ROLLING PLAINS QUAIL RESEARCH FOUNDATION

2017 ANNUAL REPORT

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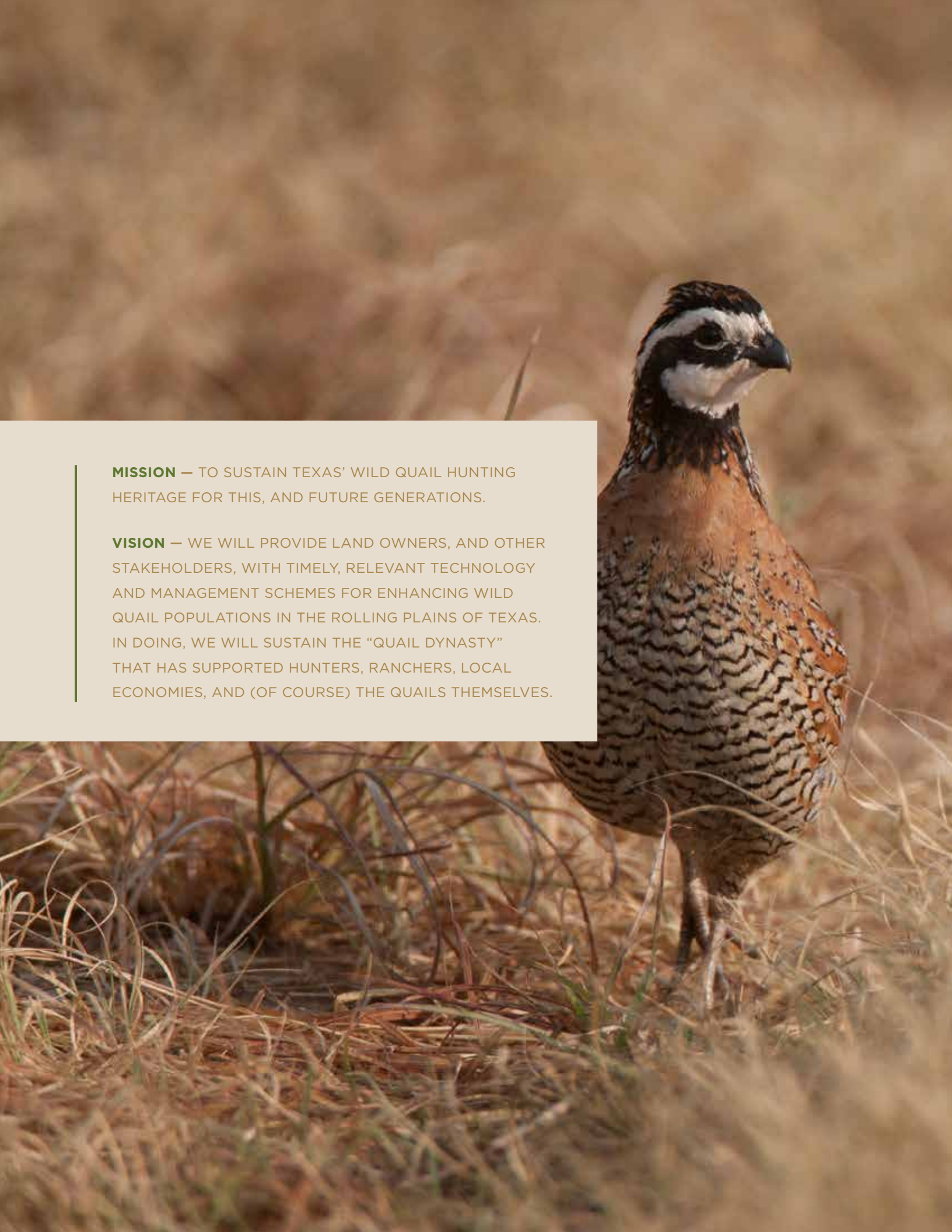

MISSION — TO SUSTAIN TEXAS' WILD QUAIL HUNTING HERITAGE FOR THIS, AND FUTURE GENERATIONS.

VISION — WE WILL PROVIDE LAND OWNERS, AND OTHER STAKEHOLDERS, WITH TIMELY, RELEVANT TECHNOLOGY AND MANAGEMENT SCHEMES FOR ENHANCING WILD QUAIL POPULATIONS IN THE ROLLING PLAINS OF TEXAS. IN DOING, WE WILL SUSTAIN THE "QUAIL DYNASTY" THAT HAS SUPPORTED HUNTERS, RANCHERS, LOCAL ECONOMIES, AND (OF COURSE) THE QUAILS THEMSELVES.

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THE FIRST TEN YEARS:

A MESSAGE FROM THE PRESIDENT

Rick Snipes
President

The first ten years in the life of the RPQRF were action-filled. Initially, we faced the task of creating a vessel which was the first of its kind—a nonprofit entity dedicated to studying quail in the Rolling Plains of Texas and whose keel would be its very own research property.

Due entirely to the generosity of The Richard King Mellon Foundation and The Conservation Fund, we celebrated the acquisition of 4,700 acres of prime quail habitat which would serve as the base of all our future research, and, importantly, provide a place where we could begin the process of building a long-term data base. A research site not influenced by short-term studies or conflicts of use, free of interruption. There were a few people whose importance in getting the Foundation underway cannot be overstated: Mike Watson of The Mellon Foundation, Maurice Hornocker and Prosser Mellon, also with The Mellon Foundation and Dr. Dale Rollins and Paul Melton, a Roby, Texas rancher.

Our board of directors was comprised of a group of Texans: A. V. Jones of Albany, Ray Stoker of Odessa, Joe Crafton of Dallas, and Rick Snipes of Aspermont. Some key decisions were made concerning the operation of the ranch and Dr. Dale Rollins assumed the helm as Executive Director.

Initially our efforts centered on habitat improvements on the ranch itself and the implementation of several projects on such things as prickly pear, patch grazing, predators, and prescribed burning. We honed our research protocols and began to collect long-term data on our resident quail population. We began to push the quail paradigms with research on quail and hawks, disease and parasites, and translocations of wild quail (as opposed to pen-reared birds).

We also sought to establish relationships with Field Trial groups with the long-term goal of holding The Texas Championship on the ranch, moving it home from its temporary abode in Oklahoma. We've spent time, dollars, and sweat equity to prepare the ranch for its initial field trial (slated for March 2018).

All was running smoothly and we were pleased with our progress, but the wheels came off the cart in 2010 when what started out as a very promising quail year, turned south in a hurry.

Following a good spring, ranchers had great numbers of birds that summer, but the birds had vanished by November. Why? No one had an answer, or even a hint of why. So, we came early to the existential moment that must occur in the life of any truly worthwhile endeavor. If no one had an answer, and we called ourselves a research organization, was it not incumbent upon us to TRY and find the answer?

Such was the inspiration for Operation Idiopathic Decline, an effort to find the reason. Suitable habitat was available, and the weather had been cooperative, so the answer had to lie elsewhere. Dr. Rollins convened a group of 12 prominent scientists and a vigorous debate was held regarding the possible cause. As a result, 11 studies were approved for funding under the supervision of scientists from Texas A&M, Texas Tech, and Texas A&M-Kingsville.

Factors examined from 2011-13 included various pathogens (bacteria, viruses, fungi), parasites (micro- and macroparasites), and environmental contaminants. We sampled over 2,200 quail during three summers across 35 counties in the Rolling Plains of Texas and western Oklahoma.

What emerged from these studies was the fact that our birds had a real problem with parasitic infections, notably the eye worm and cecal worm. Subsequently, under the direction of Dr. Ron Kendall of The Wildlife Toxicology Lab at Texas Tech, we co-funded additional research on the ecology of eyeworms and cecal worms. Following 5 years of work, we are on the verge of having approval from the FDA for a medicated feed which will rid our birds of these parasites. Our field studies, under the strict auspices of the FDA, have shown that the parasites are fatal to quail, and that our medicated feed rids the birds of these parasites.

Every owner of bird dogs treats his dogs for worms, and you would be hard pressed to find a rancher who does not do the same for his cattle. In a very short time (release slated for Summer 2018), our efforts will allow every land owner or lessee to do the same for his quail. Success? You bet.

But this success did not come without costs. Early on, our Board made the decision to place the quail and its future health, ahead of even the survival of the Research Foundation. The crisis was that severe and the need that urgent. In short, the Board made the decision to spend whatever it took to solve this problem, even if it required all our funds.

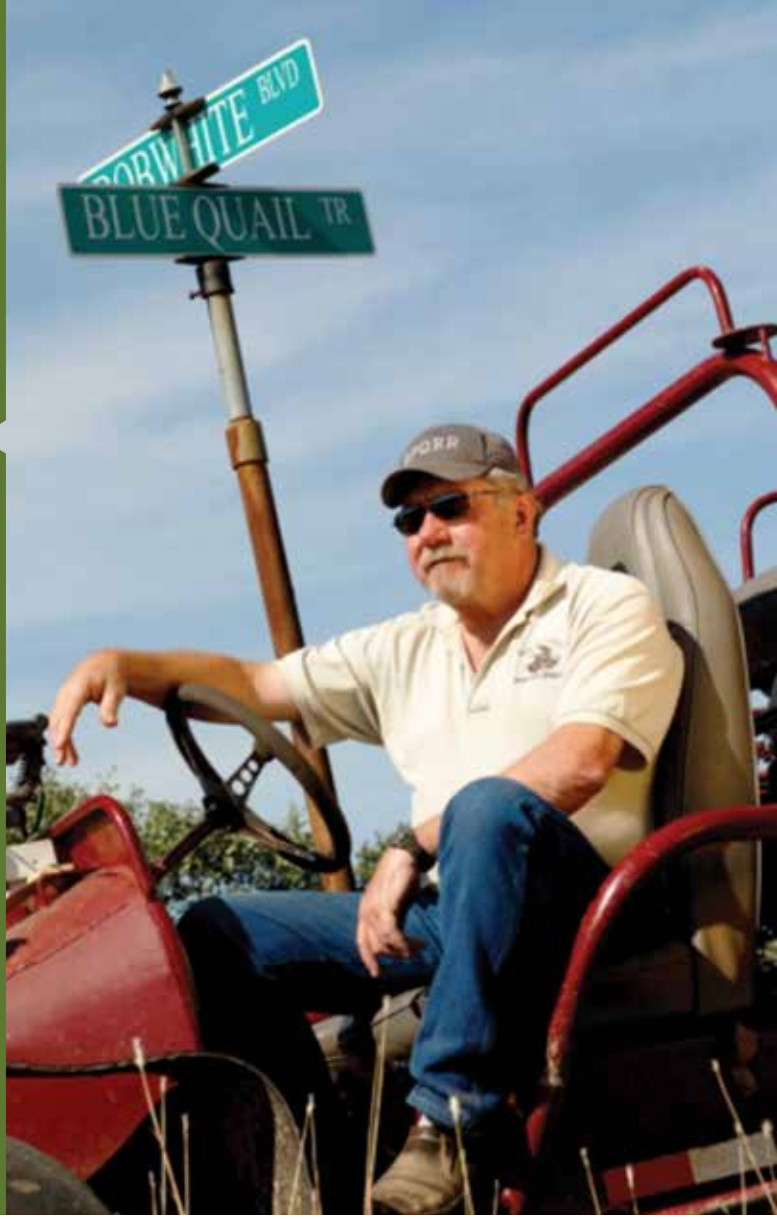
And so, we come to another critical point in the life of the Foundation—replenishing our coffers. The first ten years have seen us expend our resources in successfully addressing a critical threat to our beloved bird and sport. The next step is to find our footing and establish the Foundation to allow us to face and deal with the next issue which arises in the future. The efforts, beginning with OID and culminating with the medicated feed are unique and very significant. They have changed the entire landscape of quail study. No one since Herbert Stoddard in 1929 had addressed an issue such as this one. All other studies have been focused only on habitat, weather or perhaps supplemental feeding.

It has been my honor to serve as President during our maiden voyage. And I am pleased that Justin Trail of Albany has stepped up as our next President, he's young, motivated, and passionate for our quail mission. I know his tenure as President will continue to see us chart new territories and achieve great things. I am excited for the future of the Foundation with Justin as Board President. He will be a better president than I have been and that should always be the goal of anyone leaving a position.

OUR QUAIL ODYSSEY:

THE FIRST TEN YEARS

Dale Rollins
Executive Director



An odyssey is defined as 1) an extended adventurous voyage or trip, or 2) an intellectual or spiritual quest, i.e., an odyssey of discovery. Yep, that's what we've experienced since our dream of a quail research ranch hatched in 2007. An odyssey is often characterized by many, often sudden, unexpected changes in fortune. While bobwhites here "on the western front" are known to be "irruptive" and characterized by "boom-bust" populations, we have witnessed, and documented, the highest (2016) and lowest (2012) populations of bobwhites in the Rolling Plains since 1978, perhaps ever.

It has been my pleasure to serve as the Foundation's executive director since our inception. For someone like me who has treasured quail and quail hunting all my life (childhood, adolescence, adulthood, and now soon to be my "golden years") this assignment has been exciting, intriguing, and challenging.

Birds of a feather do indeed flock together, and our flock has included a dedicated Board of Directors, an engaged Advisory Committee, a talented staff, and a covey of stakeholders who have been quick to cooperate.

We especially thank Park Cities Quail and Texas A&M AgriLife Extension Service for being major partners in our endeavors.

We have trapped and leg-banded 13,541 bobwhite and scaled ("blue") quail during our first decade, and fitted 1,677 with radio transmitters to learn their various secrets. We have initiated ground-breaking research with our Operation Idiopathic Decline study of disease and parasites, our translocation of wild-trapped quails, and our delving into the mechanics of predator-prey relationships as they impact quail. We have counted quail every possible way; we've burned and disced, disced and burned, sculpting our habitat to maximize the amount of useable space on the RPQRR.

The Ranch and Foundation has served as a training ground for 12 Master's students, 3 doctoral candidates, and 32 undergraduate interns.

We've enjoyed some great publicity, including features in national outlets including the *Wall Street Journal*, *Field & Stream*, *Outdoor Life*, *Shooting Sportsman*, and *Garden & Gun*. We've been a regular in the *Dallas Morning News* and Lone Star Outdoor News. We've co-produced over 30 "webisodes" on Youtube.

We've proved that we can mobilize a research force to tackle the "big" questions. As we embark on our next ten years, we've identified some hurdles. Our Board will be announcing a capital campaign soon as we seek to replenish our coffers. We've worked hard to collect the types of data that will shape quail policy in the near future.

We appreciate your interest, participation, and support—you are the collective wind under our research wings. We look forward to what our unfolding odyssey holds.

ROLLING PLAINS QUAIL RESEARCH FOUNDATION:

THE NEXT TEN YEARS

Justin Trail
Incoming President

I believe we are called to be valuable in all things we do. "Value" has both quantitative and qualitative components. To me, in the context of RPQRF, being valuable is stewarding our resources wisely to execute our goals to impact our mission, while caring for all people involved.

The RPQRF collectively, and Rick Snipes individually, have created immense value over the past 10 years. The accomplishments and work products are too numerous to address here. As a result of Rick's leadership, the RPQRF has zeroed in on what could be the "smoking gun" relative to implosions in quail populations in the Rolling Plains. The approval of a medicated feed for bobwhites is on the horizon—truly a monumental undertaking and testament to Rick's relentless focus. The next 10 years will inform quail enthusiasts as to that particular project's importance and influence on quail populations. The fact that it can be carried forward by others, due to the previous effort by Rick and the board several years ago, is remarkable and deserving of a special place in the history of all things quail.

It was a beautiful spring day when Rick asked me to assume the role of President of RPQRF. I was reluctant and asked for some time to think about it. Rick seemed confused. He was telling me I was going to be President and I thought he was asking me if I wanted to be!

All kidding aside, I remember spending time in the pasture that day and thinking "how hard can it be? The quail are back."

Sure, we have to raise some money, but at the time, the biggest barriers to that were the fact that we had a quail under every bush. As Paul Melton says "even the poor people had quail."

As I write this letter, things don't seem so rosy. Nobody expected a repeat of the last 2 years. We would all be happy with 40% or 50% of last year's numbers. We had exceptional carryover. We did not have great nesting conditions but we raised a fair number of birds considering we had very few insects. We had a relatively mild summer and the range conditions were good in late summer and are great now. The stage was set for a "soft landing." But alas, it wasn't meant to be.

