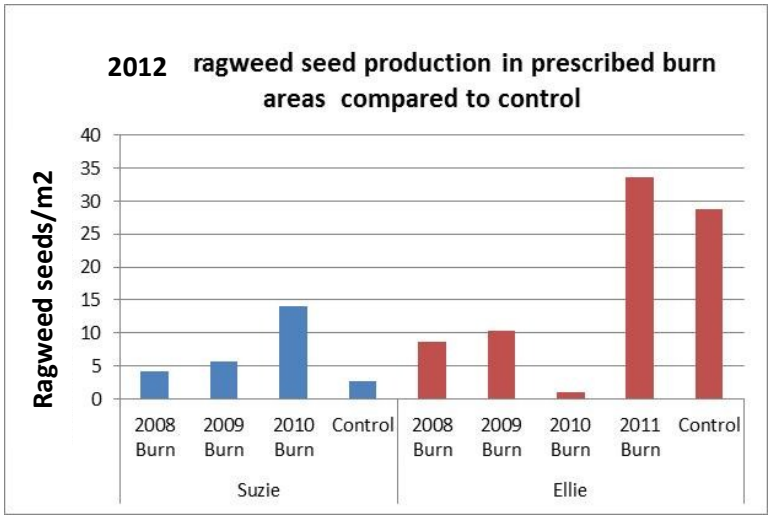


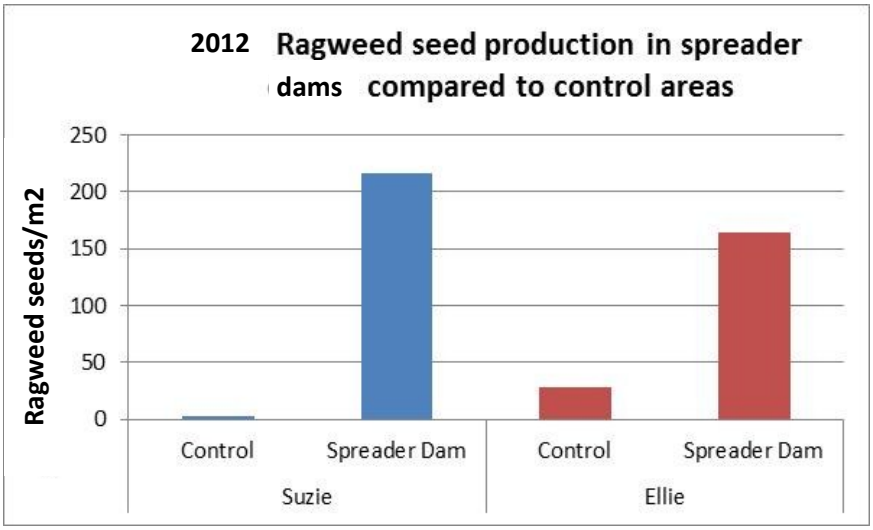


Ragweed Seed Dynamics

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 production of western ragweed at RPQRR to determine whether dormant-season burning stimulates seed production, as it can do for other plant species. We sampled western ragweed plants every November starting in 2009 through 2012 using a stratified random design on two rangeland sites burned in March, and from two adjacent unburned control areas. We discovered that there was a great deal of variability between the treatments in the two pastures. We also compared ragweed seed production in our spreader dams /"quail oases" versus the control areas. In the Ellie pasture the spreader dams produced five times more ragweed seeds than the control area in Ellie. In the Suzie pasture the spreader dams produced 72 times more ragweed seeds compared to the control area in Suzie. Spreader dams appeared to be good producers of ragweed plants that contained a large number of seeds per plant.





STOP 4

Guzzlers and water management

Camera trapping in quail management

What is "useable space?"

Play ball for bobwhites – the SHET model

Enhancing useable space on former CRP contracts

What is "Useable Space?"

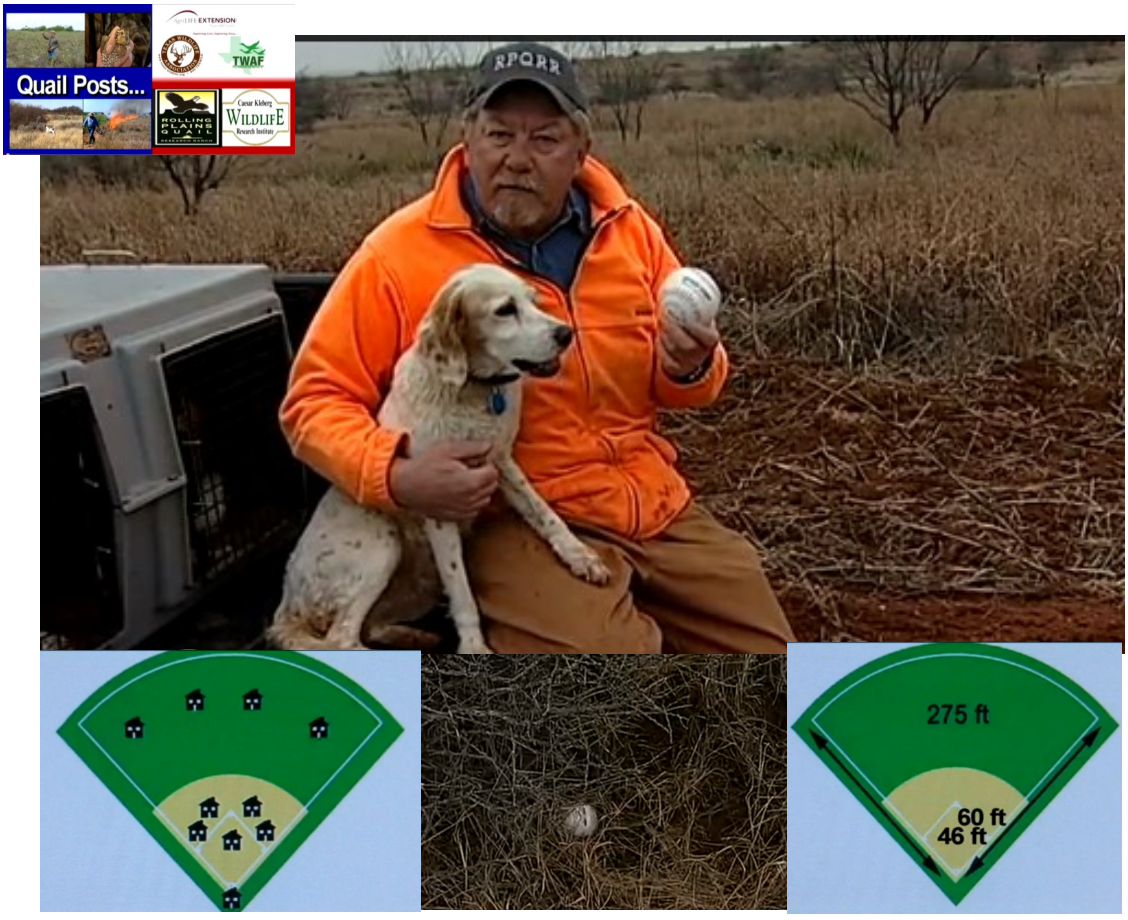
Dale Rollins, Rolling Plains Quail Research Ranch

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.

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, 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.