I have had reports across the Rolling Plains from dismal to fair. Where did the birds go? That is the question I have been asked a dozen or more times in the past few days. I don't have the answer. The biological calculus of quail populations is complicated. We still have work to do.

RPQRF is at a crossroads. The first ten years were very active with the inception of the foundation, procurement of the ranch, fundraising, and research that resulted in the exhaustion of funds. Rick put it eloquently in stating "We put the bird and the research squarely before our own continued existence". RPQRF has without question been valuable in its first 10 years of existence. In order to continue to add value and pursue our stated mission (To sustain Texas' wild quail hunting heritage for this and future generations) we have to refill our coffers, which will be the primary focus of the foundation in the coming years. Although fundraising will be our obvious focus in the short term, we must identify and recruit new leadership at the board level, and address a perpetuation plan for ranch operations and key personnel to ensure the future existence of the foundation. Foundation funds are critically low. The "operational endowment" has been exhausted pursuing OID research efforts. The foundation is now reliant upon current donations to continue operations. We do not have a rainy-day fund. We do have a plan in place to raise $22,900,000 and our ability to execute the plan will determine the future of RPQRF. We hired Phil Lamb as director of development and I'm confident in the foundation's ability to execute the plan, beginning with the first asks in the coming weeks.

The primary goal is to raise $22,900,000 in the near future. I believe a win would be to raise $3 million in the next 12 months and an additional $5million by January 2020. This would be in cash received. Pledges and deferred amounts would remain part of the overall goal and continue to be critical to the long-term sustainability of the foundation.

Another goal would be to create an ongoing fundraising effort that is self-perpetuating into the future. This could be part of better in-house grant writing functionality or altogether separate.
And finally, our goal should be to steward those resources wisely.

Looking ahead we will need to continue to identify and recruit leadership at the board level as original and current board members retire off the board and/or take a less active role. My goal is to have three new board members identified and seated in the next three years, one of which to become president of the board. I don't intend to fill that position for 10 years.

Quail hunters care for quail. We've lost a generation of quail hunters. Without quail hunters and those who care for quail, our effort is impossible and in vain. The only way we succeed long term is to foster a passion in others, identify those that have the passion, are capable of contributing to the foundation in a meaningful way, and recruit them to join our efforts through service. As we replenish our coffers and look to the next 10 years, it will be incumbent upon us to identify and enable the next generation of operational employees at the foundation.

These will be exciting times. Honoring and recognizing the pioneers that made it happen while ushering in the next generation of leadership to carry out the mission will be a welcome focus once we are flush with cash. I look forward to searching for people to fill our expanded research and educational outreach positions described in our Statement of Needs. The next ten years will not be easy—nothing worth doing is. I believe it is attainable.

More important it is worth doing. I'm encouraged by the work that has been done, the team in place, and the prospects of pulling off some very lofty goals. I'm looking forward to working with you to steward this great species that has brought us all together.

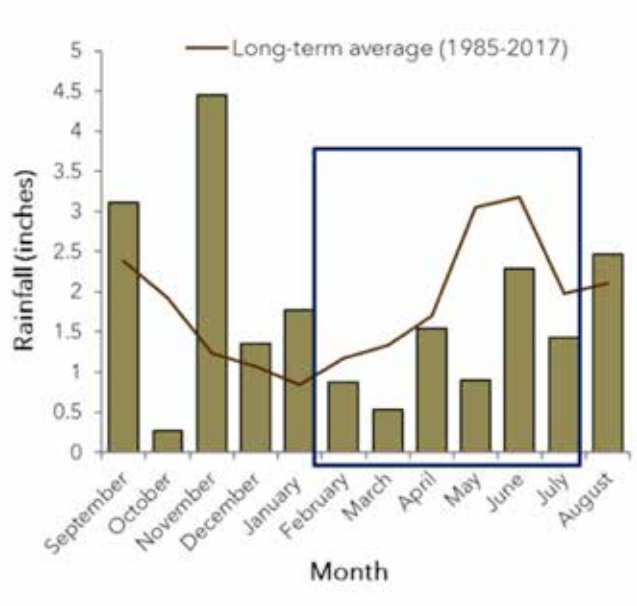
2017 WEATHER -

THE YEAR IN REVIEW

Bradley W. Kubecka Rolling Plains Quail Research Foundation

Quail productivity is essentially a function of 8 key variables —

1) JUVENILE SURVIVAL
2) ADULT SURVIVAL
3) NEST SUCCESS
4) CLUTCH SIZE
5) NUMBER OF HENS ENTERING NESTING SEASON
6) PROPORTION OF HENS THAT PARTICIPATE IN REPRODUCTION
7) NUMBER OF NESTS PER HEN
8) LENGTH OF LAYING SEASON



In the Rolling Plains, weather is perhaps the biggest driver of all of these. Overwinter survival, and subsequently, the number of hens entering a laying season will be dictated by winter conditions. Likewise, rainfall during the growing season typically increases cover and subsequently nest-success and survival. Furthermore, rainfall during the growing season is typically associated with cooler temperatures and longer nesting seasons. When summer conditions are hot and dry, reproduction curtails.

Winter conditions during 2016–2017 at RPQRR were relatively mild with no major snow or ice storms. January lows reached 8° F, but these temperatures were brief and not in association to any large precipitation events. February, on the other hand, was warm and had temperatures peaking upwards to 92° F. Rainfall preceding and during nesting season was below average. Though temperatures were relatively cool, nesting season was short. The latest nest attempt at RPQRR was found to be initiated around July 10. Despite receiving above-average rainfall and cool temperatures during August, a late-season hatch was not stimulated.

MONITORING QUAIL ABUNDANCE

AT RPQRR

Bradley W. Kubecka, Lloyd Lacoste, and Becky Ruzicka
Rolling Plains Quail Research Foundation

Since RPQRR was established in 2007, we have implemented various ways to monitor quail abundance over time. These efforts include —

1) HELICOPTER SURVEYS

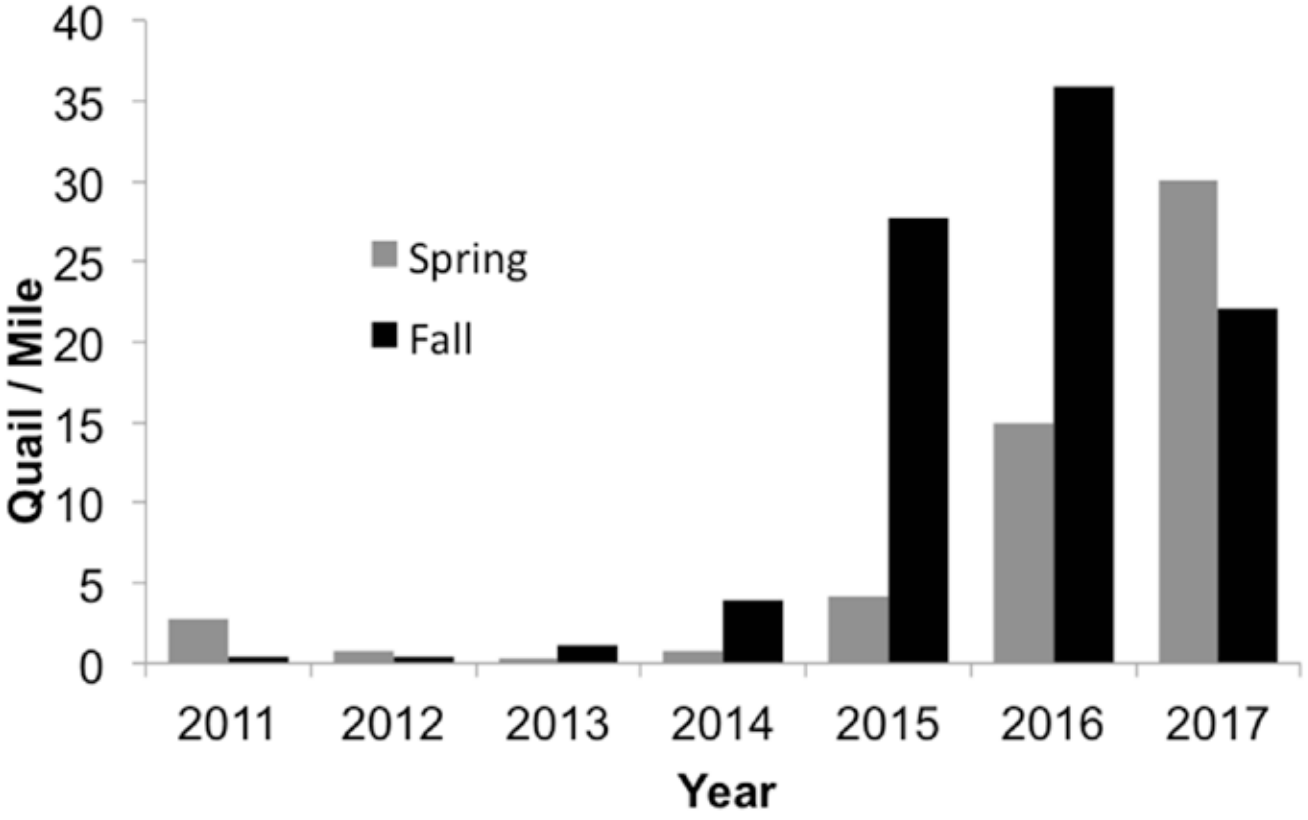
2) CALL COUNTS (SPRING AND FALL)

3) MARK-RECAPTURE (USING LEG-BANDED BIRDS),

4) FALL ROADSIDE COUNTS

Our goal in collecting these data over time is two-fold. Primarily, we would like to track changes in the population over time and investigate factors that may be influencing those changes. Secondarily, we want to be able to determine which of these provide reliable indices of the population relative to the time and expense of conducting counts to provide landowners with guidance for monitoring quail on their own property.

It is important to keep in mind that the best use of relative abundance indices, such as call and roadside counts, is for comparison on the same property over multiple years.



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 with a total sampling effort of 52 miles. These surveys are flown "low and slow" (compared to typical deer surveys) to maximize our ability to see coveys. We use our helicopter counts as both an index and estimator of quail abundance (both species combined) on the ranch.

During years when > 60 coveys were detected, density surface models (DSMs) were developed to provide density estimates across the Ranch. In November of 2016, we recorded our highest ever count of just over 35 quail/mile. Spring 2017 counts were lower than fall, as one would expect given over winter attrition, however it was the also the highest spring counts on record. We are expecting fall 2017 to show a decrease compared both fall 2016 and spring 2017.

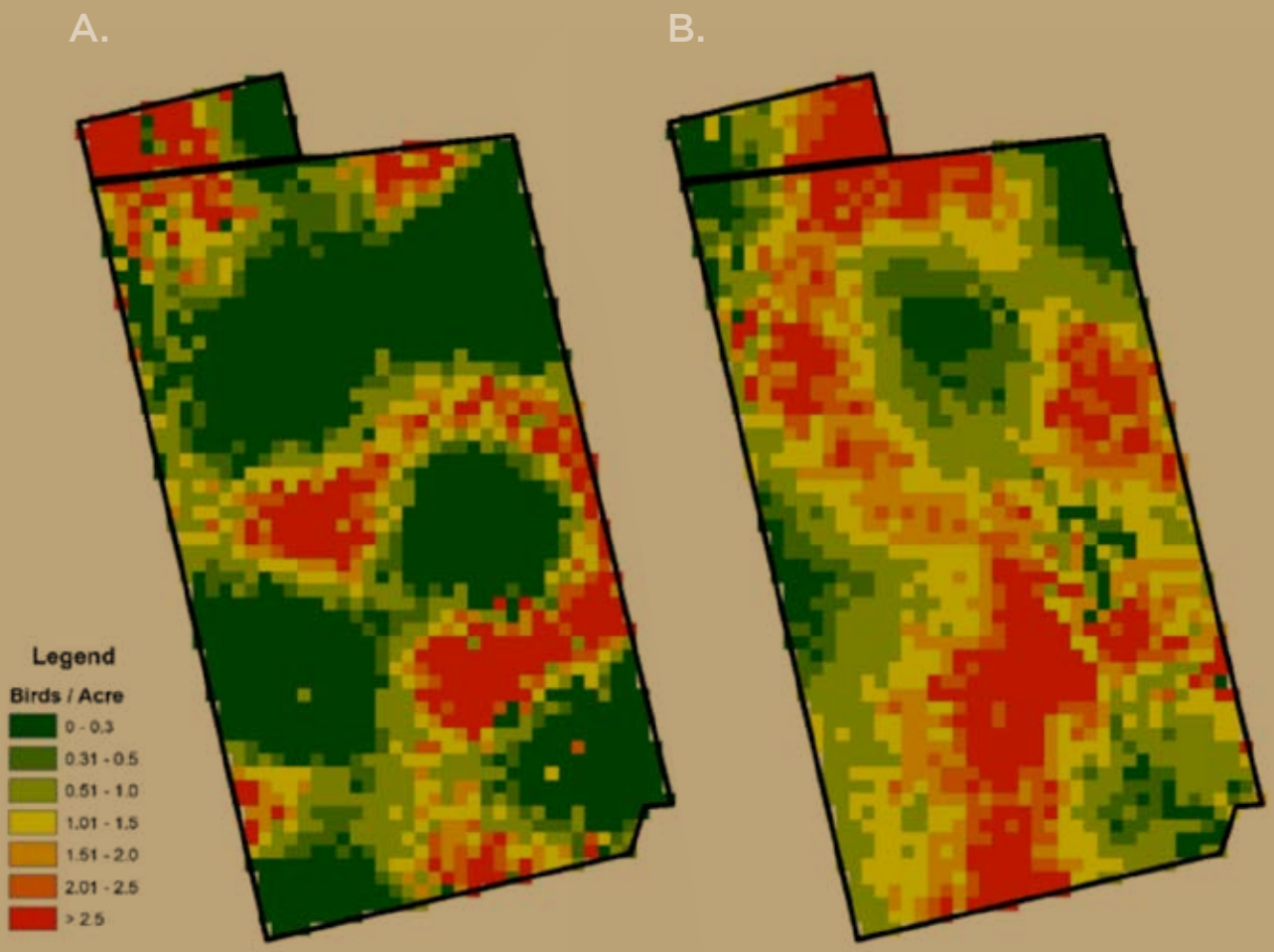
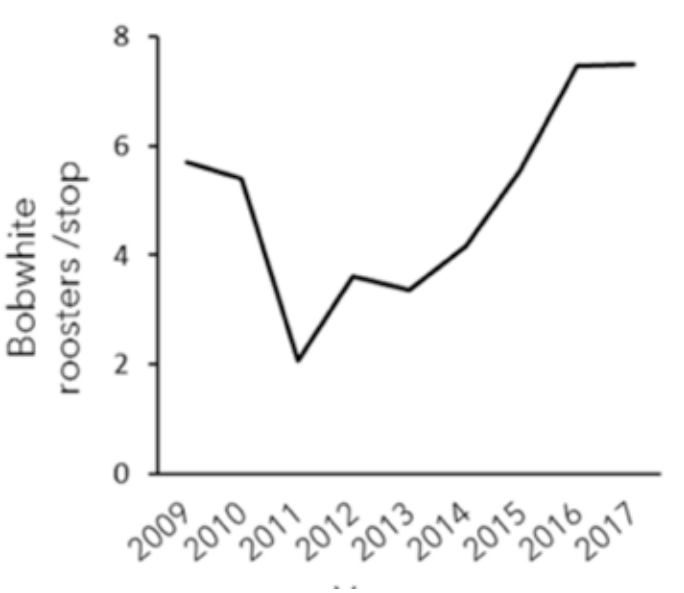
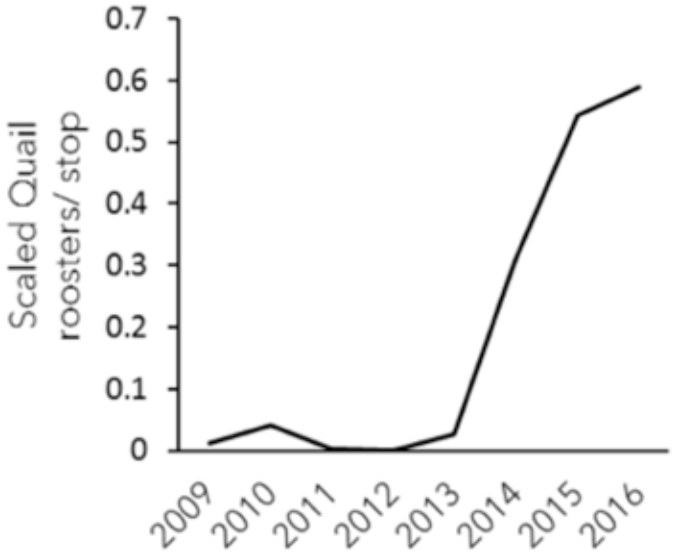


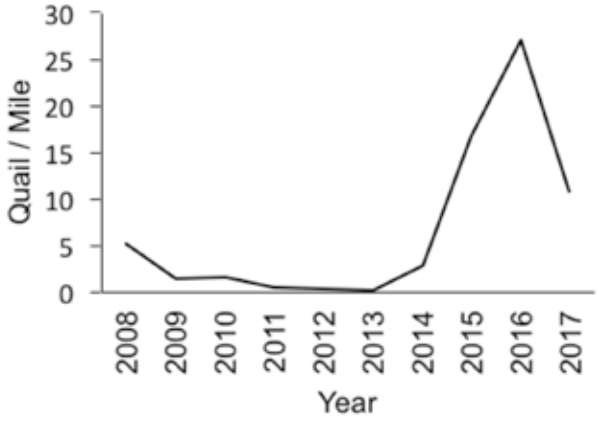
Figure 1 Density surface models of bobwhite abundance generated from helicopter-based distance sampling during A) January 2016, and B) January 2017, Rolling Plains Quail Research Ranch, Fisher County, TX, USA.

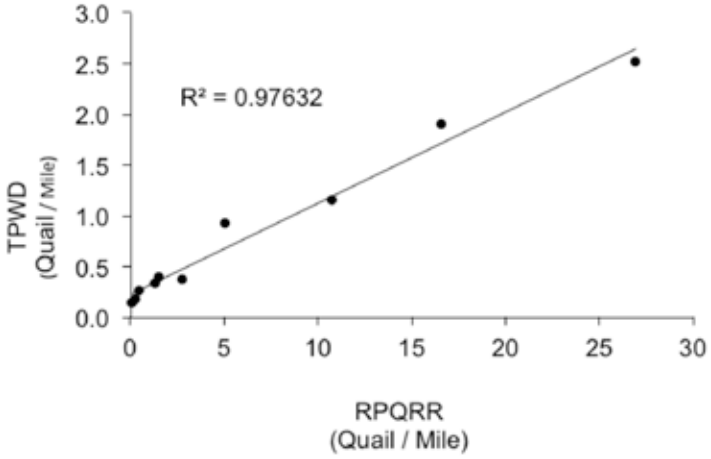




SPRING CALL COUNTS

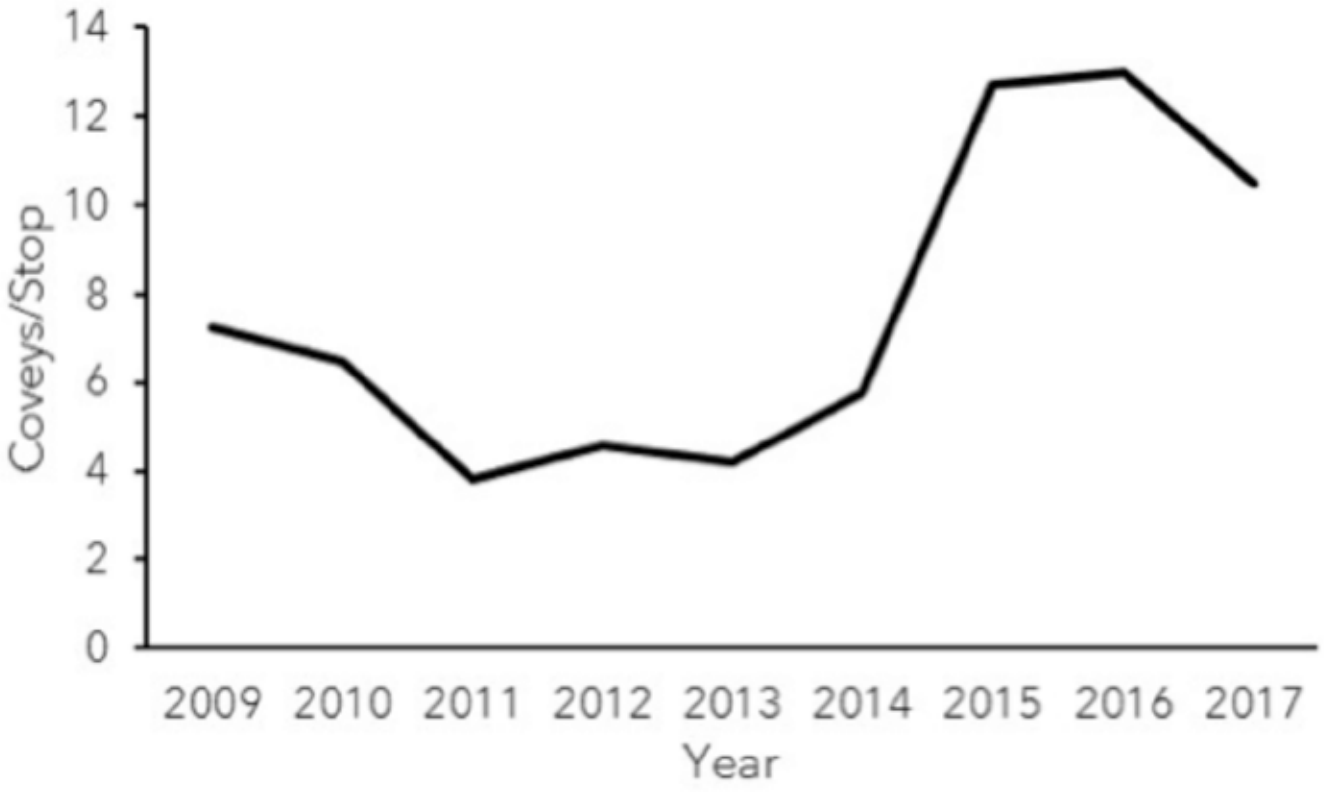
Spring cock call counts or “call counts” can be used to index quail abundance over time. The best use of these counts is to obtain an average value for a property (i.e., average no. cocks heard at all stops combined) and compare how that value changes over time. Spring call counts are conducted at 25 “mile markers” 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. Each year counts are conducted twice a week starting mid-May and continuing until mid-July. We follow trends in both bobwhites and scaled quail over time, although bobwhites are more prolific callers and thus easier to index using this method. Spring 2017 counts were high for both species.





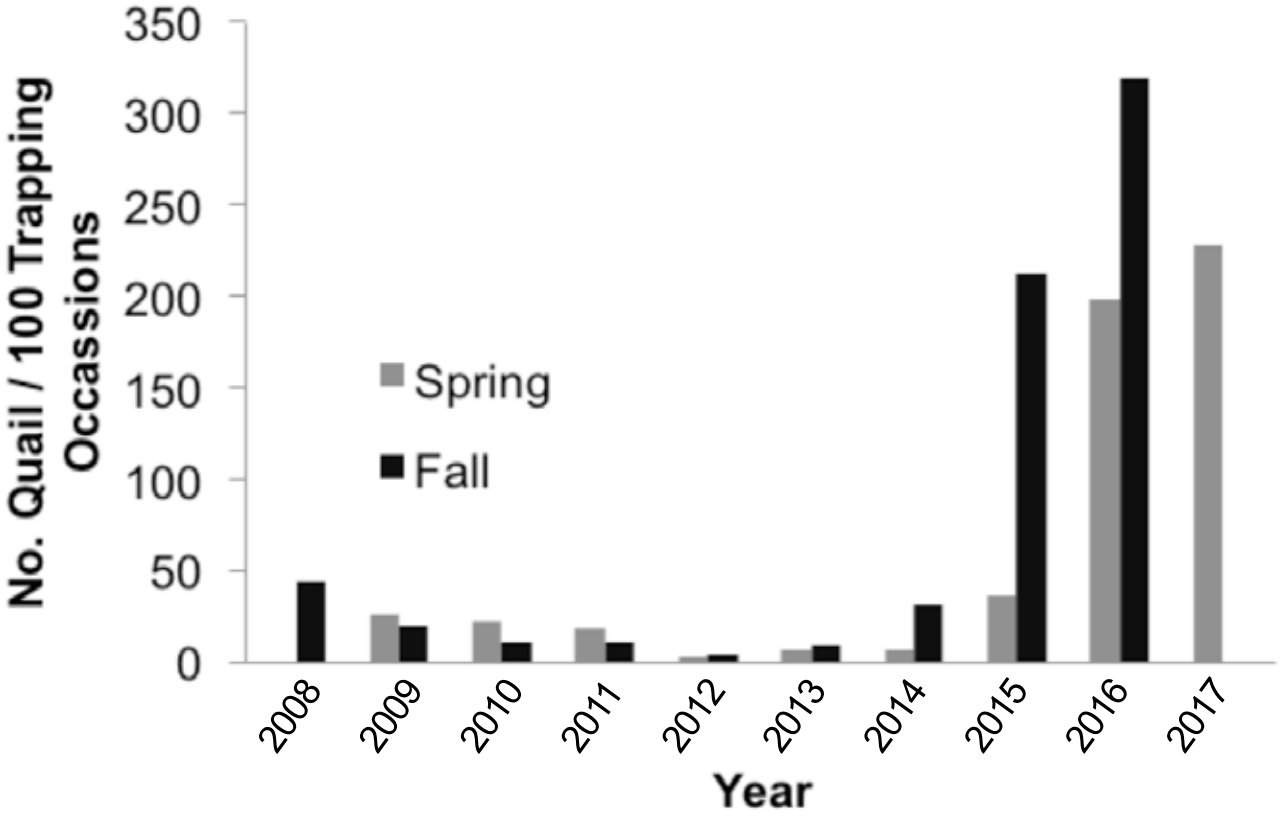
ROADSIDE COUNTS

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. Roadside counts are effective on small (~ 3000 acre) properties as well as large properties. 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. Our counts this fall showed a decrease of approximately 50% from 2016. Each year during August, Texas Parks and Wildlife Department biologists conduct similar roadside counts on 20-mile routes across much of Texas. In RPQRR's first ten years, we have documented that our counts are extremely correlated (R= 0.99) with TPWD counts across the Rolling Plains.



FALL COVEY CALL COUNTS

In October, we measure bobwhite abundance by listening at dawn for "covey calls." Covey call counts are the most time intensive measure of relative abundance because researchers can only listen at one site per day. Covey call counts are used extensively throughout the Southeast as a population monitoring tool and can be used prior to hunting season to identify local hotspots. We listen at all of our odd-numbered mile markers for a total of 2 counts per stop and record number of different coveys heard. In 2016 we heard a record number of 13 coveys per stop. Our counts in 2017 are slightly down from those highs at 10.5 coveys per stop.



TRAPPING

We intensively trap RPQRR twice a year with baited walk-in wire traps. We have several goals for our trapping efforts: 1) to affix radio-collars to monitor survival and reproduction, 2) monitor relative abundance and minimum known population, and 3) estimate true abundance using mark-recapture data analysis techniques (see Kubecka et al. in this report). Our trapping data since fall of 2015 has documented the bobwhite population explosion the Rolling Plains experienced.

MONITORING QUAIL SURVIVAL AND NESTING

AT RPQRR

Bradley W. Kubecka, Lloyd Lacoste, and Becky Ruzicka Rolling Plains Quail Research Foundation

Bobwhite and scaled quail are fitted with 6-g radio-transmitters during March each year to document nesting ecology and survival. On 1 May 2017, 34 bobwhite hens were alive, on-property and being monitored daily; 17 hens attempted one nest (50%) and 3 attempted a second nest (9%) for a total of 20 nest attempts. One bobwhite nest was abandoned. Apparent nest success was 42%. A total of 21 scaled quail hens entered nesting season on 1 May. Fifteen nests were found with 7 successful hatches.

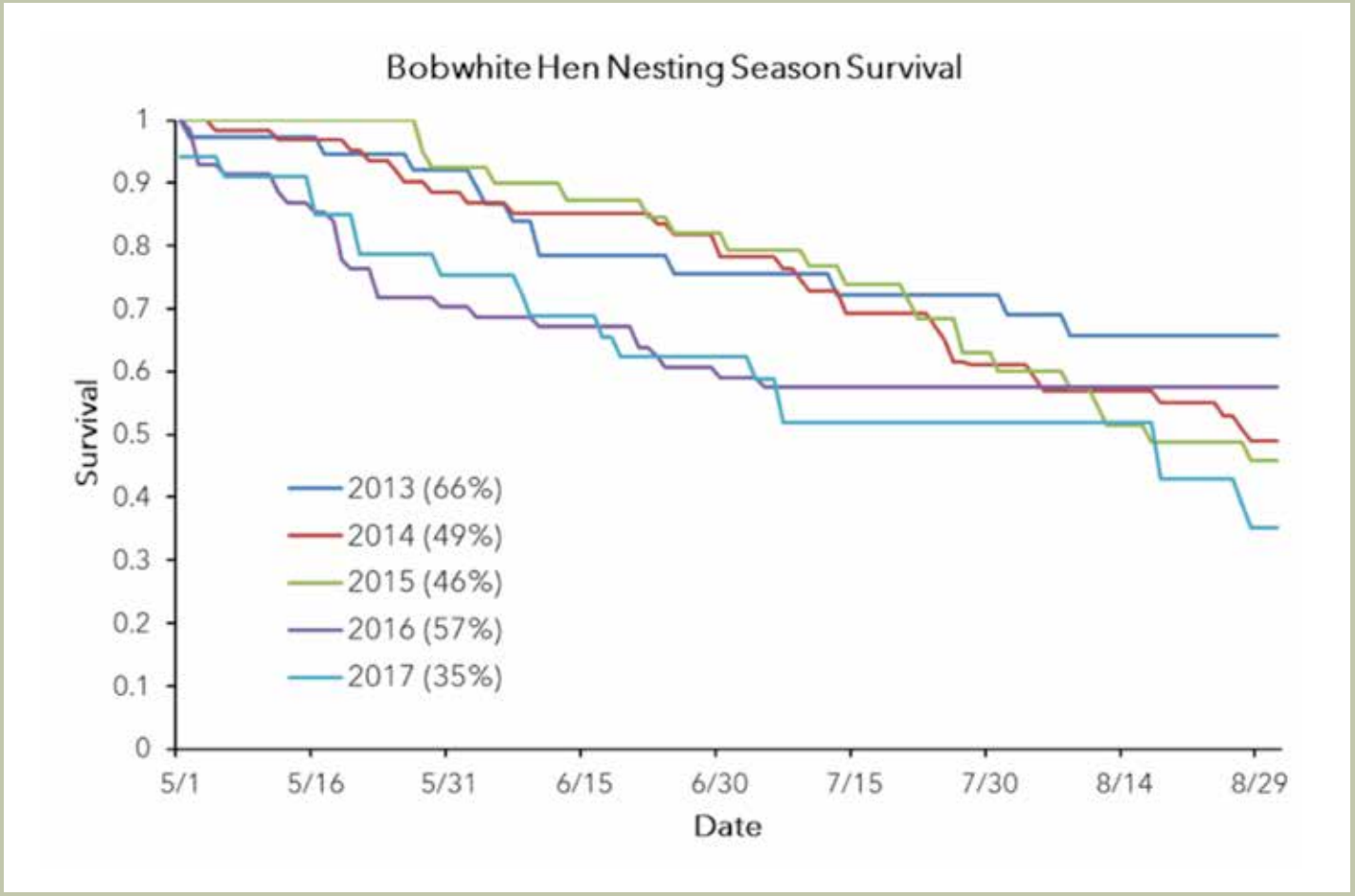
Table 1. Bobwhite nest productivity and hen survival at RPQRR, Fisher County, TX, USA. 2009–2017.