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Perkins Honored for Outstanding Thesis

Becki Perkins, who did her research at RPQRR, received the Texas Tech University Outstanding Thesis Award for her thesis "*Anti-predatory Behavior of Northern Bobwhite in the Rolling Plains of Texas*". This is a substantial accomplishment, as only one award is given every other year in the life sciences at TTU; thus, the thesis was in competition with all life science theses submitted for consideration from the last two years. I'm very proud of Becki and her accomplishments, which would not have been possible without the support of the RPQRR. Thank you, and please feel free to share the information with you staff, and use as a promotion among your Board and supporters to show the good work done on the ranch. – **Dr. Clint Boal, Texas Tech University**

Operation Idiopathic Decline:
Central Sample Receiving, Processing and Distribution Laboratory

Steven M. Presley, Galen P. Austin, Kristyn N. Urban, and Anna G. Gibson, The Institute of Environmental and Human Health, Texas Tech University, Lubbock, TX

Operation Idiopathic Decline is a research consortium focused on determining if disease-causing organisms and toxicants are involved in the decline of northern bobwhite populations in the Rolling Plains of Texas and Oklahoma. The Central Sample Receiving, Processing and Distribution Laboratory is responsible for collecting and providing samples, specimens and data to collaborating research laboratories for further pathogen and toxicant analyses. Samples and tissues from northern bobwhite, and potential arthropod vectors of pathogens (i.e., mosquitoes and ticks) are collected from 35 different locations throughout the Rolling Plains regions of northern Texas and western Oklahoma. Field trapping efforts during August and October 2012 resulted in collecting and sampling 647 birds. Of the bobwhite sampled during 2012, 42% were females and 35% were adults. Overall there were 9% more bobwhite sampled during 2012 when compared to 2011 trapping success. Additionally, 23% more birds were sampled during August 2013 when compared to August 2012, and 69% more than in August 2011. A total of 160 bobwhite were necropsied during 2012, of which 53% were females, 26% were adults, and 19.4% were found to be infested with the wild bird eyeworm *Oxyspirura petrowi*. The average bodyweight for all bobwhite that were necropsied during 2012 was 152.6 g. A total of 8,459 bobwhite samples and tissue specimens were collected and processed during 2012, including lungs and trachea, intestines, feathers, crop, blood, tracheal and cloacal swabs, fecal pellets, heads, legs, breast, liver, brain, and heart. Trapping and support teams logged a total of 20,388 miles and approximately 5,070 man-hours during 2012 field efforts.

We gratefully acknowledge the Rolling Plains Quail Research Foundation for their funding of this research through Operation Idiopathic Decline.

Table. Summary of overall bobwhite trapping results during 2012, with comparative data for August 2013, 2012 and 2011 trapping results.

Study site region	2012 Trapping summary				Comparison of total birds		
	Total	Females	Adults	Average Bodyweight	August 2013	August 2012	August 2011
Northwest Oklahoma	84	46%	22%	154.98 g	69	25	38
Southwest Oklahoma	65	41%	25%	151.36 g	30	37	60
North Rolling Plains Texas	53	31%	78%	161.36 g	53	24	45
Central Rolling Plains Texas	50	47%	44%	159.06 g	65	18	2
South Rolling Plains Texas	357	44%	21%	145.02 g	124	174	65
Permian Basin Texas	38	41%	18%	129.05 g	13	10	NA
Totals/Averages	**647**	**41.7%**	**34.7%**	**150.14 g**	**354**	**288**	**210**

Operation Idiopathic Decline
Survey of Organochlorine Pesticides in Quail from the Rolling Plains

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

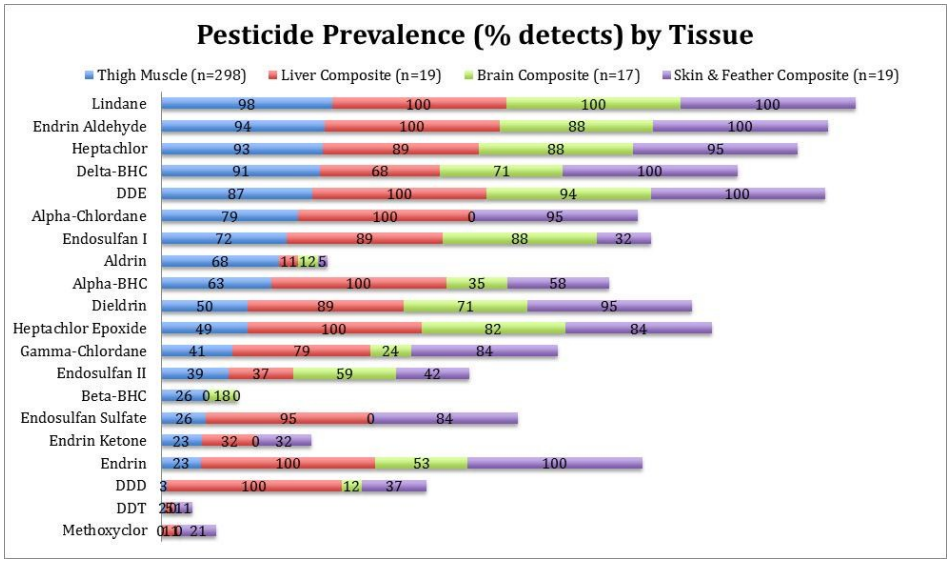
Organochlorine pesticides (OCs) are some of the most notorious and persistent contaminants to be introduced to the environment. Aside from an assessment of toxic risks, OC surveys are useful as an indicator of an animal's diet and the ability of its particular habitat to trap and distribute lipophilic contaminants. Quail are of particular interest for an OC survey because they are birds (a common candidate for toxicity studies) and there is a lack of information on OC contamination in game birds and ground birds in general. In this study, thigh muscles from 298 birds (159 birds from 2012 trapping efforts and 139 birds from 2013) were tested for 20 OC pesticides. In addition, small composites of livers, brains, and skin and feathers (from thighs) were also examined. Most amounts were below reporting limits (around 10 ng/g) and therefore suggest that any potential effects to quail are related to secondary mechanisms (i.e. immune suppression, endocrine disruption) rather than direct OC toxicity. Future analysis of the data includes factoring in sex, age, species, and location. A cursory examination of habitat soil, insects, and vegetation for OCs will also be performed in order to evaluate likely routes of exposure.

Examination of the different patterns of pesticide prevalence in each tissue indicates differential storage/metabolism mechanisms, such as postmortem conversion of DDT and DDE into DDD in the liver. Additionally, the possible use of skin and feathers as a sink for OCs may be considered. It is impressive to note that some of the most troublesome OCs, DDE for example, are found in almost all samples. This indicates that DDT has deteriorated in the environment and/or that the quail (like many birds) have a preferential metabolic mechanism for converting DDT to DDE. The abundance of lindane is also interesting, as it may be coming from past and recent use as an insecticide for livestock.

Highest Found Pesticide Levels with Example Toxicities

Pesticide	Level Causing Toxicity (Endpoint)	Highest Level Found in RP Quail
Lindane	>2,000 ppm (LD_{50})	11 ppb
DDE	9 ppm (Death)	7.0 ppb
Endrin Aldehyde	1.2 ppm (LD_{50})	11 ppb
Endosulfan Sulfate	31.2 ppm (LD_{50})	11 ppb
Heptachlor	8 ppm (Death)	8.1 ppb
Dieldrin	4 ppm (Death)	6.8 ppb
Gamma-Chlordane	14.1 ppm (LD_{50})	6.9 ppb

Funding provided by Rolling Plains Quail Research Foundation



Operation Idiopathic Decline
Parasitological Survey of Scaled Quail Collected from the Rolling Plains

Kelsey Bedford and Alan M. Fedynich, Texas A and M University - Kingsville
Dale Rollins, RPQRR

The scaled quail (*Callipepla squamata*) is an important game species with both economic and cultural significance throughout the state of Texas. However, its population has been in decline since the 1980s. The role of parasites and diseases in scaled quail population decline needs to be considered. Little study has been done on the impact of parasites on scaled quail in any part of its range and even less parasite research has been conducted in the Rolling Plains ecoregion. The objectives of this study are to (1) determine prevalence, abundance, and intensity of helminth parasites in scaled quail from the Rolling Plains and Permian Basin and to document the pathological response of infected tissues; (2) correlate helminth parasite prevalence, abundance, intensity to host age, host sex, body weight, and estimates of scaled quail population density; and (3) compare helminth parasite prevalence, abundance, and intensity of hunter collected scaled quail of the Rolling Plains and Permian Basin to South Texas hunter-collected scaled quail; and (4) create a database of helminth community ecology. Time and sample size permitting, we will correlate helminth parasite prevalence, abundance, and intensity to host diet. Samples were collected under an intensive quail study in the Rolling Plains and Permian Basin in 2012 and 2013. This study will assess the possible correlation between parasites and the scaled quail population decline.

Funding provided by Rolling Plains Quail Research Foundation

Photo: Becky Ruzicka

Operation Idiopathic Decline:
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]

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

Highlights of Findings:

Coccidial infection rates (at ~50% or higher) indicate that coccidiosis was a potential problem.
Cryptosporidial infections were not (or unlikely) a concern in quail.
Microsporidial infections were unlikely a concern, as they were mostly insect parasites taken by quail.
Blood parasites or other pathogens were not a major concern in wild quail.
Cecal worm might be a concern in some quails and some seasons when they were heavily loaded by the parasite (e.g., in one batch of samples had an average of ~200 worms per bird).