Year	Total Nests Attempted	Avg. Nests Per Hen	Hens That Attempted a Nest (%)	Hens That Attempted 2nd Nest (%)	Hens Alive May 1	Hens Alive Aug 1	Hen Survival (%)[a]	Nest Success (%)[b]
2009	43	0.54	41	13	79	27	34	51
2010	20	0.4	36	4	50	35	70	45
2011	10	0.14	14	0	73	43	59	60
2012	11	1.0	73	27	11	9	82	73
2013	16	0.59	55	4	27	19	70	56
2014	30	0.81	70	13	37	22	59	58
2015	44	1.07	78	27	41	27	66	77
2016	31	0.44	40	4	70	36	51	62
2017	20	0.59	50	9	34	13	38	42

Table 2. Scaled quail nest productivity and hen survival at RPQRR, Fisher County TX, USA. 2013-2017

Year	Total Nests Attempted	Avg. Nests Per Hen	Hens That Attempted a Nest (%)	Hens That Attempted 2nd Nest (%)	Hens Alive May 1	Hens Alive Aug 1	Hen Survival (%)[a]	Nest Success (%)[b]
2013	43	0.54	41	13	79	27	34	51
2014	20	0.4	36	4	50	35	70	45
2015	10	0.14	14	0	73	43	59	60
2016	11	1.0	73	27	11	9	82	73
2017	16	0.59	55	4	27	19	70	56

[a] Apparent Survival (Hens Alive Aug 1 / May 1) [b] Apparent Nest Success (Nest Successes / Nest Attempts)


Bobwhite Hen Nesting Season Survival
Survival
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2013 (66%)
2014 (49%)
2015 (46%)
2016 (57%)
2017 (35%)
5/1
5/16
5/31
6/15
6/30
7/15
7/30
8/14
8/29
Date

DUMMY NESTS

AT RPQRR

Trenton Dragon and Bradley W. Kubecka
Rolling Plains Quail Research Foundation

Dummy nests are a type of simulated nest that mimic the volume and nest substrate of an actual avian nest. In bobwhite (*Colinus virginianus*) management, dummy nests are used to approximate nest survival during a given nesting season, and provide a method for landowners to assess nest predator assemblage. The accuracy and precision of dummy nests in the literature is equivocal and often compared using paired nests of radio-marked birds. Thus, our objectives were to 1) determine whether nest success is similar among actual, paired, and independent dummy nests, 2) determine whether predator assemblages are similar between independent dummy nests and actual nests, and 3) determine what percent of dummy nests are correctly classified by diagnostic sign. We compared the accuracy of paired dummy nests to actual nests using PROC FREQ in SAS with a Fisher's exact test. Paired nests and actual nest success did not differ (P = 0.25), and overall accuracy was 71.4%.We modeled nest survival between actual, independent, and paired nests in Program Mark using AICc selection. The model with the most evidence given the data suggested a constant daily survival. Thus, we report daily survival rate as calculated by the Mayfield estimator.

Mayfield nest success for independent dummy nests, paired dummy nests, and actual nests was 63%, 80%, and 50% respectively.

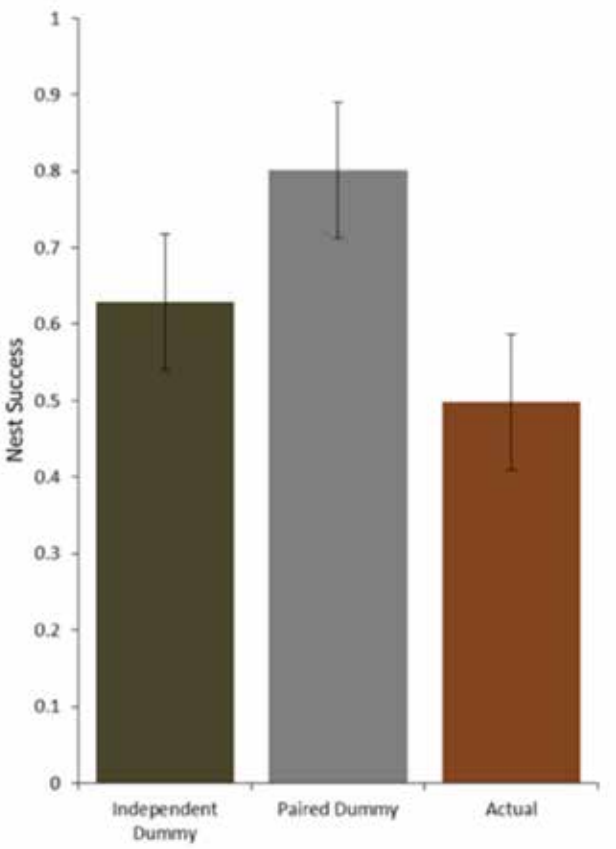


Figure 1. Mayfield nest success of dummy nests independent of actual nests, actual nests, and paired dummy nests. Error bars represent standard error (SE).

Small samples limited our ability to detect a statistical difference (P > 0.05) among nest types, however the discrepancy in survival between paired and actual nests indicated fates were not similar between the groups. Only badgers (*Taxidea taxus*) and Mexican ground squirrels (*Spermophilus mexicanus*) were documented to depredate actual nests. Four of 13 depredations events for actual nests were caught on camera. These included 2 badger depredations and 2 ground squirrel depredations. Predators of dummy nests included striped skunks (*Memphitis memphitis*), badgers, and Mexican ground squirrels. Fifteen of 18 dummy nest depredations were caught on camera: 7 skunk, 5 badger, 1 ground squirrel, and 2 multi-animal depredations.

Figure 2. Game camera photos of **A)** Mexican ground squirrel removing a chicken egg from a dummy nest, and **B)** badger depredation of dummy nest.

Multi-animal depredations included one depredation by 2 badgers and one by a ground squirrel and badger. Of 29 observations, 31% of skunk depredations (n = 7) were correctly classified from dummy nest diagnostic sign. Of 19 observations; 53% of badger depredations (n = 7) were correctly classified from diagnostic sign. Of 4 ground squirrel observations, 1 was correctly classified.

There were two multi-animal depredations – neither were correctly classified. Collectively, 33% of all observations (n = 60) were correctly classified. Blind observers, not allowed to see video footage of nests during the study, correctly classified 17% of depredations (n = 35) whereas open observers correctly classified 56% of observations (n = 25).

Table 1. Accuracy matrix of nest success between actual nests and paired dummy nests placed 50 m in a random azimuth at the Rolling Plains Quail Research Ranch.

	ACTUAL			
Paired Dummy	**Successful**	**Failure**	**Total**	**OVERALL ACCURACY (N = 21)**
Successful	12	5	17	71.4%
Failure	1	3	4	
	13	8	21	

SMALL MAMMAL SURVEYS

AT RPQRR

Alec Ritzell, Bradley W. Kubecka
Rolling Plains Quail Research Foundation

The relationship of small mammals and quail is important because small mammals have the potential to serve as buffer prey for quail, or species that shift predatory pressure away from quail.

Alternatively, high abundance of small mammals could also attract predators and the relationship of small mammals and quail demography could be antagonistic. Thus, it is important to understand the mechanisms of their relationship.

Small mammal population trends are monitored at RPQRR by biannual trapping. We trap 8 ecological sites throughout the ranch: Prickly Pear, Old Field, CRP, Food Plot, Mesquite Woodland, Rocky Outcrop, Sandy Soil, and Riparian.

Twenty-five Sherman traps placed in 5 X 5 grids covering 2,500-m^2 are set at 5 locations within each ecological site, and each trap is checked for a total of 4 nights (i.e., 500 trap nights / ecological site).

Figure 1. Hispid cotton rat (left) and wood rat (right).

The number of new individuals caught per trap effort serves as an index of small mammal population trends. Preliminary analysis indicates a strong correlation of RPQRR's summer small mammal index and fall bobwhite populations, but the mechanisms of this relationship are currently unknown. From June 2016 to June 2017, the small mammal index suggested a 94% decrease in small mammal abundance.

Hispid cotton rats (*Sigmodon hispidus*) comprised the majority of the trap yield in 2016, but experienced a 99% population decline in 2017. All small mammal species, except Mexican ground squirrels (*Spermophilus mexicanus*), exhibited lower numbers during the June 2017 trapping season. More Mexican ground squirrels (19 total) were captured during the June 2017 trapping season than all other trapping efforts combined. Considering the past relationship between small mammals and quail populations, we anticipate documenting future quail response to this drastic decline.

Figure 2. Mexican ground squirrel (Image credit to Robert Burton, USFWS)

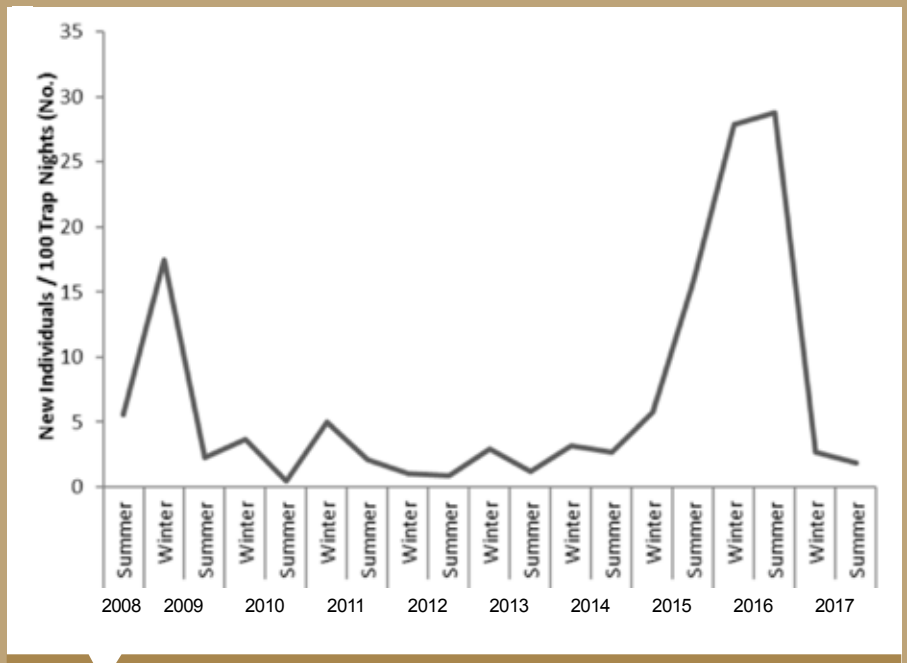
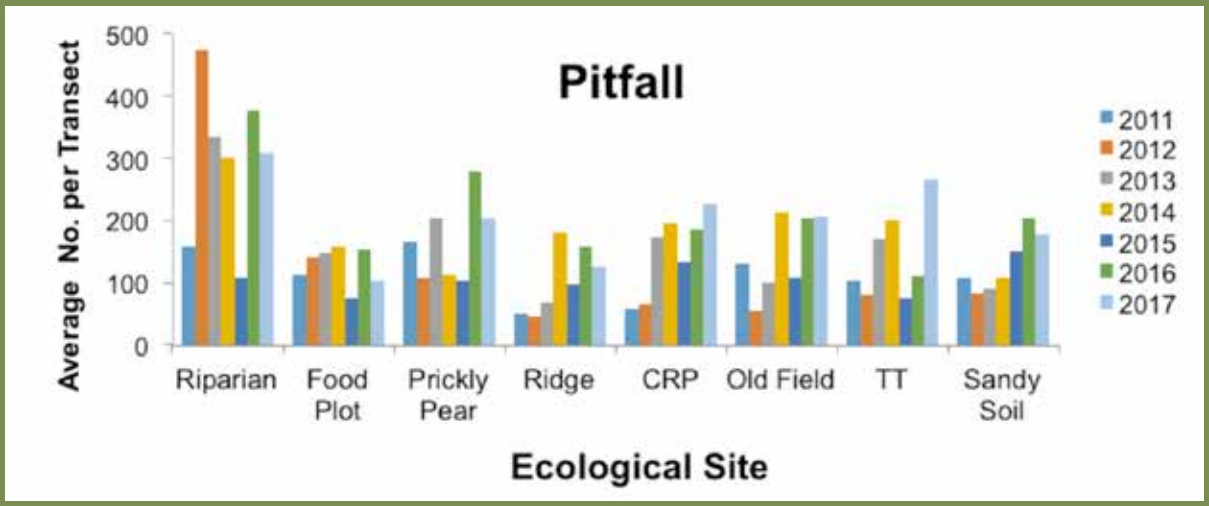


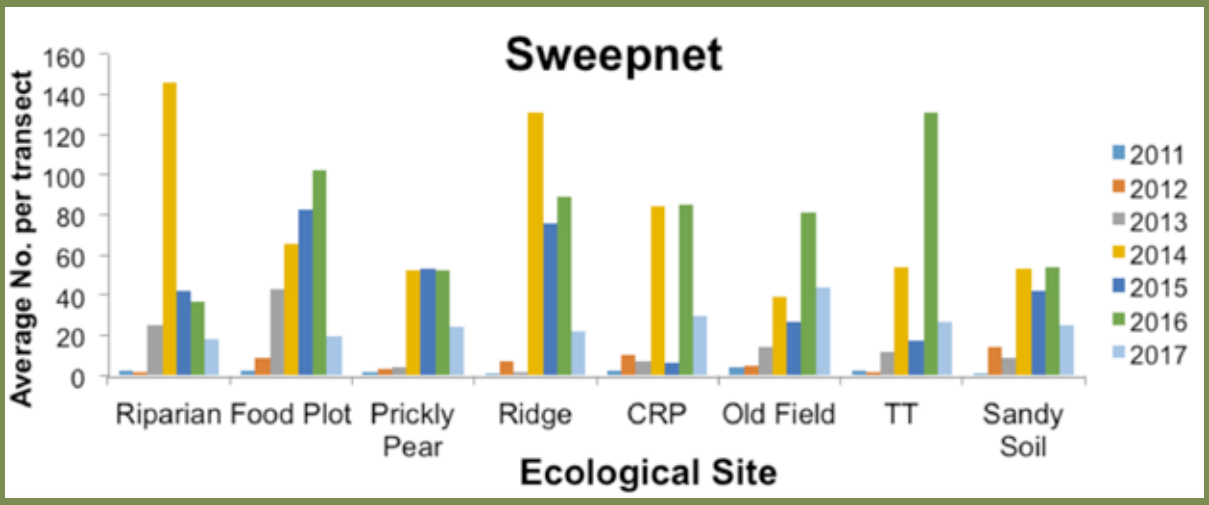
Figure 3. Small mammal population trends at the Rolling Plains Quail Research Ranch during 2008–2017, Fisher County, Texas, USA.

ARTHROPOD DYNAMICS

Lloyd LaCoste Rolling Plains Quail Research Foundation

Arthropods (e.g., insects) are a source of protein, moisture, and essential amino acids required for egg laying, feather production, and growth of nesting hens and chicks. During July, we conduct annual arthropod surveys to estimate the relative abundance of arthropods across 8 ecological sites on the ranch. Pitfall arrays and sweep-nets are used to sample arthropod abundance and diversity at 2 micro-scales. Pitfalls tend to represent communities of ground dwelling (e.g., beetles) arthropods whereas sweep-nets tend to represent arthropod communities preferring the canopy of herbaceous plants. Five pitfall arrays consisting of 6 traps are checked 3 times at 3-day intervals within each ecological site. Four replicates of sweep-netting occurs at each pitfall array. All arthropods are dried, counted, and recorded.





EXTENSION & OUTREACH ACTIVITIES

Our extension and outreach activities are an integral part of what we do as a non-profit organization and in support of our overall mission 'to preserve Texas' wild quail hunting heritage for this and future generations.' Annually, our whole organization participates in and leads a variety of extension and outreach activities both at RPQRR and off-site. We partner with many other conservation-focused organizations including, Texas A&M AgriLife Extension Service, Texas Wildlife Association, and the Quail Coalition.

At RPQRR our doors are always open, stop in for a tour! Our 2017 events included:

1) DALLAS SAFARI CLUB CONVENTION

2) CROSS TIMBERS QUAIL BANQUET

3) PARK CITIES QUAIL BANQUET

4) PRESENTATION AT MT7 RANCH EVENT ON TRANSLOCATION EFFORTS

5) PRESENTATION AT WESTERN ASSOCIATION OF FISH AND WILDLIFE AGENCIES MEETING

6) MULTIPLE PRESENTATIONS AT STATEWIDE QUAIL SYMPOSIUM

7) MULTIPLE PRESENTATIONS AT QUAIL 8 NATIONAL QUAIL SYMPOSIUM

8) FISHER COUNTY AG PRESENTATION ON QUAIL FORECAST AND BURNING

9) QUAILMASTERS

10) PARK CITIES QUAIL GROUP TOURS

11) BIG COUNTRY CHAPTER OF THE TEXAS MASTER NATURALISTS FIELD DAY

12) 10+ PRIVATE TOURS OF RPQRR

13) 29 DAYS OF HOSTED QUAIL HUNTS/ 559 QUAIL HARVESTED

RPQRR 2017 MANAGEMENT ACTIVITIES

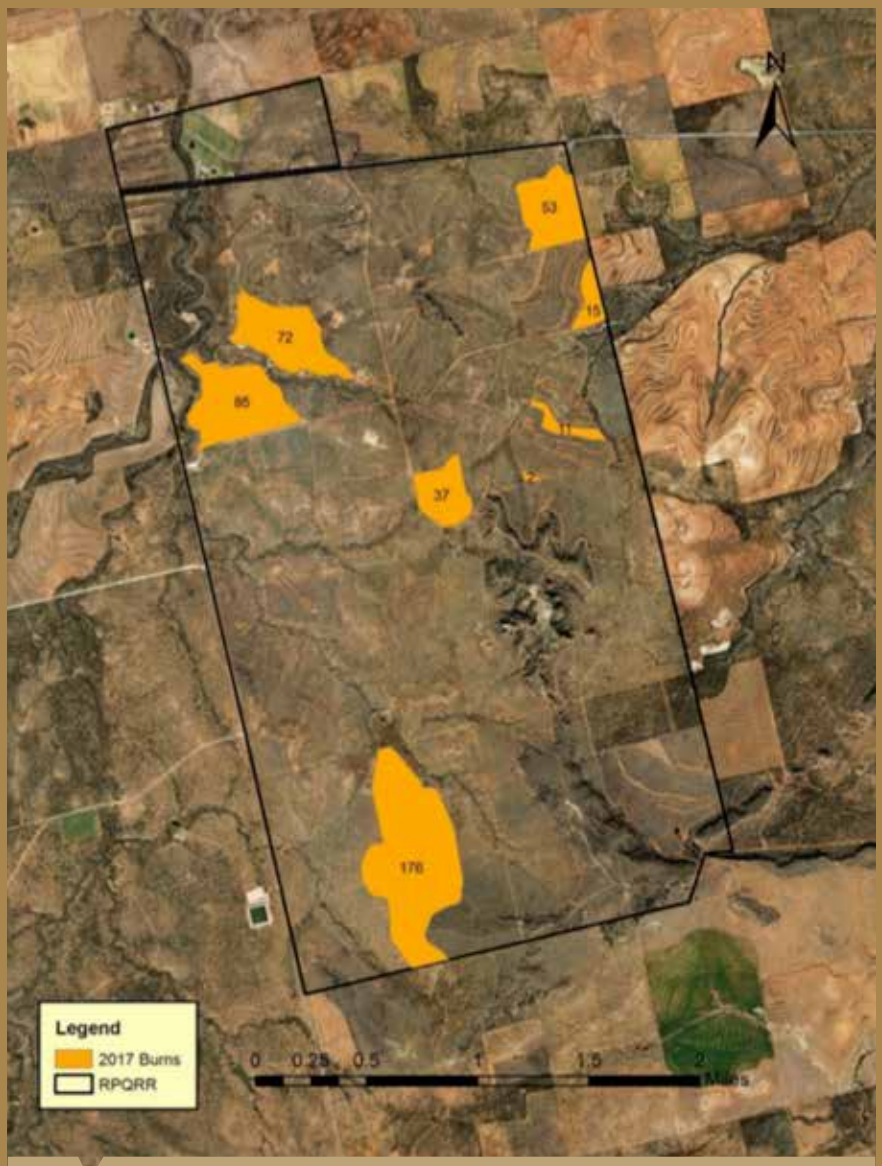


Figure 1. RPQRR burn plots.

1) PRESCRIBED BURNING: 451 ACRES

2) PLANTED 162 AND 95-ACRE COOL SEASON PLOTS WITH 80% WHEAT AND 20% HAIRY VETCH

3) PLANTED 67-ACRE WARM SEASON PLOT WITH MILO

4) PLANTED MEANDERING SORGHUM ALMUM STRIPS THROUGHOUT THE RANCH AND ON AREAS DISTURBED BY OIL FIELD ACTIVITY

5) INDIVIDUAL PLANT TREATMENT (IPT) ACROSS 100 ACRES USING SENDERO ON MESQUITE REGROWTH

FOOD PLOTS AT RPQRR

Lloyd M. LaCoste
Rolling Plains Quail Research Foundation

Figure 1. Planting food plots at RPQRR.

The strongest bobwhite populations in the state of Texas occur in semi-arid environments (e.g., South Texas, Rolling Plains) dominated by El Nino/ La Nina weather patterns. Consequently, food plots for quail are controversial because of the irony that "when we need them, we can't grow them; and when we can grow them, we don't need them."

Furthermore, the notion that food is rarely a limiting factor for bobwhite suggests food plots may not necessarily increase bobwhite abundance. Rather, a prominent management philosophy to increase abundance has become to increase usable space. If food plots are planted in an area that is not fully usable, it is possible (theoretically) to increase habitat quality with food plots. At RPQRR, we use this concept to manage Conservation Reserve Program (CRP) fields recently withdrawn from the program. The CRP fields at RPQRR are largely dominated by Kleingrass, and brush cover is limited because of the program requirements. As such, planting strips between terraces serves to increase bare ground, plant diversity, and screening cover. The plots within the CRPs are planted to a mix of wheat and hairy vetch, milo, or sorghum almum. In addition to planting in the former CRP fields we plant food plots with the same combination of plants near the headquarters for demonstration purposes, and to provide dove hunting opportunities. In 2017 RPQRR planted a total of 162 acres. Ninety five acres were cool season plantings with a ratio of 80% wheat and 20% hairy vetch, and 67 acres were planted with milo, and sorghum almum.

DEVELOPMENT OF FIRE PLOTS

Bradley W. Kubecka
Rolling Plains Quail Research Foundation

In 1959, Herbert Lee Stoddard, the 'Father of Bobwhite Management' established 84 one-half acre fire plots at Tall Timbers Research Station (TTRS) in Tallahassee, FL. His objectives were to evaluate the effects of fire return intervals on vegetation. For nearly 70 years, the plots have been burned systematically and serve as excellent demonstration and research plots for TTRS.

Burning in semi-arid regions, however, can yield drastically different responses based on post-burn weather conditions. As such, the RPQRR established 31 one acre fire plots to serve as demonstration and research plots in west Texas. The plots will have replicates of varying fire return intervals along with paired non-burned plots. The fire plots will meet their first drip torch this winter.

SOCIAL MEDIA PRESENCE

FACEBOOK @RPQRR

Year to Date Followers: 6,313

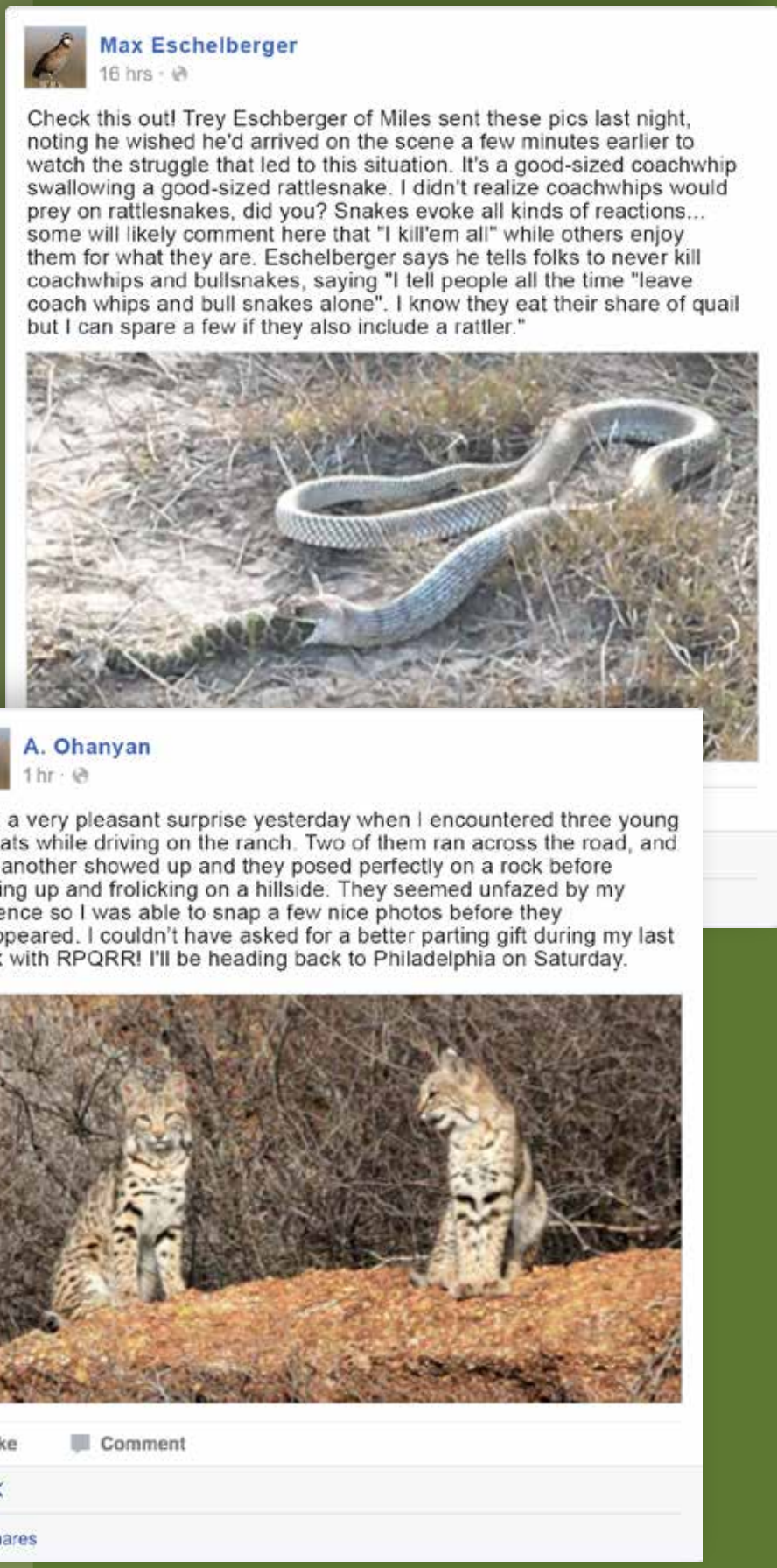
Total Daily Page Engaged Users: 170,628

(number of unique users who engaged with the page)

Cumulative Daily Reach: 1,554,700

(number of unique users who saw content)

TOP POSTS FROM 2017:



GEOGRAPHIC SURVEY OF *OXYSPIRURA PETROWI*

AMONG WILD NORTHERN BOBWHITES IN THE UNITED STATES

Bradley W. Kubecka, Andrea Bruno, and Dale Rollins Rolling Plains Quail Research Foundation

Recent speculation of eyeworms (*Oxyspirura petrowi*) as a potential factor associated with declining populations of northern bobwhite (*Colinus virginianus*) warranted a large-scale geographic investigation of eyeworm prevalence in bobwhites. Our objective was to document prevalence of eyeworms across the geographic range of wild bobwhites in the United States. We examined 782 wild, hunter-donated bobwhites across 9 states from the 2013–2015 hunting seasons. We received samples from Alabama, Georgia, Iowa, Kentucky, Louisiana, Missouri, Oklahoma, Virginia, and Texas; each state had at least 2 sampling areas. Of the 9 states, 4 harbored infected individuals. Prevalence rates were 59.1%, 52.1%, 14.8%, and 1.6% for Texas (n = 110), Oklahoma (n = 121), Virginia (n = 27), and Alabama (n = 61), respectively. Average intensities were 15.6 3 2.1 (95% CI = 13.5–17.7), 6.9 3 1.2 (95% CI = 5.7–8.1), 2.5 3 1.0 (95% CI = 0–8.1), and 2 worms in Texas, Oklahoma, Virginia, and Alabama, respectively. Prevalence and intensity of eyeworms in the Rolling Plains of Texas were significantly higher ($P < 0.001$, $P = 0.002$, respectively) than that of any other area sampled. Based on our survey, eyeworms are locally prevalent and abundant in bobwhites from the Rolling Plains ecoregion, but virtually non-existent in many areas that were surveyed.

Table 1. Prevalence (percent of hosts infected), mean intensity (average eyeworms per infected host), and mean abundance (average for total sample) of *Oxyspirura petrowi* from northern bobwhites (*Colinus virginianus) across 8 states.*

			Intensity		Abundance	
State	*n*	Prevalence No. (%)	$\bar{x} \pm$ SE	Range	$\bar{x} \pm$ SE	Total
Alabama	61	1 (2)	2 ± N/A	1-2	<0.1 ± <0.1	2
Georgia	79	0	0	0	0	0
Iowa	56	0	0	0	0	0
Kentucky	36	0	0	0	0	0
Louisiana	25	0	0	0	0	0
Missouri	267	0	0	0	0	0
Oklahoma	121	63 (52)	6.9 ± 1.2	1–56	3.6 ± 0.7	433
Virginia	27	4 (15)	2.5 ± 1.0	1–5	0.4 ± 0.2	10
Texas[a]	110	65 (59)	15.6 ± 2.1	1–79	9.2 ± 1.4	1015

3a Rolling Plains ecoregion (Gould 1975)

NEW HOST RECORDS OF A PARASITE IN NORTH AMERICAN BIRDS –

NORTHERN BOBWHITE AND SCALED QUAIL

Bradley W. Kubecka and Dale Rollins
Rolling Plains Quail Research Foundation

Nicole Traub, Taylor Shirley, Alan Fedynich
Caesar Kleberg Wildlife Research Institute
Texas A&M University–Kingsville

Vasyl V. Tkach
University of North Dakota Grand Forks

Figure 1. Northern bobwhite (Colinus virginianus) heart with tetrathyridia of Mesocestoides sp. under the pericardial sac collected during February 2017 in Mitchell County

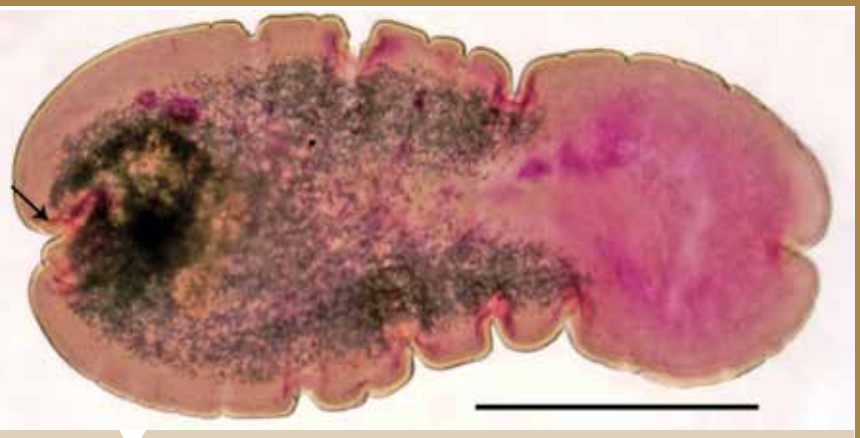


Figure 2. Total mount of tetrathyridium of Mesocestoides sp. from Northern bobwhite (Colinus virginianus). Note the invaginated anterior (indicated by arrow) and posterior end, and numerous calcareous corpuscles in parenchyma of the metacestode that appear as dark inclusions in the stained specimen. Scale-bar: 1mm.

Tetrathyridia of the genus Mesocestoides were found under the pericardial sac, on the surface of the crop, and in the body cavity of a hunter-harvested northern bobwhite (*Colinus virginianus*) and a scaled quail (*Callipepla squamata*) collected during the 2016–2017 hunting season in northwest and southern Texas, respectively.