PCR detection of three major types of protozoan parasites

We have performed nested PCR to detect parasite-specific 18S rRNA genes for coccidial, cryptosporidial, and microsporidial pathogens. The recently and previously acquired data are summarized together in the following Table 1.

Among apicomplexans, it is clear that coccidial infection rates were high at ~50% in both fecal and gut samples. In general, positive rates are higher in gut samples than in feces, which is likely due to the fact that infections, particularly chronic infections in guts may not always result in the release of large amounts of parasite oocysts in feces. The high positive rate of coccidia is suggestive that coccidiosis is a potential concern in quail.

However, crytosporidial infections were **not** detectable in all samples. Extensive re-testing and molecular sequencing indicated that positive PCR products were all derived from certain gregarinal species. Therefore, cryptosporidial infections were not or unlikely a concern in the northwest of Texas. Microsporidial infection rates were also high. However, molecular sequencing indicated that all sequences belonged to insect microsporidia species. The data indicate that the detected microsporidia are not native to birds, but from insects that simply taken by birds. Although more samples may need to be sequenced to be more representative, the current data indicate that microsporidia were unlikely a major concern in wild quail. Using Chi-square test on samples with defined sex and age information, we observed no statistically significant differences in infection rates between different sexes and ages for coccidial and microsporidial infections (Tables 2 and 3).

Table 1. Infection rates of quail specimens collected in between Fall 2010 and Spring 2013

Sample Collection Time	Sample Type	Positive rate		
		Crypto*	Coccidia**	Microsporidia
2010 Fall/2011 Spring	Feces	ND	>40%**	TBD
2011 Sum/2011 Fall	Feces	ND	43.3%	TBD
2012 (Sum/Fall)	Feces	ND	>40%**	36.8%
2012 (Sum/Fall)	Intestine	ND	55.9%	85.3%
2013 Spring	Feces	ND	43.1%	27.3%

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

Molecular sequencing and genotyping

In our first batch of cloning and sequencing experiments with fecal samples, we have obtained 10 sequences for coccidia and microsporidia at ~690 bp in length. All 6 coccidial sequences are identified as *Eimeria* species, which confirms their identity as coccidia. All four microsporidial sequences were identified to be closely related to *Liebermannia* species that were known to infect grasshoppers or other insects, suggesting that the majority of the microsporidia in feces identified by PCR were insect-origin, rather than true parasites in quail. We are in a process to clone and sequence more samples, and will perform more comprehensive sequence analysis and phylogenetic reconstructions for better understanding of the intestinal parasites in quail.

Parasites in blood

We have examined all blood smears collected in 2011 (> 100 slides) and observed no apparent pathogens or unusual hematology. We have also examined 200 slides (out of >400 slides) collected in 2012, and again, observed no apparent pathogens, except for a few samples showing some increased neutrophil granulocytes. Therefore, we conclude that blood parasites (and blood infections by other bacterial or fungal infections) are unlikely a major concern in quail.

Table 2. Comparison of infection rates between male and female birds with gut samples *

Type of Sample	No. Sample	No. of Positive Samples (and % rate)	
		Coccidia	Microsporidia
Female	41	23 (56.1%)	36 (87.8%)
Male	51	31 (60.8%)	43 (84.3%)
Total	92	54 (58.7%)	79 (85.9)

* *p*-values > 0.05 in Chi-square tests for both parasites

Table 3. Comparison of infections rates between adult and juvenile birds with gut samples *

Type of Sample	No. Sample	No. of Positive Samples (and % rate)	
		Coccidia	Microsporidia
Adult	**16**	11 (68.8%)	15 (93.7%)
Juvenile	**83**	45 (54.2%)	69 (83.1%)
Total	**99**	56 (56.6%)	84 (84.9%)

* *p*-values > 0.05 in Chi-square tests for all three parasites

Funding provided by Rolling Plains Quail Research Foundation

Operation Idiopathic Decline

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

The northern bobwhite quail (*Colinus virginianus*) is a species that has both ecological and economic importance. A microbiological enigma concerning quail health is the presence and extent of antimicrobial resistance in quail populations. Although wild quail have rare contact with antimicrobial agents, acquisition via water and food contaminated by antimicrobial resistant bacteria of human or farmed quail birds is likely. To investigate this microbiological enigma, we have determined the antimicrobial susceptibility of opportunistic pathogenic bacteria isolated from wild bobwhites, including *Escherichia coli* and *Pseudomonas aeruginosa* as well as commensal bacteria, *Neisseria* species. The results show that 100% of *Escherichia coli* strains (*n*=16) were resistant to Clindamycin, Erythromycin, Neomycin, Penicillin, and Sulphadimethoxine. Twenty-five % and 75% of *E. coli* strains showed resistance to Florfenicol and Sulphatiazole, respectively. *Pseudomonas aeruginosa* strains (n=8) were resistant to 13 of the 18 antimicrobial agents tested, including Amoxicillin, Ceftiofur, Clindamycin, Clindamycin, Enrofloxacin, Enrofloxacin, Enrofloxacin, Erythromycin, Florfenicol, Novobiocin, Oxytetracycline, Penicillin, Spectinomycin, Streptomycin, Sulphadimethoxine, Sulphatiazole, Tetracycline, and Trimethoprim/Sulpha. All *Neisseria* isolates (n=6) exhibited resistance to Clindamycin and Erythromycin; 80% *Neisseria* isolates were resistant to Penicillin; and 40% were intermediately susceptible to Spectinomycin. In summary, high-level resistance to multiple commonly used antibiotics was detected in both opportunistic and commensal quail bacteria. These findings highlight the need of further investigation on the source of antimicrobial resistance encountered in the wild populations.

This photo was taken at one of the Texas South Team ranches spring 2013. Notice the band on the hen; she was captured in either 2011 or 2012 as part of Operation Idiopathic Decline.

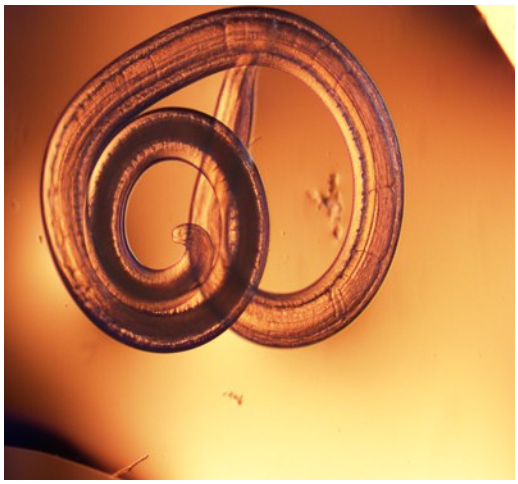
Funding provided by Rolling Plains Quail Research Foundation

Operation Idiopathic Decline

The Impact of Eyeworms on Northern Bobwhite Foraging and Flying Efficiency

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

Northern bobwhite (*Colinus virginianus*) populations have been experiencing a dramatic decline throughout North America, which has been long associated with habitat loss, fragmentation and rainfall patterns. However, with optimal habitat and environmental conditions, dramatic fluctuations in quail population still exist. Minimal data has been reported on host-parasite interactions and their ability to regulate host populations and more specifically if eyeworms (*Oxyspirura petrowi*) negatively impact bobwhite survival. As a part of "Operation Idiopathic Decline", northern bobwhites sampled from West Texas had substantial eyeworm infection. In contrast, northern bobwhites sampled from South Texas showed almost no evidence of eyeworms. Because of the lack of data on the impact eyeworms have on northern bobwhite survival, a pilot experiment was conducted to determine if eyeworms could be removed from wild-captive northern bobwhite quail and transferred into pen-raised northern bobwhite quail in order to understand if eyeworms negatively impact vision. Live eyeworms were removed from quail, and immediately after removal, were transferred into the eyes of pen-raised birds at varying degrees of infection. During the pilot we observed eyeworms evading forceps, moving from eye to eye, and noticed that eyeworms grew within the new host's eye. With the success of our pilot experiment, submission of our large-scale foraging and flight efficiency study has been approved by the animal care and use committee, which will commence this fall. The large-scale study will test northern bobwhites navigation ability and their ability to find and secure food while infected with eyeworms at different levels of infection. In addition to infecting northern bobwhites, we have also been collecting eyeworms from the Operation Idiopathic Decline trapping initiative as well as other approved trapping sites in an attempt to document the infection rates and work out our methodologies. Currently, we are placing eyeworms in various media in order to keep them alive for extended periods of time which will allow us to document their lifecycle and/or raise eyeworms from eggs *in vitro*.