Mesocestoides spp. exhibit a cosmopolitan distribution with zoonotic potential. The pathogenicity of Mesocestoides is low, and human infections occur from consuming raw or undercooked meat containing tetrathyridia. Molecular analysis has demonstrated that the tetrathyridia from the quails likely belong to an undescribed species and are identical to pre-tetrathyridium stages recently found in Scincella lateralis skinks in Oklahoma. This is the first report of Mesocestoides from North American birds. Recent helminth surveys of quails from Texas have been extensive, and comprehensive helminth surveys have been conducted across their geographic range. Thus, the occurrence of Mesocestoides in quails, or any New-World birds, is rare and likely incidental. Regardless, hunters should assure their harvest is washed and cooked thoroughly before consumption. Additionally, we suggest that intestines and internal organs not being consumed be disposed in a place not accessible to pets or other wildlife.

NEST SITE SELECTION

TO RANCH ROADS

Bradley W. Kubecka
Rolling Plains Quail Research Foundation

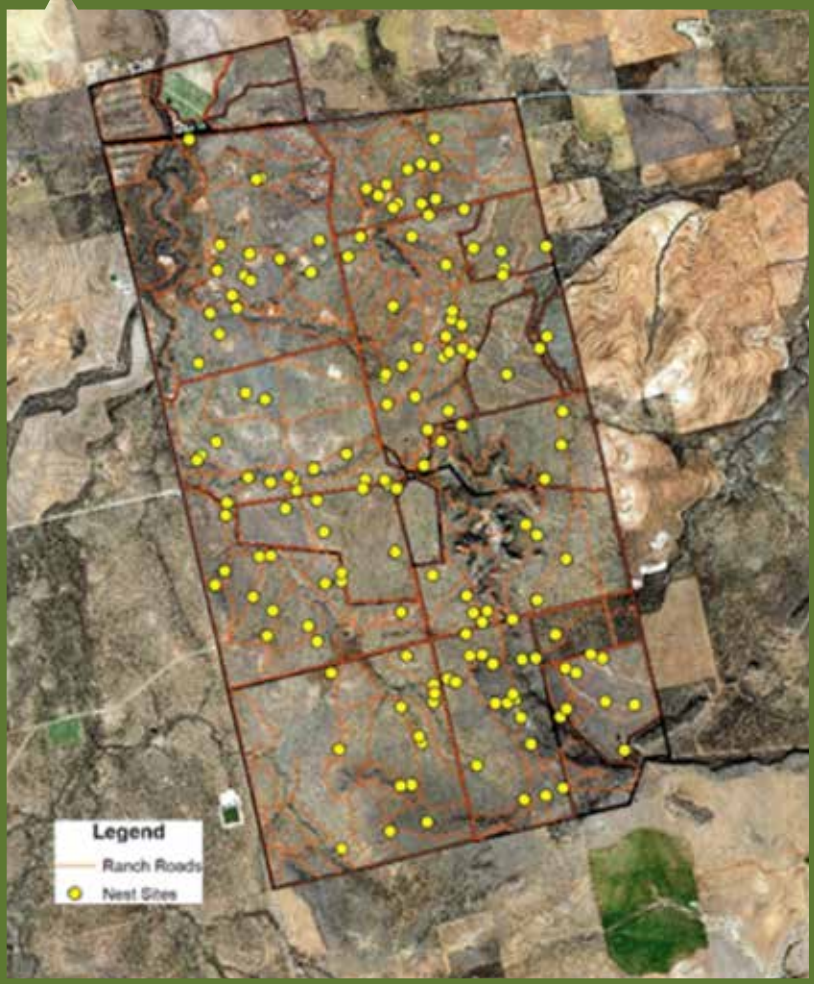
Road ecology is an important aspect to wildlife management at RPQRR because energy development (e.g., oil wells) is often concomitant with intricate road systems. Additionally, mesopredators are known to use roads for travel. Descriptive analysis of bobwhite nest sites indicated that nests are typically found near ranch roads at RPQRR. However, RPQRR has 91 miles of ranch roads. As such, simply because nests are close to roads does not imply selection. Thus, I mapped actual nest sites from 2012–2017 (n = 155) and generated random points (n = 155) across RPQRR. I digitized all ranch roads and used the near tool in ArcMap to calculate the perpendicular distance to the nearest road. I used the simple saddlepoint approximation to estimate a probability density function (DeMaso et al. 2011) for actual nest sites [f(x)] and random points [g(x)], and calculated a continuous selection function [u(x)= f(x)/g(x)] of random vs. actual nests. The selection function was interpreted similar to a discrete selection ratio where u(x) > 1 suggests use greater than availability, and u(x) < 1 indicates avoidance.

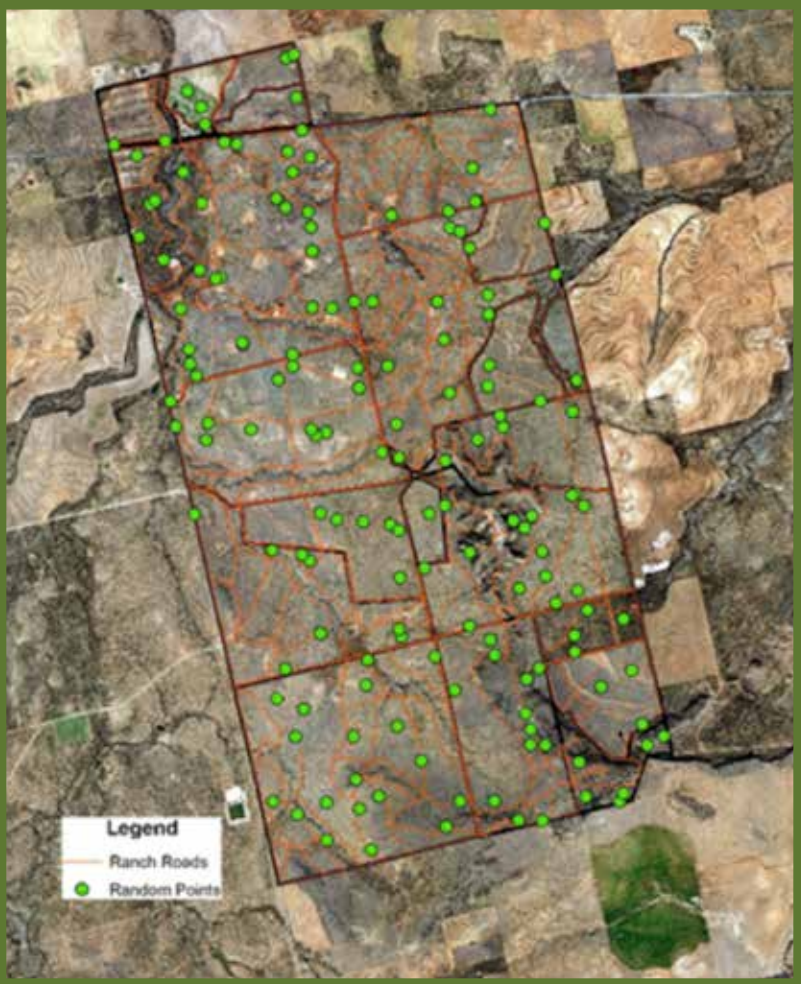
The selection function suggested that bobwhites selected for nest sites < 55 m from a road.

Interestingly, Palmer et al. (this volume) found that the likelihood of a nest succeeding declined as distance from road increased. From their data, the odds of a nest failing was 2 : 1 at 59 m from a roads' edge. Collectively, these data support the claims of Rosene (1969:63) and Lehmann (1984:81–82) that nesting bobwhites prefer areas near roads or openings such as cattle trails or clear cuts. These results do not imply that roads benefit bobwhite demography, but rather suggest that we failed to find a negative effect by roads within the context of our study area.

Figure 1. Continuous selection function of Northern bobwhite (Colinus virginianus) nest sites (n = 155) in relation to ranch roads at the Rolling Plains Quail Research Ranch during 2012–2017.

Figure 2. Maps of A) Northern bobwhite (Colinus virginianus) nest sites (n = 155) during 2012–2017, and B) randomly generated points (n = 155) at the Rolling Plains Quail Research Ranch.





OXYSPIRURA PETROWI INFECTIONS

OF SYMPATRIC NORTHERN BOBWHITES & RIO GRANDE WILD TURKEY

Bradley Kubecka, Andrea Bruno, and Dale Rollins
Rolling Plains Quail Research Foundation

The Rolling Plains ecoregion of Texas hosts the highest known prevalence and intensity of eyeworms (*Oxyspirura petrowi*) among Northern bobwhites (*Colinus virginianus*) in the United States.

Given the precipitous decline of the bobwhite, eyeworm infections have gained the attention of researchers and wildlife managers. Because Rio Grande wild turkeys (RGWT; Meleagris gallopavo intermedia) are galliformes with similar diets and life characteristics we hypothesized that RGWT are also infected by eyeworms.

Our objective was to compare prevalence and intensity between sympatric bobwhites and RGWT in the Rolling Plains.

We dissected 104 heads of RGWT and 50 bobwhites from a 27,530 ha area in Roberts County, TX, USA.

Only 1 turkey (adult hen) was infected with a single eyeworm. Prevalence, mean abundance (3 SE) and mean intensity (3 SE) among bobwhites on the same area was 58%, 7.6 3 1.8, and 7.9 3 1.9, respectively.

We surmise that RGWT are likely consuming intermediate hosts that contain infected larvae of eyeworms, but O. petrowi infections are incidental among wild turkeys in the Rolling Plains. Our findings support the findings of other studies across the United States that also indicate wild turkeys are not susceptible hosts for *O. petrowi.*

HABITAT SUITABILITY MODELS

FOR BOBWHITES

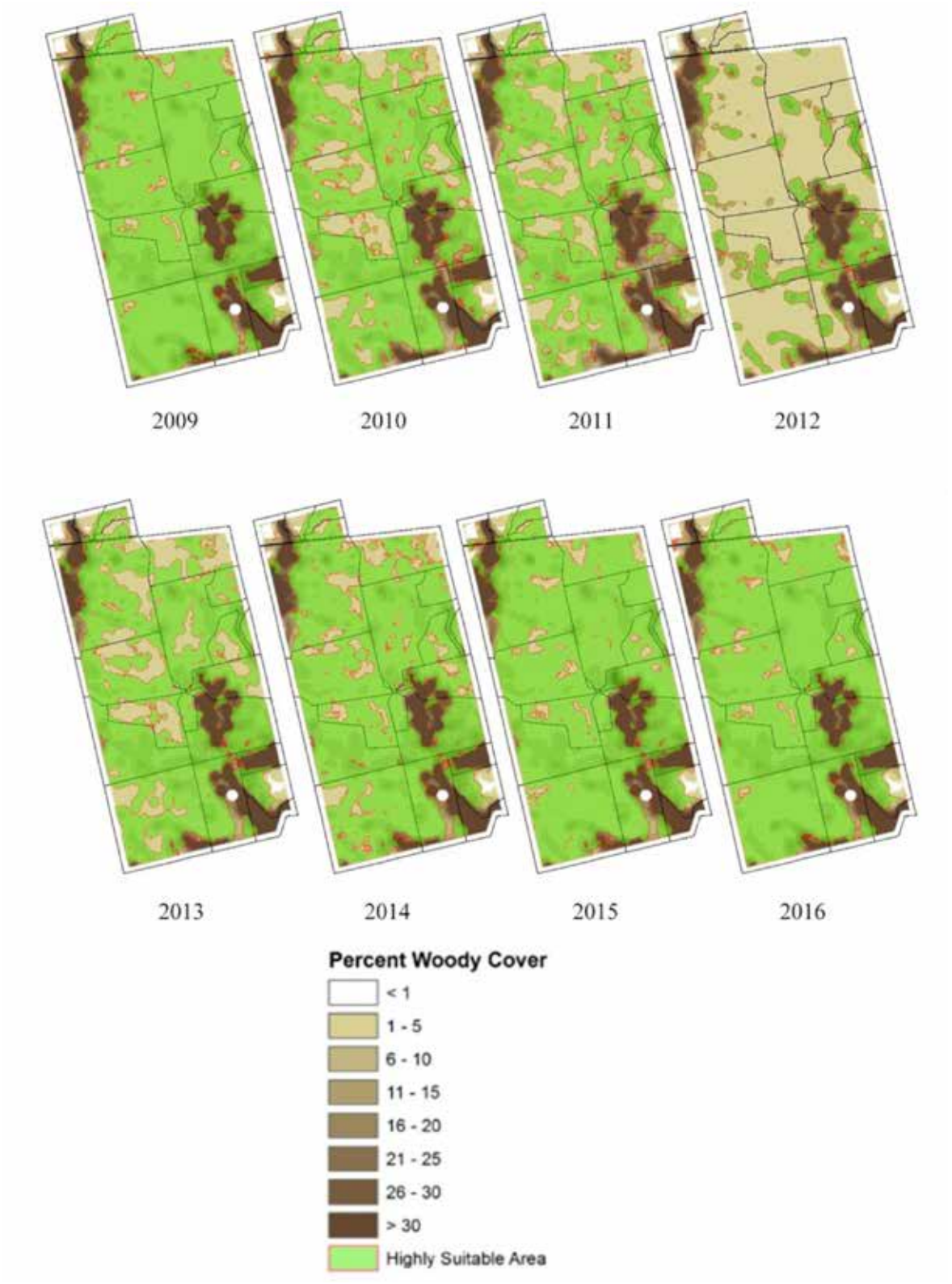
Bradley Kubecka and Dale Rollins
Rolling Plains Quail Research Foundation

Fidel Hernandez and Humberto Perotto-Baldivieso
Caesar Kleberg Wildlife Research Institute
Texas A&M University–Kingsville

We classified satellite imagery of woody cover and built habitat suitability maps based on 6 woody cover metrics and bobwhite abundance. We evaluated relationships of woody cover and bobwhite abundance at 2 scales: 1) 100 m surrounding trap sites to mimic the home range of a bobwhite, and 2) habitat suitability (low, medium, and high) at the ranch scale. At the trap scale, the only competitive model (< 2$\triangle$AICc) relating mean bobwhite abundance to woody cover was Precipitation (PRECIP) + Mean Patch Area (MPA) + MPA^2 + PRECIP*MPA^2 + Clumpiness Index (CL). This model, however, explained very little of the variation in bobwhite abundance (R^2 = 0.16). Brush cover means differed among habitat-suitability classes ($P < 0.001$) at the ranch scale. Low, medium, and high suitability classes were characterized by average woody cover estimates of 36.7%, 19.2%, and 5.7%, respectively.

We observed that areas of high suitability spatially constricted to areas possessing the greatest woody cover when precipitation decreased and expanded into include areas of lower woody cover when precipitation increased. As rainfall decreased, bobwhites tended to occupy areas with higher LPI (R^2 = 0.46, P = 0.07) and CL (R^2 = 0.44, P = 0.07) values.

However, percent woody cover characterizing highly suitable areas remained constant among various rainfall measures (P = 0.98). As rainfall increased, low suitability classes were characterized by greater amounts of woody cover (P = 0.01). Woody cover requirements for bobwhites varied by location and year. No single patch configuration tended to perform best, but larger and clumpier woody patches tended to be occupied by proportionally more bobwhites during dry years. Managers pursuing brush control should consider 6–20% canopy cover at varying patch sizes and configurations when sculpting brush for bobwhites.


2009
2010
2011
2012
2013
2014
2015
2016
Percent Woody Cover
< 1
1 - 5
6 - 10
11 - 15
16 - 20
21 - 25
26 - 30
> 30
Highly Suitable Area

ARTIFICIAL NEST ACCURACY

& FACTORS INFLUENCING NEST SUCCESS FOR NORTHERN BOBWHITE

Christine Palmer, Bradley W. Kubecka, Dale Rollins, and Becky Ruzicka
Rolling Plains Quail Research Foundation

Nest success of northern bobwhites (*Colinus virginianus*) is a key variable in quail production. Anthropogenic factors such as roads and quail feeders are speculated to reduce nesting success by increasing nest depredation. Artificial nests have been used to evaluate the influence of roads and feeders on nesting success, however, using artificial nests to depict actual nest success has been questioned, and empirical results are equivocal. Our objectives were to 1) compare nest success between artificial nests (n = 705) and actual nests (n = 135), and 2) analyze the influence of age, year, gender, and nest proximity (meters) to quail feeders and roads on bobwhite nest success using data from the Rolling Plains Quail Research Ranch, 2012–2017. We found no correlation between success of artificial and bobwhite nests (P = 0.87). We used a backward stepwise selection in a logistic regression framework to determine the candidate variables included in the final model. Age and nest proximity to road were both significant predictors of bobwhite nesting success. Juveniles (i.e., first year breeders) exhibited higher nest success (70.7%, n = 92) than adults (50%, n = 62, P = 0.01).