Funding provided by Rolling Plains Quail Research Foundation

Operation Idiopathic Decline
Survey of Organochlorine Pesticides in Quail from the Rolling Plains

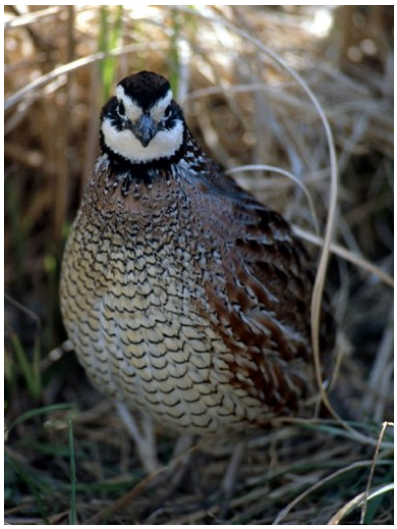
Sara Pappas and Ronald J. Kendall, Ph.D., The Institute of Environmental and Human Health, Texas Tech University

A factor being considered in the decline of Northern Bobwhite (*Colinus virginianus*) and Scaled Quail (*Callipepla squamata*) populations throughout the Rolling Plains is heavy metal contamination. To test this hypothesis, field sampling activities during 2011 captured 157 birds (152 bobwhites, 2 scaled, 3 unknown). During 2012, 144 birds were caught (107 bobwhites, 35 scaled, 2 unknown).

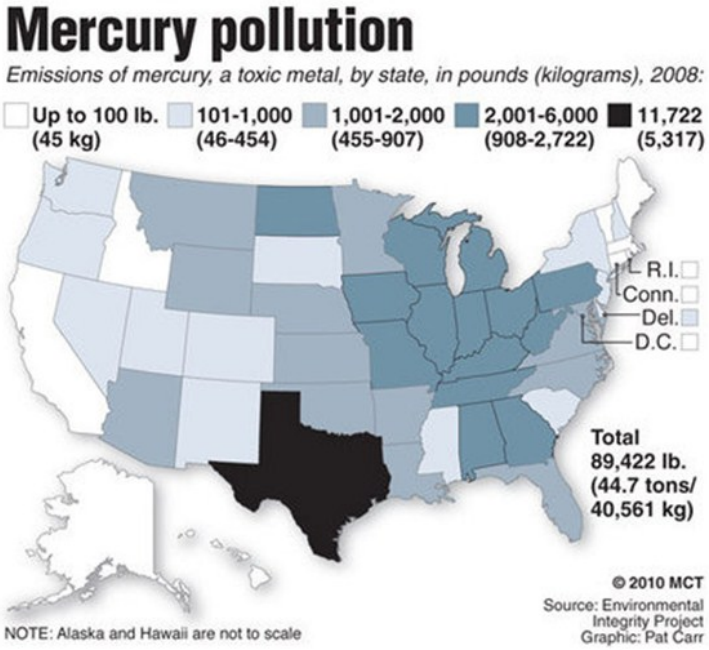
	2011			2012		
Breast Muscle Samples (Hg)	Total #	Above Avg	%	Total #	Above Avg	%
	156	29	18.6	144	0	0.0
	Min (ppm)	Max (ppm)	Avg (ppm)	Min (ppm)	Max (ppm)	Avg (ppm)
	0.0024	0.0824	0.0119	N/A	N/A	N/A
Liver Samples (Hg)	Total #	Above Avg	%	Total #	Above Avg	%
	49	23	46.9	144	3	2.1
	Min (ppm)	Max (ppm)	Avg (ppm)	Min (ppm)	Max (ppm)	Avg (ppm)
	0.0026	0.0252	0.0121	0.050	0.052	0.051
Femur Samples (Pb)	Total #	Above Avg	%	Total #	Above Avg	%
	157	9	5.7	140	9	6.4
	Min (ppm)	Max (ppm)	Avg (ppm)	Min (ppm)	Max (ppm)	Avg (ppm)
	0.0641	151	39.2	0.784	137	41.0

Past research has determined many of the detrimental effects caused by these common heavy metals. Organic mercury compounds, like methylmercury (MeHg), are easily absorbed and biomagnify quickly. MeHg crosses the blood brain barrier easily, leading to nervous system damage and behavioral changes like brain lesions, spinal cord dysfunction, abnormal locomotion and flight, decreased food intake, and uncoordinated muscles. Once ingested, lead is readily dissolved by the digestive system and is absorbed directly into the blood where it causes hyperproteinemia, erythrolysis, and enzyme inhibition. Lead bonds to metallothioneins in the liver and kidneys. It can also deposit in bone by replacing calcium; females are especially susceptible, due to the depletion of calcium during egg production.

These effects may not cause direct mortality, but may result in indirect effects that make can make wildlife more vulnerable to predation. They may also cause quail to be more susceptible to parasites due to immunosuppression.



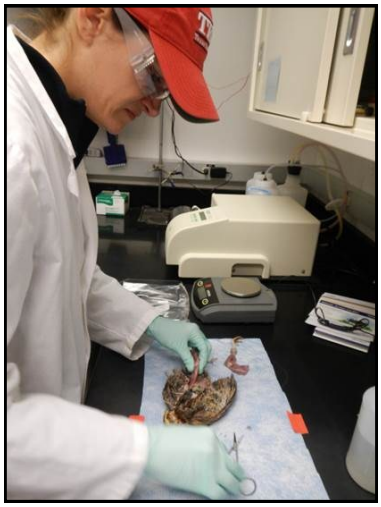
Funding provided by Rolling Plains Quail Research Foundation



Operation Idiopathic Decline:
Prevalence of Arboviral, Infectious and Zoonotic Pathogens

Steven M. Presley, Kristyn N. Urban, Sadia Almas, and Anna G. Gibson, The Institute of Environmental and Human Health, Texas Tech University

To support the overall goals of the Operation Idiopathic Decline research program we utilize blood and other tissue samples from northern bobwhite populations occurring across the Rolling Plains of Texas and Oklahoma to screen for infection with specific infectious and zoonotic pathogens. We focus on two primary objectives: (1) Determine the incidence and prevalence of specific pathogenic microorganisms in populations of northern bobwhite populations; (2) Determine the extent and influence of arthropod vectors and other potential host species on the prevalence of disease. A total 8,459 samples were collected from bobwhites during August and October 2012, and 3,913 samples were screened for pathogens specific to this project. Bobwhite brain tissue samples (n=142) and mosquito specimens (n=1,642) were screened for general *Flavivirus* (e.g. WNV, SLE) using reverse transcriptase polymerase chain reaction assay (RT-PCR) and all were determined to be negative. Brain tissue was also screened for Western equine encephalitis virus (WEEV: *Alphavirus*) using polymerase chain reaction (PCR), with all samples determined to be negative. Cloacal swabs (n=429) were screened for *Coxiella burnetti* and *Pasturella multocida* using bacterial DNA published primers and PCR. All samples were determined to be negative for both *C. burnetti* and *P. multocida*. Crop and crop content samples (n=71) are currently being utilized for elements of the *Oxyspirura petrowi* lifecycle work; specifically for PCR detection of nematode and arthropod genetic material, which is reported separately. One pool of mosquitoes (*Culex erythrothorax*) collected in October 2012 from a Permian Basin location screened positive for *Flavivirus*, but was determined negative for WNV.



We gratefully acknowledge the Rolling Plains Quail Research Foundation for their funding of this research through Operation Idiopathic Decline.

Table. Pathogens, sample type and assay methods for infectious/zoonotic disease survey of bobwhite quail.

Specific pathogen	Tissue/samples	Assay	Results
Flavivirus (general)	Brain, mosquitoes	RT-PCR	Positive mosquitoes
West Nile virus (*Flavivirus*)	Brain, mosquitoes	RT-PCR	All samples negative
St. Louis encephalitis virus (*Flavivirus*)	Brain, mosquitoes	RT-PCR	All samples negative
Western equine encephalitis virus (*Alphavirus*)	Brain, mosquitoes	RT-PCR	All samples negative
Quail pox virus (*Avipoxvirus*)	Lesions (skin, pulmonary), tracheal swabs	Gross examination, qPCR	No lesions detected All samples negative
Q fever (*Coxiella burnetii*)	Cloacal swabs, serum, ticks	nested PCR	All samples negative
Fowl cholera (*Pasturella multocida*)	Cloacal swabs	PCR	All samples negative

Operation Idiopathic Decline: Determining Lifecycle and Transmission Dynamics of *Oxyspirura petrowi* in Rolling Plains Northern Bobwhite Quail

Steven M. Presley and Sadia Almas, The Institute of Environmental and Human Health, Texas Tech University

Limited published information is available regarding the lifecycle, transmission dynamics and intermediate hosts of *Oxyspirura petrowi,* a common nematode eyeworm of wild birds. Primarily a parasite of ground feeding birds, *O. petrowi* infests the orbital area of the eye, but does not penetrate into the globe. *Oxyspirura petrowi* was first reported in North America in 1937 occurring in ruffed grouse, prairie chicken, sharp-tailed grouse, eastern robin, and eastern meadowlark, and has been reported to be the most common parasite of quail and prairie chickens in western Texas. Most published information for the species is based upon the chicken eyeworm *O. mansoni*, for which the Surinam cockroach (*Pycnoscelus surinamensis*) is the intermediate host. Various arthropods such as bibionid fly larva, grasshoppers and cockroaches have been suggested as intermediate hosts for *O. petrowi*. To identify the intermediate host(s) of *O. petrowi* in northern Texas, and better understand its transmission dynamics, we screened approximately 100 insects for *O. petrowi* DNA using polymerase chain reaction (PCR) techniques. We detected *O. petrowi* DNA in 38% (13/34) of wood cockroaches tested, in 27% (3/11) of field crickets, and in 31% (15/49) of grasshopper species tested. Our findings are new to the scientific community, as there are no published reports of *O. petrowi* occurring in grasshoppers. Additionally, we screened bobwhite fecal pellets using PCR techniques to develop a method for a less invasive method of determining infestation with *O. petrowi*. A total of 80 fecal pellets (from 80 different birds) were screened for *O. petrowi* DNA, resulting in 74% (59/80) being positive.

We gratefully acknowledge the Rolling Plains Quail Research Foundation for their funding of this research through Operation Idiopathic Decline.

Table. Arthropods collected from ranchland in North Texas during August and October 2012 and screened for the presence of *O. petrowi*.

Arthropod species screened	Positive for *Oxyspirura* spp.	Positive for *Oxyspirura petrowi*
Wood cockroach (*Parcoblatta* spp.)	38% (13/34)	38% (13/34)
Field cricket (*Gryllus texensis*)	27% (3/11)	27% (3/11)
Redlegged grasshopper (*Melanoplus femurrubrum*)	37% (10/27)	33% (9/27)
Differential grasshopper (*Melanoplus differentials*)	27% (4/15)	27% (4/15)
Snakeweed grasshopper (*Hesperotettix viridis*)	100% (1/1)	100% (1/1)
Ponderous spur-throated grasshopper (*Melanoplus ponderosus*)	17% (1/6)	17% (1/6)

***Note** – An additional four other arthropod specimens were collected and screened but were not found to contain Oxyspirura spp. genetic material.*

Operation Idiopathic Decline:
Virus surveillance in wild bobwhite quail in the rolling plains of Texas, USA

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

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

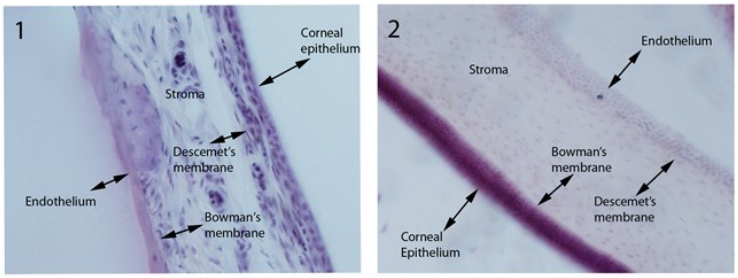
Bobwhite quail populations have decreased significantly in the past few years throughout the rolling plains of Texas and Oklahoma, and the cause of this drop is thus far unknown. This study is part of a large-scale cooperative effort to determine the role of infectious diseases in the population decline. 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 565 tracheal swab samples (136 year 1, 429 year 2), 576 cloacal swab samples (141 year 1, 435 year 2), 548 blood samples (FTA cards; 133 year 1, 415 year 2) were collected from wild captured or hunter–harvested bobwhite quail from November 2011 to April 2012 (year 1) and August and October 2012 (year 2) at 19 ranches across 18 counties in Northwest Texas as part of the cooperative study. In total, 6 tracheal swab samples tested positive, 36 were suspicious, and 25 cloacal swabs tested suspicious for avian influenza virus (AIV) by real-time RT-PCR (rRT-PCR). . Thirty tracheal samples tested were suspect for Newcastle disease virus (NDV) by rRT-PCR. No viruses were isolated by inoculation of embryonated chicken eggs from any of the AIV or NDV samples tested. No tracheal swabs and 18 cloacal swabs were positive (n=10) or suspicious (n=8) 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. Of the 548 FTA blood samples tested for reticuloendotheliosis virus (REV) by duplex real-time PCR, one positive sample was detected, however since the sample was collected on FTA cards virus isolation was not possible. Results obtained to this point indicate possible exposure to avian adenovirus (quail bronchitis, QBV), avian paramyxovirus 1 (APMV-1/ NDV), and avian influenza (AIV). Although no viruses were isolated, these results indicate the presence of specific nucleic acid associated with the virus (positive and suspicious RT-PCR/PCR results). The significance of these results, particularly in relation to the population decline, remains to be determined.

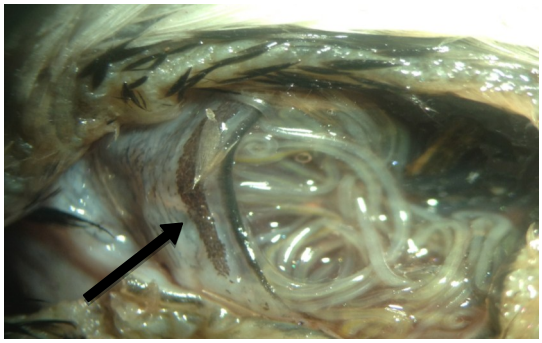
		Positive (Ct<35)	Suspicious (Ct 35.1-39.9)	Negative (Ct>40)	Total
Newcastle disease virus (NDV)					
Cloacal swab	Year 1	0	0	141	576
	Year 2	0	0	435	
	Total	**0**	**0**	**576**	
Tracheal swab	Year 1	0	0	136	565
	Year 2	0	13	416	
	Total	**0**	**13**	**552**	
Avian influenza virus (AIV)					
Cloacal swab	Year 1	0	20	121	576
	Year 2	0	5	430	
	Total	**0**	**25**	**551**	
Tracheal swab	Year 1	6	34	96	565
	Year 2	0	2	427	
	Total	**6**	**36**	**523**	
Avian adenovirus (AvAd)					
Cloacal swab	Year 1	9	3	129	576
	Year 2	1	5	429	
	Total	**10**	**8**	**558**	
Tracheal swab	Year 1	0	0	136	565
	Year 2	0	0	429	
	Total	**0**	**0**	**565**	
Reticuloendotheliosis virus (REV)					
Blood (FTA)	Year 1	0	0	133	548
	Year 2	1	0	414	
	Total	**1**	**0**	**547**	

Operation Idiopathic Decline
Parasitic Infections of Northern Bobwhites Across the Rolling Plains

Andrea Bruno and Alan M. Fedynich, Texas A&M University-Kingsville
Dale Rollins, RPQRR

Factors regulating bobwhite populations across Texas are under intense analyses. Seldom do researchers consider parasites and diseases as a potential cause of decline. As a result, an intensive parasite and disease study began in 2011 to examine the possible link with the bobwhite population decline in the Rolling Plains, a region of Texas where quail are economically and ecologically significant. A total of 199 bobwhites was collected for helminth survey during 2011–2013 through trapping (n=97) and hunter donations (n=102). In trapped birds, eye and cecal tissue were taken from bobwhites to assess potential damage from parasitic infections. Additionally, live bobwhites were surveyed for *Trichomonas gallinae*, a protozoan causing disease in columbids. All 381 samples tested negative for *T. gallinae*. The helminth survey revealed eleven species of helminths, representing 25,788 individuals. The most commonly occurring (prevalent) species were intestinal worm *Aulonocephalus pennula*, eyeworm *Oxyspirura petrowi*, and proventricular worm *Tetrameres pattersoni*. Statistically, prevalence of all three species was significantly greater in adults than in juveniles (P=<0.001, P=0.005, P=0.002). Prevalence of *A. pennula* and *O. petrowi* were not significantly different by sex (P=0.22, P=0.09) and *T. pattersoni* prevalence was greater in males than females (P=0.041). Preliminary pathology indicated that eyes collected from an infected bobwhite displayed interstitial (stromal) keratitis and corneal scarring. This disorder is known to cause visual impairment. More eye and cecal tissue samples will be processed this coming year to further assess damage caused by parasites. The present study will provide current information on bobwhite parasites and diseases across the Rolling Plains ecoregion as well as provide data on pathological responses to helminth infection.