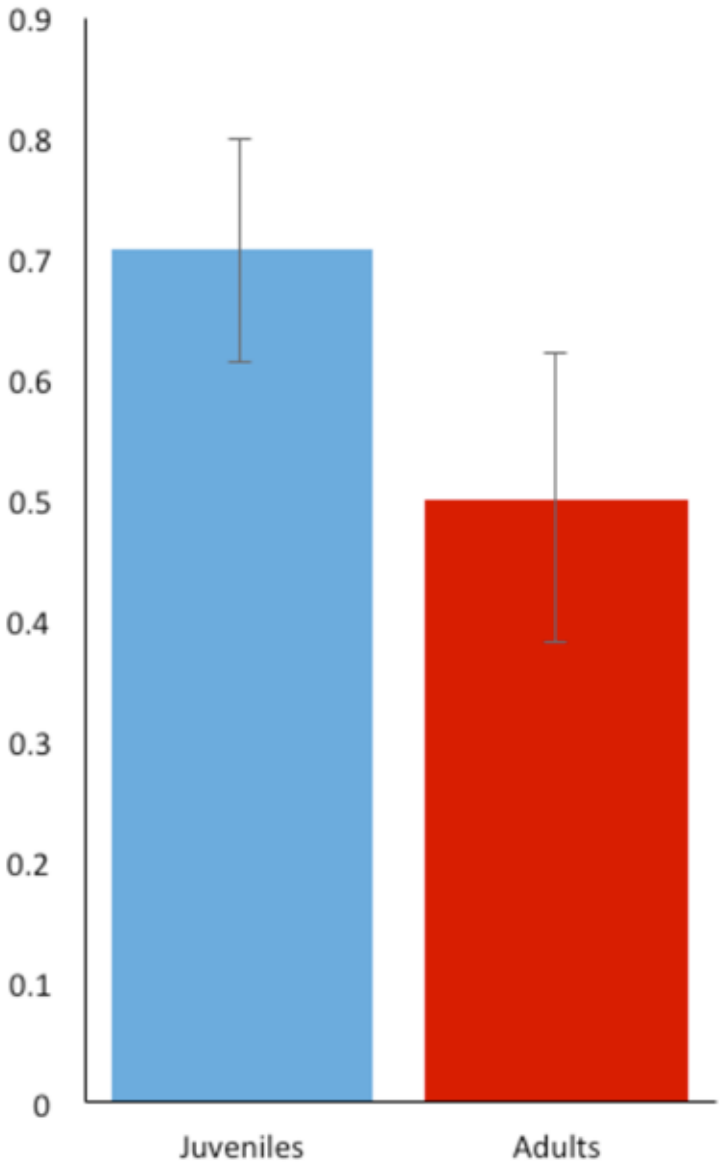


Figure 1. Apparent nest success of Northern bobwhite (Colinus virginianus) by age during 2012–2017 on the Rolling Plains Quail Research Ranch, Fisher County, TX, USA. Error bars represent 95% confidence intervals about the binary means as calculated by the Adjusted Wald Technique. First year breeders are considered juveniles.

Likelihood of bobwhite nests hatching increased as their distance to roads declined (P = 0.005, β=-0.012 3 0.004 [SE]). Our results suggest researchers should heed caution when making inferences using artificial nest data. Anthropogenic factors did not negatively influence nest success within the context of our study area.

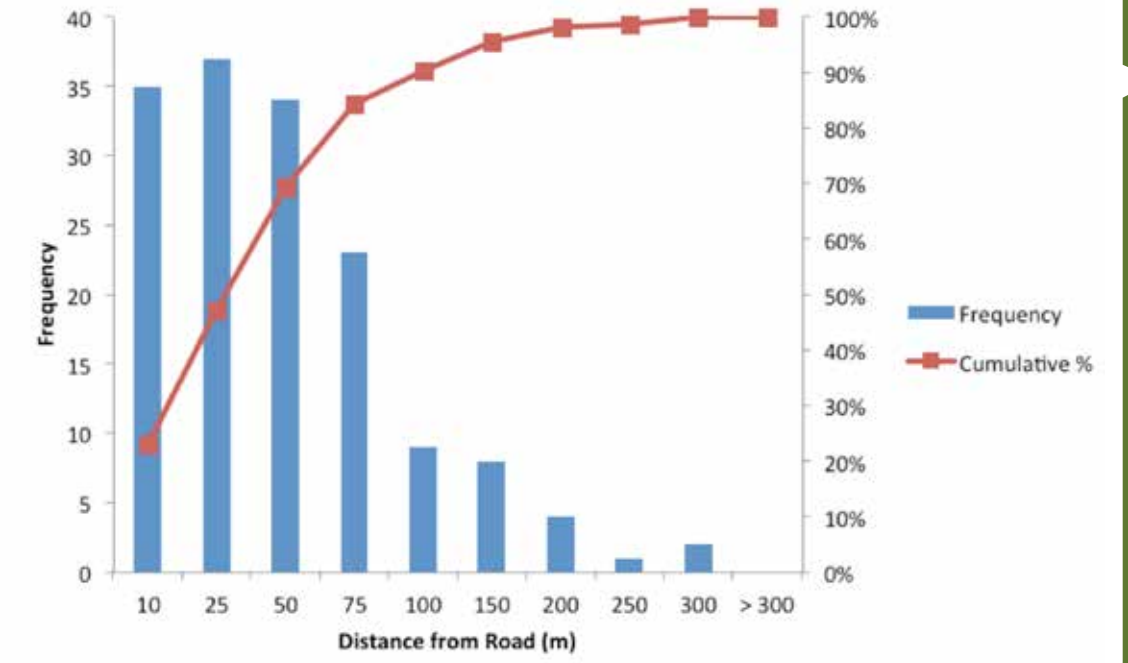
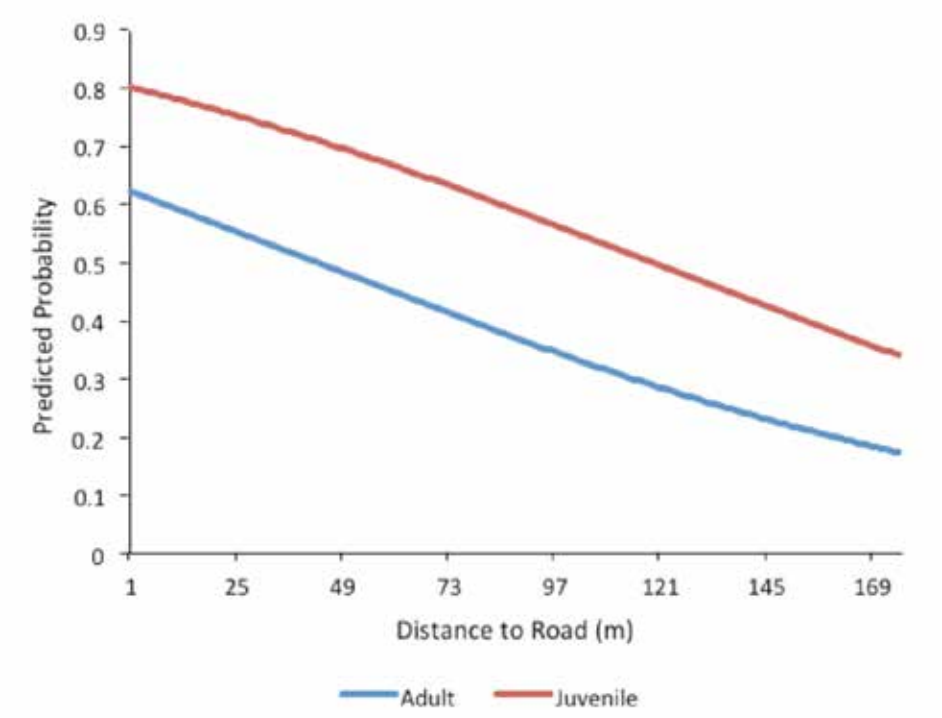


Figure 2. Distribution of Northern bobwhite (Colinus virginianus) nest distance to nearest ranch road during 2012–2017, Rolling Plains Quails Research Ranch.

Figure 3. Predicted probability of nest success for Northern bobwhite (Colinus virginianus) by age and distance to ranch roads during 2012–2017 at the Rolling Plains Quail Research Ranch



COYOTE DIETS

ON THE ROLLING PLAINS QUAIL RESEARCH RANCH DURING EL NIÑO WEATHER CYCLE

Cade Bowlin Texas Tech University, Lubbock, TX

Coyotes are common mesopredators on RPQRR. As such, they warrant investigation as to their influence on quail populations and to determine if coyotes are significant predators of quail and quail nests.

Mark Tyson conducted a coyote dietary study on the Ranch during the La Niña weather phase of 2009-11. During all three years of the study, precipitation was below 30-year mean with 2011 one of the hottest, driest years in Texas history. Tyson collected 1,080 scats along the Texas Quail Index (TQI) of RPQRR.One scat contained quail remains (0.1%) and eggshells were found in just 2 (0.2%) scats. An El Niño cycle has been in place in the Rolling Plains since summer 2015 and RPQRR has seen record precipitation and quail abundance. In an effort to investigate how coyote diets change during La Niña vs. El Niño cycles, I collected 30 coyote scats monthly along the TQI from November 2015 to February 2017 (n=480). Scats are analyzed using micro- and macroscopic techniques to identify food items present.

Food items found in scats are compared to reference collections for positive identification. Analysis is complete for 301 of 480 scats and of these completed scats, small mammals comprise four of the top five food items for coyotes during the study period.

Figure 4 Sigmodon hispidus (cotton rat) skull recovered in coyote scat on RPQRR during study period Nov 15-Feb 17

The primary small mammals consumed were *Sigmodon* (cotton rats), occurring in 74.6% of scats, and Neotoma (wood rats), found in 26.7% of scats. Feathers have been confirmed in 6 scats, one of which was from a bobwhite (0.33%). Eggs have occurred in 4.2% of scats, although it is difficult to determine species origin from eggshell remains. Interestingly, remains of badger (*Taxidea taxus*) and Mexican ground squirrels (*Spermophilus mexicanus*) have been found in 1 and 2 scats, respectively. Badgers and ground squirrels are confirmed nest predators of quail on RPQRR from camera trapping data.

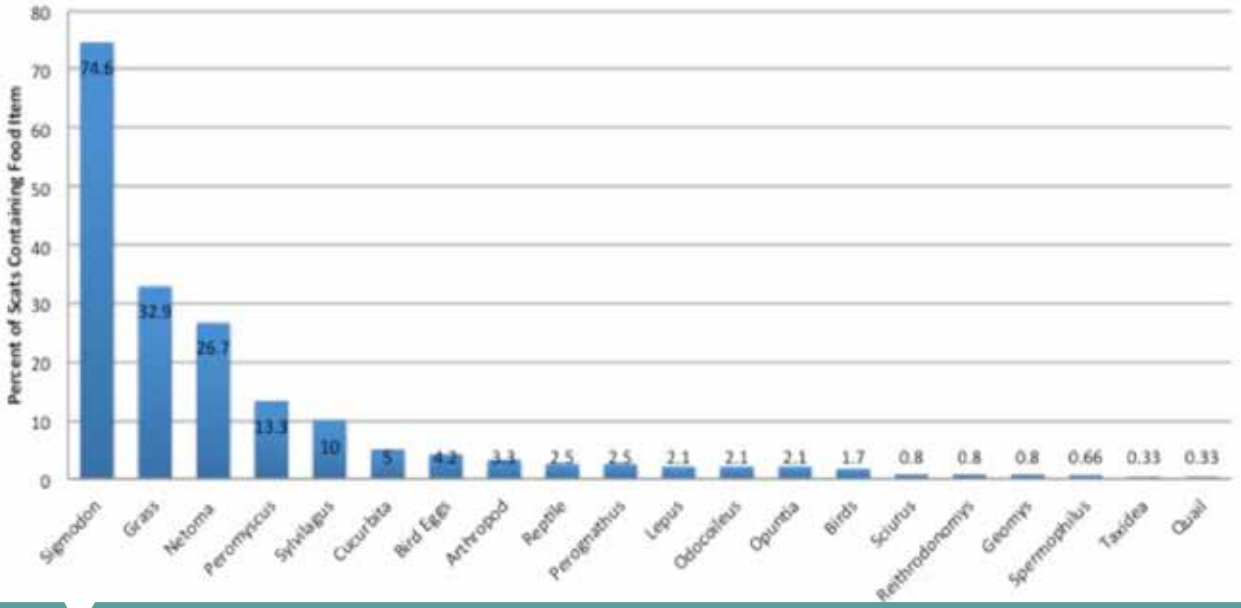


Figure 5. Percent occurence(perent of scats containing a particular food item) of food items found in coyote scats (N=301) collected on the Rolling Plains Quail Research Ranch.

AN EVALUATION OF POPULATION COUNTS

FOR BOBWHITES

Bradley W. Kubecka and Dale Rollins
Rolling Plains Quail Research Foundation

Fidel Hernandez and Humberto Perotto-Baldivieso
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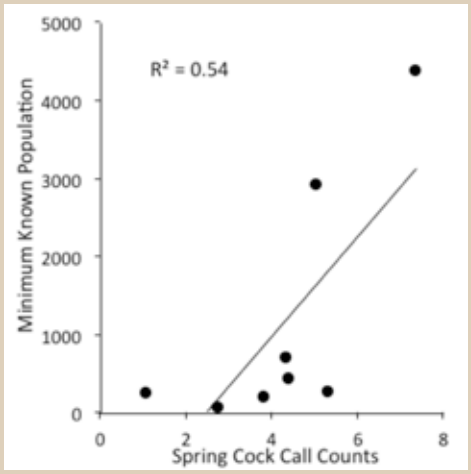
We compared spring cock call counts, fall covey call counts, roadside counts, and helicopter counts to minimum known populations (MKP) and mark-recapture estimates at the Rolling Plains Quail Research Ranch (RPQRR) in Fisher County, TX during 2009–2016. Spring cock call counts and fall covey call counts were analyzed at 2 spatial scales– ranch-wide and within the radius of audibility of listening stations (600 m). At the ranch-wide scale, the annual mean of spring cock call counts was a moderate predictor of fall MKP (R^2 = 0.54, P = 0.04) but good predictor of fall abundance (R^2 = 0.80, P = 0.02). However, at the listening station scale, the mean number of cocks heard at each listening station were poor predictors of densities surrounding call stations (R^2 = 0.02, P = 0.29). The average number of coveys heard during fall covey call counts was a significant predictor of both MKP (R^2 = 0.88, P < 0.001) and fall abundance (R^2 = 0.84, P = 0.01). Similar to spring cock call counts, however, covey calls were a poor predictor of densities surrounding listening stations (R^2 = 0.11, P = 0.11).

Helicopter surveys (individuals / km) were a significant predictor of MKP (R^2 = 0.99, P < 0.001) and fall abundance (R^2 = 0.93, P = 0.002). Overall, roadside counts (individuals / km) were the best index for predicting MKP (R^2 = 0.996, P < 0.001) and fall abundance (R^2 = 0.98, P< 0.001). Generally, indices were good predictors of general abundance across RPQRR, but poor predictors of density at a smaller scale.