Descriptive statistics helminths from 199 northern bobwhites collected from August-January 2011-2013 in the Rolling Plains ecoregion of Texas and western Oklahoma.

Helminth Species	Prevalence n (%)	Abundance Range	Abundance ± SE	Total
Aulonocephalus pennula **S,L,C**	169 (85)	1–1,162	120.3 ± 11.1	23933
Oxyspirura petrowi **E**	34 (33)	1–67	6.6 ± 0.9	1310
Tetrameres pattersoni **P**	42 (21)	1–11	0.7 ± 0.1	134
Acanthocephalan **N**	23 (12)	1–60	1.0 ± 0.4	208
Physaloptera sp. **BM**	9 (9)	1–25	0.5 ± 0.2	102
Gongylonema phasianella **CR**	7 (13)	1–5	1.6 ± 0.3	21
Cheliospirura spinosa **G**	20 (10)	1–10	2.9 ± 0.6	57
Dispharynx nasuta **P**	2 (2)	1–6	2.7 ± 1.7	8
Cestode **S**	3 (2)	1	1.0 ± 0.0	3
Mediorhynchus sp. **S**	1 (1)	1	1.0 ± 0.0	1
Eucoleus contortus **CR**	1 (1)	1	1.0 ± 0.0	1

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

Funding provided by Rolling Plains Quail Research Foundation

Operation Idiopathic Decline:
A Scalar Approach to Northern Bobwhite Abundance

Markus J. Peterson[1], Kelly Reyna[2], Brian L. Pierce[3], John M. Tomeček[1]
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[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 period fluctuations in weather. This is known to impact nesting success and recruitment directly and indirectly. With regard to the focus of Operation Idiopathic Decline (OID) on the factors contributing to the decline of the species in this range, it is essential to fully understand the multiple scales at which environmental variation impacts Northern Bobwhite. Our research focuses on the intersection of environmental variables as they affect quail species at micro and macro scales. We seek to know if temperature, relative humidity, and precipitation are experienced differently at two scales: ranch and region. On the ranch-scale, across 12 OID cooperator ranches, we correlate estimates of quail abundance with the above environmental variables collected by the use of iButtons™, as well as measured vegetation and soil data. ibuttons™ are deployed on cooperator ranches at varying heights off the ground to record. Regionally, we correlate abundance data obtained from TPWD annual counts with climatic data obtained by NOAA and the PRISM Climate Study Group at Oregon State University to determine relationships existing in those data. Ultimately, we seek to understand the significance of the differences in values obtained at those scales and how they may inform future management decisions. With this understanding, we hope in the future to coordinate with other OID efforts to elucidate relationships between the epidemiological and parasitological factors impacting Northern Bobwhite decline.

Funding provided by Rolling Plains Quail Research Foundation

Operation Transfusion: Translocating Wild-trapped Bobwhites to Recently Depopulated Range in the Rolling Plains

Michelle Downey, Dale Rollins, and Fidel Hernandez- Rolling Plains Quails Research Ranch and Texas A&M- Kingsville

Operation transfusion aims to examine the success of translocating wild-trapped northern bobwhites (*Colinus virginianius)* to an area of the Rolling Plains of Texas experiencing lower than average bob-white densities. Bobwhites (*n*=300 per year) will be relocated to a 2000 ha ranch in Shackleford County prior to the breeding season for 3 consecutive years (2013−2015). The Control site, located 25km south of the Release site, is of similar size and management as the Release site, however the Control will not receive any translocated quail. Relative abundance and occupancy estimates will be based on spring whistle counts, fall covey call counts, and semi-annual helicopter surveys. Surveys will occur at both sites (a) prior to translocation, (b) throughout translocation years, and (c) the year following the last translocation. Indices of relative abundance will be compared among years and between the Release and Control site. Of the 202 wild bobwhites translocated to the Release site in 2013, 95 were radio-collared females that were monitored daily thereafter. As of September 11, 2013, we have recorded 28 females alive, 56 mortalities, 7 missing, and 4 collar failures. Half of the mortalities were identified as raptor kills (50%, *n*=28), 27% (*n*=15) were identified as mammal kills and 23% (n=23) died from unknown causes. A total of 72 nests have been initiated with 24 being renests. Nest success stands at 40.0% (n=28), which yielded a minimum of 277 hatched eggs. This study will continue to translocate wild bobwhites through 2015 and monitor population trends into 2016. Results from this study will give insight into whether translocation may be a viable method for restoring bobwhite populations.

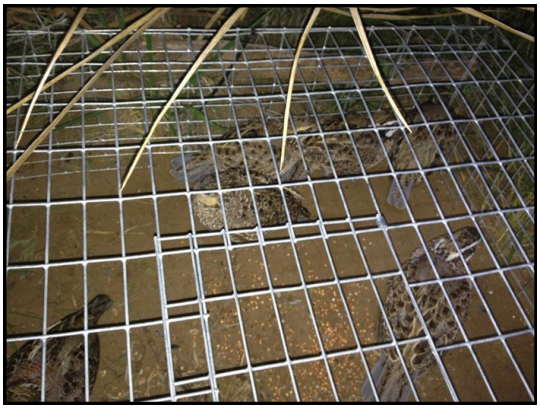
Table 1. Nesting substrate selected by translocated northern bobwhites and observed fate (%) of 69 nests.

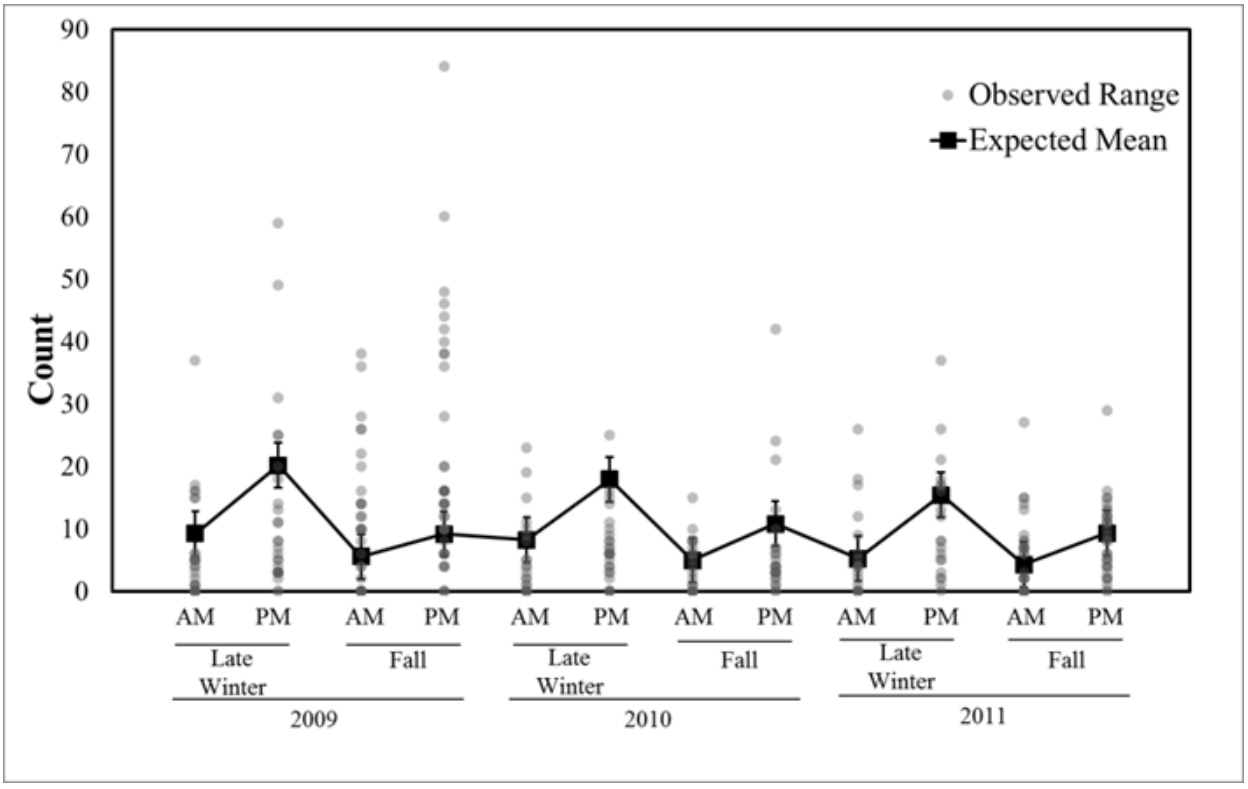
Nest Substrate	Total Nests (%)	Hatched Nests (%)
Prickly Pear	63.8	64.3
Bunchgrass	23.2	25.0
Shrub	4.3	7.1
Green Briar	2.9	0.0
Yucca	1.4	0.0
Tasajillo	1.4	3.6
Non-plant	2.9	0.0

Factors Affecting Trapping Success of Northern Bobwhites in the Rolling Plains of Texas

Becky Ruzicka, Dale Rollins, and Lloyd Lacoste, RPQRR
David Wester, Texas A & M University - Kingsville

Trapping for northern bobwhites (*Colinus virginianus*) is commonly conducted for research purposes, and trapping success can vary greatly. We investigated the influence of weather, lunar phase, time of day, and season on bobwhite trapping success on the Rolling Plains Quail Research Ranch from 2009-2011. Bobwhites are trapped in the fall (Oct-Nov) and late-winter (Feb-Mar) using walk-in funnel traps baited with milo every year at RPQRR. We used a negative binomial regression to examine effects of temperature, humidity, wind speed, precipitation, lunar phase, time of day, season, the number of traps set, and year trend. We found that on average more bobwhites were trapped during the late-winter, in the evenings, and when temperatures were cooler. There was also some evidence for an effect of lunar phase on the number of bobwhites captured with higher counts during the new moon and third quarter.

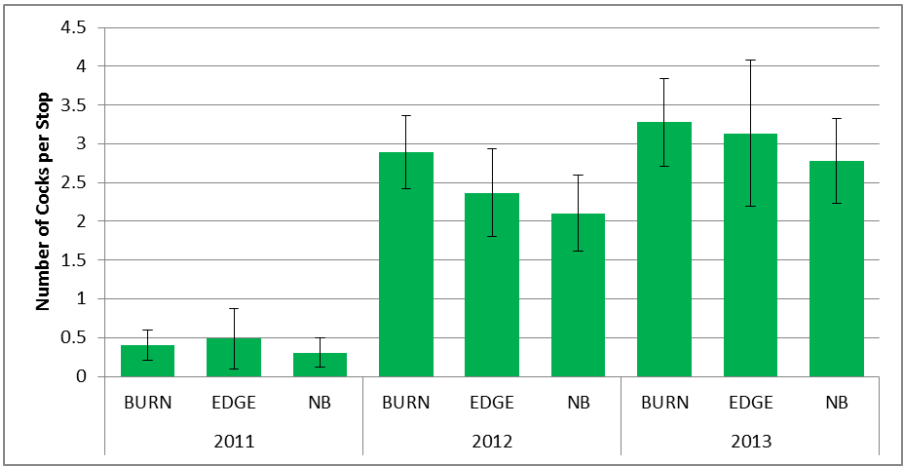


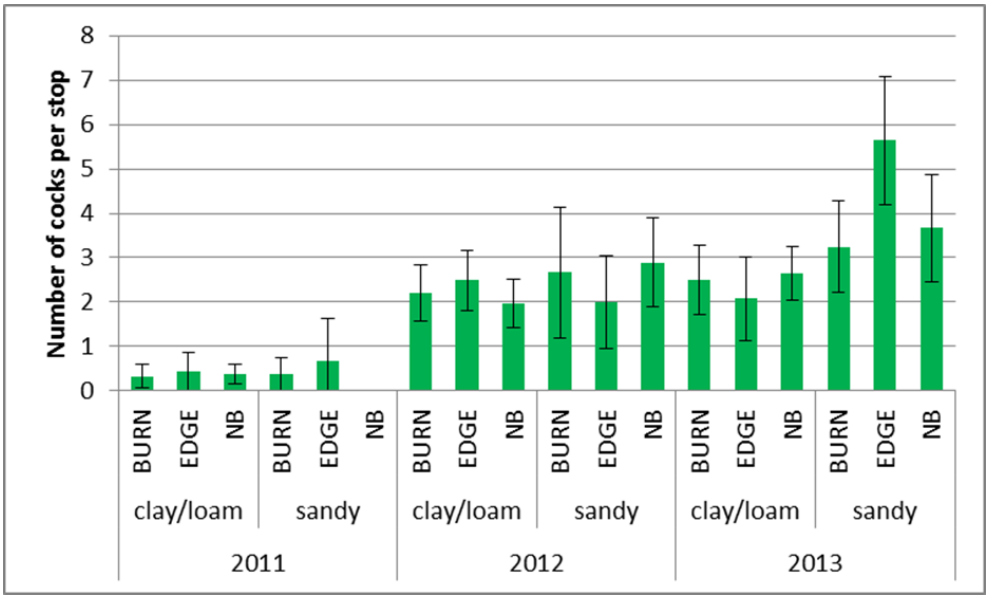


Operation Phoenix:
Monitoring bobwhite abundance following large-scale wildfires in West Texas

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 3 million acres of prime quail habitat in west Texas. We conducted spring call counts for 3 years post-fire 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 7-10 miles with listening stations every 1 mile 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 and 2013. The number of birds counted in 2012 and 2013 were greater than in 2011. On average we heard 12 times more calls and counted 3 times more quail per listening station in both 2012 and 2013 compared to the first year of the study. Call count numbers in 2011 were likely depressed at all the sites because of record drought and high temperatures observed when doing our counts in 2011. Two and 3 years post- burn there were no differences in the number of quail counted or the number of calls heard among the burned, edge, and non-burned areas when all the sites were combined. There also does not appear to be a difference in quail numbers between sandy and clay/loam soil sites at 3 years post burn. These results are preliminary; future analysis of these data will incorporate all factors to shed more light on the processes at work in recovery of quail after wildfire and severe drought.





Monitoring Texas Horned Lizards in the Rolling Plains of West Texas

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

Horned Lizards, also known as Horny Toads, represent a unique group of arid dwelling lizards that inhabit the Southern United States and Northern Mexico. The Texas Horned Lizard, *Phrynosoma cornutum*, is perhaps the most recognizable species of Horned Lizard. It is the largest native species of Horned Lizard (Family: Phrynosomatidae) and has the widest distribution of any other Horned Lizard in the Unites States.

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 2013 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 600 hours sampling roads resulting in close to 900 captures. Approximately 480 have been PIT tagged and 95 have been recaptured at least once.

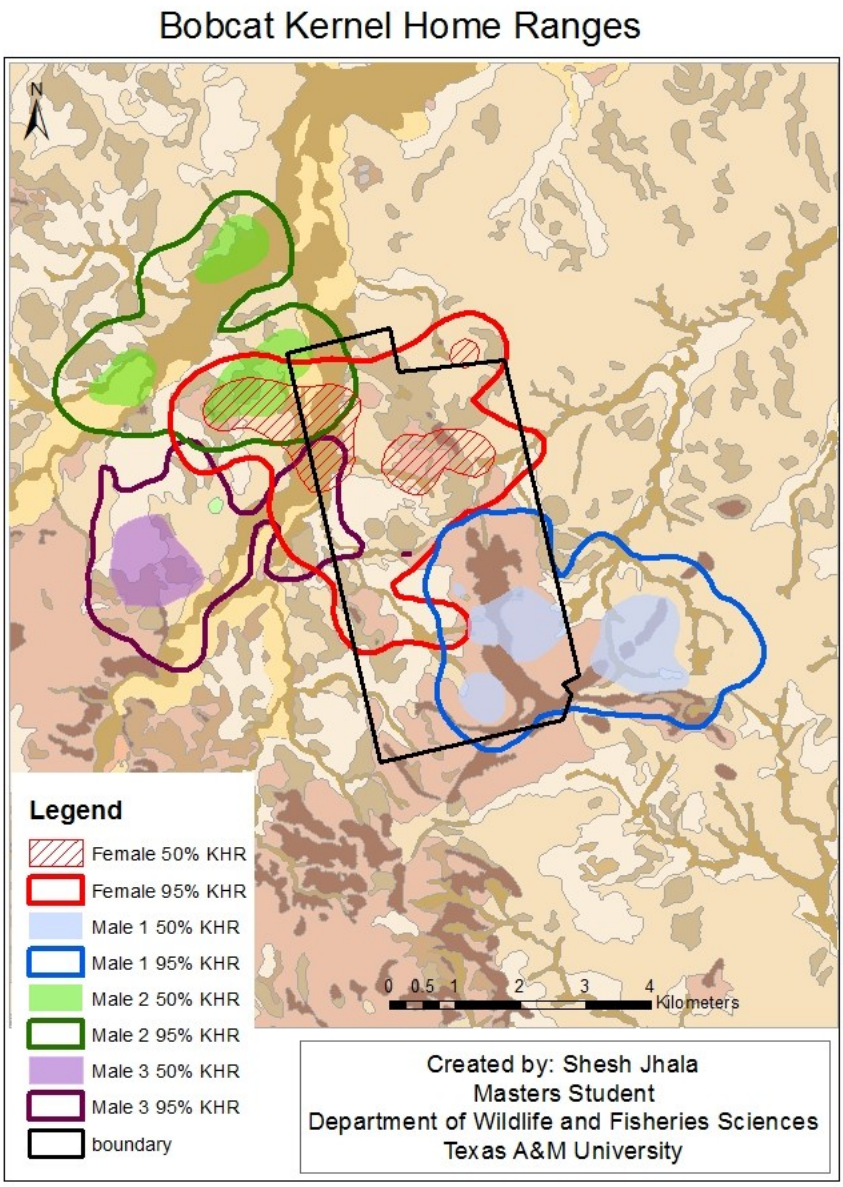
We postulate weather has a significant impact on population levels. While this season has appeared on the surface to have been more favorable than last year, we are still learning what the "norm" may be for *Phrynosoma* in the rolling plains. We can say that reproduction following last year's drought 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.

The total numbers of lizards captured in 2013 is approximately 170, which is down from 2012. However, we were only able to spend 84 hrs at the ranch this season, which is about 50% less time on the property than the past few seasons respectively. Two lizards per road hour is actually a little higher than our overall average. Our recapture rate in 2013 is around 8%. This season's recruitment seemed strong as we noticed good numbers of hatchlings in August and the first part of September. All of these numbers are unofficial at this point.

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

Nest predation by mammals is one of several factors potentially contributing to the decline in northern bobwhite (*Colinus virginianus*) populations. In this study, we examined nocturnal habitat selection and movement patterns of mammalian predators of quail at the Rolling Plains Quail Research Ranch. Our objective was to determine which predators had the greatest spatial overlap with known quail nesting locations and thus may be the most significant predators of quail nests. During quail nesting season, we tracked four bobcats (*Lynx rufus*), six coyotes (*Canis latrans*) and thirteen raccoons (*Procyon lotor*) fitted with GPS collars. Bobcats and female raccoons favored densely wooded habitats, so rarely encountered quail nesting sites which tend to be in grassland habitats. Male raccoons also favored dense cover but their additional use of shrub-by grassland increased their rate of encounter with quail nesting sites. Coyotes favor grassland, so had the highest encounter rate with known quail nest sites. Risk of nest predation also depends on characteristics of the predators. The intensive search patterns of raccoons, their attraction to quail feeders, and their potential for high population density due to overlapping home ranges, increases the risk of raccoon predation of quail nests. Conversely, the rapid and direct travel paths of coyotes, often along ranch roads, may reduce their chance of detecting well-hidden quail nests. Furthermore, the low occurrence of overlap of raccoon and coyote home ranges suggests that the presence of coyotes may benefit quail by limiting the excursions of raccoons into open habitats where quail nest.



An evaluation of coyote diets on the Rolling Plains Quail Research Ranch

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

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[2] Texas AgriLife Research & Extension Center, San Angelo, TX
[3] Rolling Plains Quail Research Ranch, Roby, TX

The coyote (*Canis latrans*) is a known predator of northern bobwhite quail (*Colinus virginianus*; hereafter bobwhite) and their eggs. Coyote predation of bobwhites on a landscape specifically managed for quail has not been investigated. We collected and subsequently examined 1080 coyote scats from December 2008 to December 2011. The contents of each scat were analyzed macroscopically, then any guard hairs were analyzed microscopically to identify prey genus. Across all 3 years of our study 67.4% of scats contained mast or grass, 63.4% contained mammalian remnants, 10.7% contained insect parts, 5% contained bird vestiges, and 0.7% contained reptile remnants. Rodents as a group comprised the top food item, while prickly pear and mesquite mast ranked second and third, respectively. We documented bobwhite remains in only 1 scat (0.1%) while the remains of known predators (feral hog, raccoon, striped skunk, badger, and reptiles) of quail occurred in 13.4% of scats. Coyotes were not an important cause of mortality for bobwhites during our study. Management for multiple stages of plant succession is not only beneficial to quail, but it can also encourage a greater abundance of diverse food items for coyotes. Coyotes preyed more on potential predators of quail than quail themselves during our study. Accordingly, any assessment of the desirability of coyote control should be evaluated on a case-by-case basis to determine whether control is warranted.

[4] *Deceased*.

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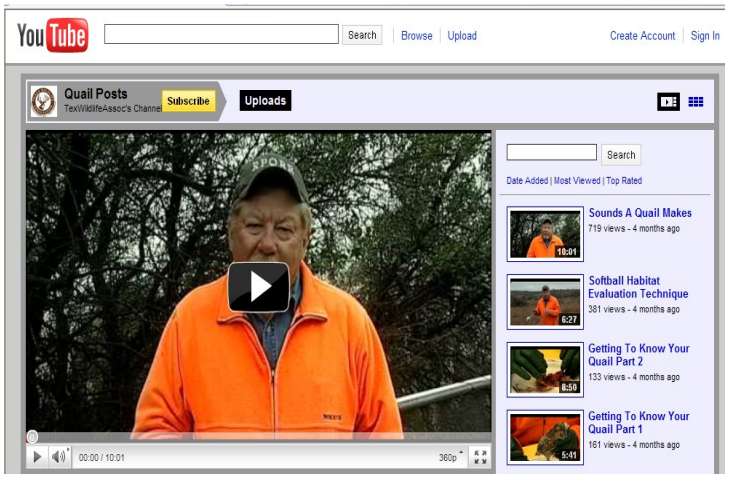

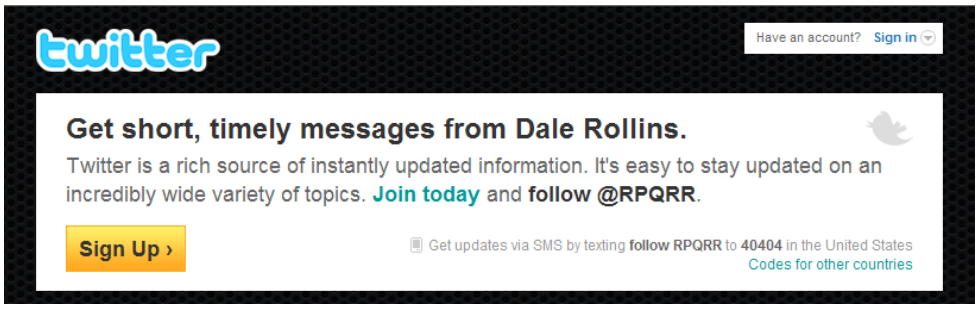

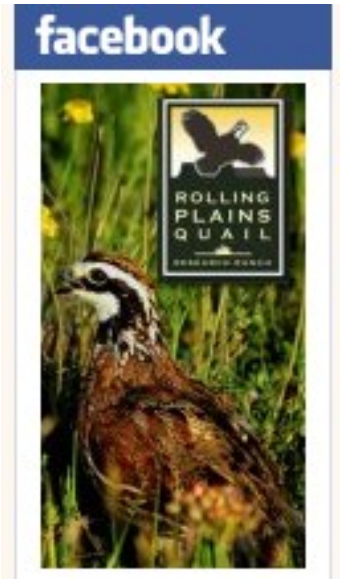

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