*Scatterplots of **spring** cock call counts and A) minimum known population, B) fall abundance estimated using mark-recapture, and C) fall density surrounding listening points estimated using distance sampling, Rolling Plains Quail Research Ranch, Fisher County, Texas, 2009–2016.*



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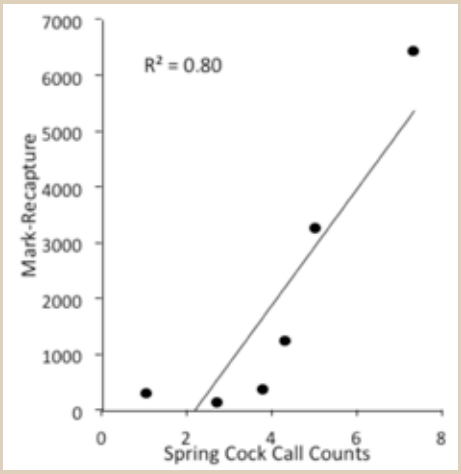

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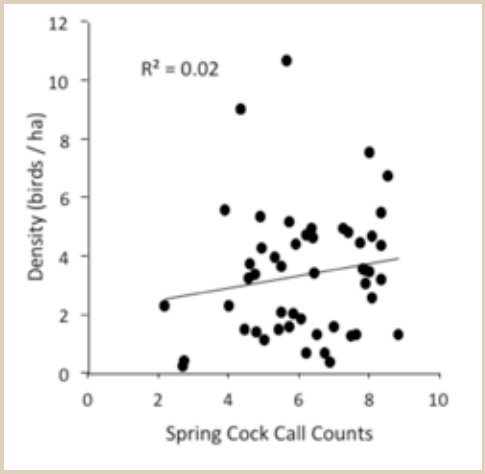
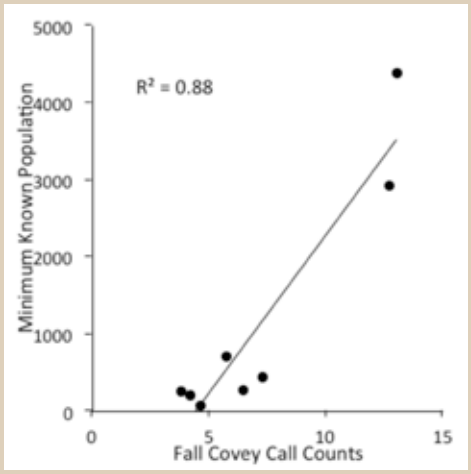


C.

*Scatterplots of **fall** covey call counts and A) minimum known population, B) fall abundance estimated using mark-recapture, and C) fall density surrounding listening points estimated using distance sampling, Rolling Plains Quail Research Ranch, Fisher County, Texas, 2009–2016.*



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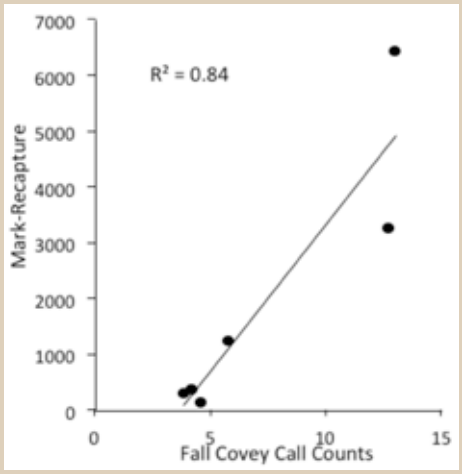

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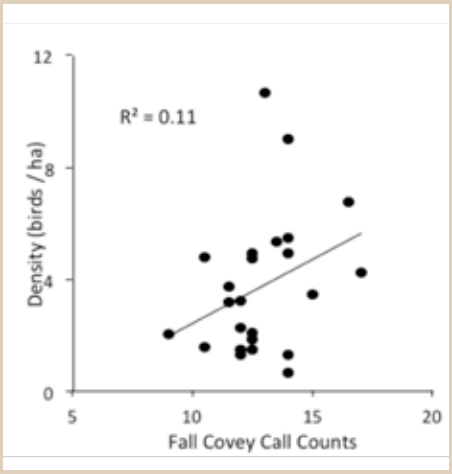
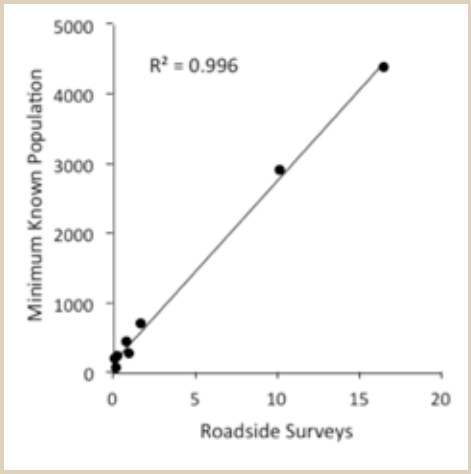


C.

Scatterplots of roadside counts and A) minimum known population, and B) fall abundance estimated using mark-recapture, Rolling Plains Quail Research Ranch, Fisher County, Texas, 2009–2016.



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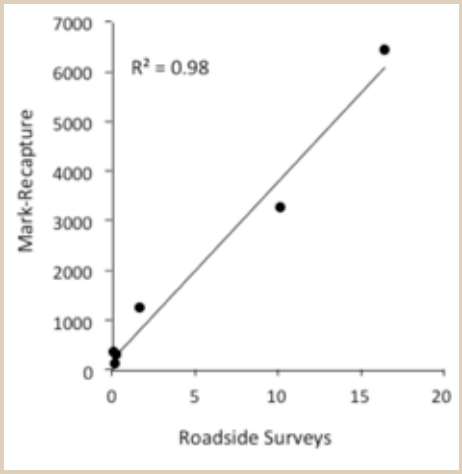
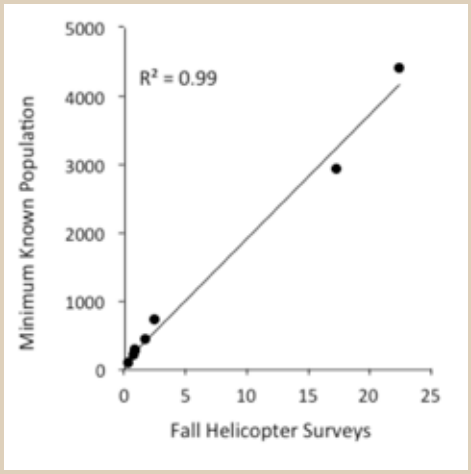


B.

Scatterplots of November helicopter surveys (individuals / km) and A) minimum known population, and B) fall abundance estimated using mark-recapture, Rolling Plains Quail Research Ranch, Fisher County, Texas, 2009–2016.



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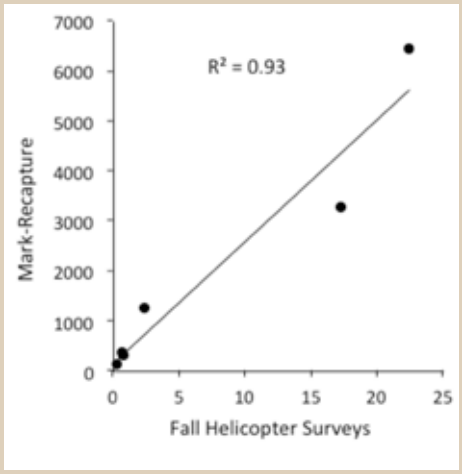


B.

MITIGATION STRATEGIES

FOR MONARCH BUTTERFLIES

Matthew Brym, Cassandra Henry, and Ronald Kendall
Wildlife Toxicology Laboratory, Texas Tech University, Lubbock

Monarch butterflies (*Danaus plexippus*) are an iconic species that have experienced a dramatic population decline over the past 20 years according to the US Fish & Wildlife Service.

The primary reason cited for this decline is loss of habitat, particularly the loss of milkweed plants (*Asclepias spp.*) upon which monarchs are uniquely dependent. Monarchs require adequate sources of milkweed and flowering plants throughout their migration, and this is especially important as the butterflies pass through a narrow corridor in Texas. Consequently, the protection and restoration of habitat in Texas is critical to monarch conservation.

The Wildlife Toxicology Laboratory at Texas Tech is conducting research to aid monarch conservation efforts by developing and evaluating the utilization of monarch sanctuaries in the Texas corridor. These sanctuaries will be used to bolster monarch habitat within West Texas, a region largely lacking in restoration initiatives.

In order to determine the best composition for these sanctuaries, we have established test plots in collaboration with the Rolling Plains Quail Research Ranch that utilize the spreader dams at the ranch.

Figure 1. Monarch butterfly (Danaus plexippus) caterpillars feeding on a green milkweed (Asclepias viridis) within a monarch sanctuary.

We planted several species of milkweed, such as antelope horn milkweed (*A. asperula*) within the spreader dams. Additionally, we seeded plots with a variety of native flowering plants. This composition of milkweed and flowering plants is well suited to the environmental conditions at the ranch and will confer benefits to monarchs and local wildlife throughout the year. Monarch sanctuaries will provide breeding habitat and nectar for monarchs as well as other pollinators, while also producing food and cover for valuable game such as Northern bobwhite quail (*Colinus virginianus*). The development and success of the test plots is regularly monitored, and over time, we will arrive at an ideal plant composition for use in future restoration efforts to benefit monarchs, pollinators, and Northern bobwhite quail.

MOLECULAR ASSESSMENT OF PARASITIC INFECTION

IN NORTHERN BOBWHITE QUAIL OF ROLLING PLAINS, TX UTILIZING A MOBILE LABORATORY PLATFORM

Kendall Blanchard and Ronald Kendall
Wildlife Toxicology Laboratory, Texas Tech University, Lubbock

In recent surveys, northern bobwhite (*Colinus virginianus*) of the Rolling Plains ecoregion have been identified as hosts for the eyeworm (*Oxyspirura petrowi*) and cecal worm (*Aulonocephalus pennula*) with >90% infection rate depending on environmental conditions. As technology has progressed, multiplex quantitative PCR (qPCR) has emerged as a widely accepted method to non-lethally assess humans and animals for parasitic infection. It is a cost-effective and time-efficient technique to accurately detect parasite infection using fecal samples.

A mobile research laboratory has been developed in congruence with this multiplex qPCR method to specifically test for these parasites' eggs in bobwhite quail feces and test insect intermediate host for the infective larvae of these parasites. The objectives of the mobile research laboratory include 1) identify areas of high, medium, and low parasitic infection in quail populations in the Rolling Plains, 2) identify larvae presence in insect intermediate hosts relative to these areas, and 3) analyze seasonal variations affecting parasite activity in quail.

Figure 1. State-of-the-art mobile laboratory.

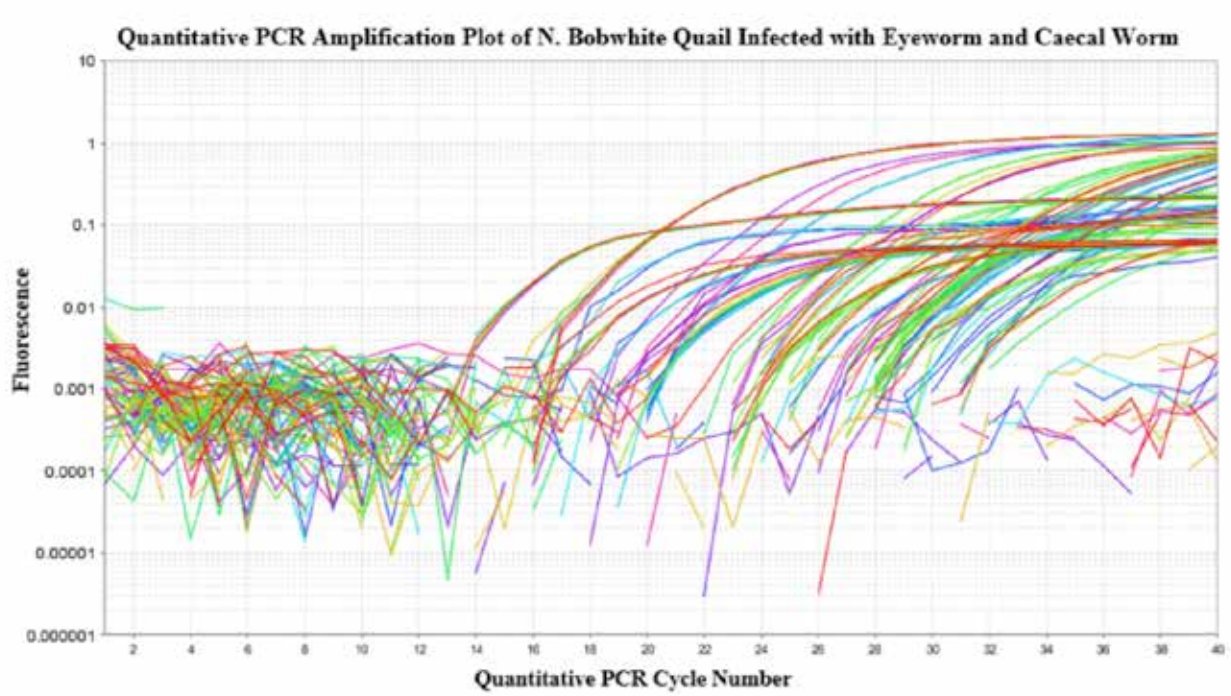


Figure 2. Quantitative PCR amplification plot generated in the mobile research laboratory depicting eyeworm and/or cecal worm infection in N. Bobwhite quail fecal DNA samples from 2014-2017. Fluorescence peaks amplifying at ≥0.01 represent quantifiable presence of parasite eggs dependent on quantitative PCR cycle number.

EFFECTS OF SOURCE POPULATION AND RELEASE STRATEGY

ON SURVIVAL, DISPERSAL, AND NESTING SUCCESS OF TRANSLOCATED SCALED QUAIL IN TEXAS

Becky Ruzicka and Dale Rollins
Rolling Plains Quail Research Foundation

Scaled quail (*Callipepla squamata*) have experienced a steep, -wide decline within the last 50 years. Similar declines have been documented in many species of gallinaceous grassland birds and the most widely accepted drivers are loss, fragmentation, and degradation of grassland habitats across the continent. Habitat loss that has contributed to scaled quail decline also inhibits recolonization. Translocation has become an increasingly popular tool to reestablish populations for recreational or conservational purposes. Overall success rate of translocations is low and has prompted research into factors that contribute to the establishment of a self-sustaining population. Source population and release strategy are two translocation tactics that may influence the success of scaled quail translocation efforts. Best practices for translocation are often species and location specific and, thus, it is critical for translocation techniques to be tested across a variety of species and landscapes. Our objective is to evaluate survival and dispersal of wild-caught, translocated scaled quail sourced from two distinct ecoregions in Texas and released using a delayed strategy consisting of 1-9 week holding period treatments.

Figure 1. Radio-collared hen released on the Knox County study site.

We translocated 388 (98 radio-marked hens) and 500 (113 radio-marked hens) scaled quail in 2016 and 2017, respectively, to a 40,000 HA release site in Knox County, Texas comprised of 3 contiguous private ranches.

We monitored hen survival, nesting attempts, nest success, and dispersal post-release April - Dec 2016 for hens released in 2016 and will continue the same monitoring protocol for hens released in 2017.

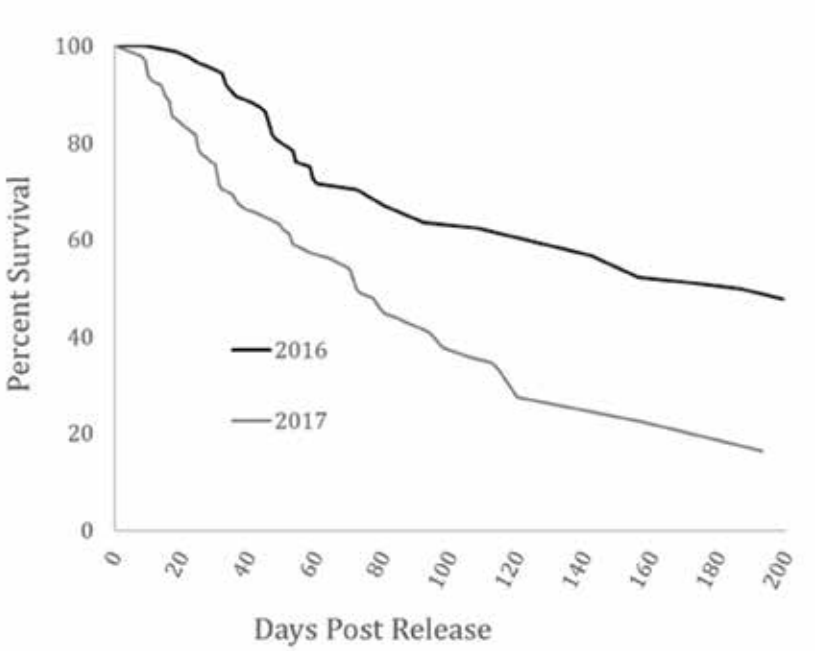


Figure 2. Comparison of 2016 and 2017 survival of wild-caught translocated hens 200 days post translocation.

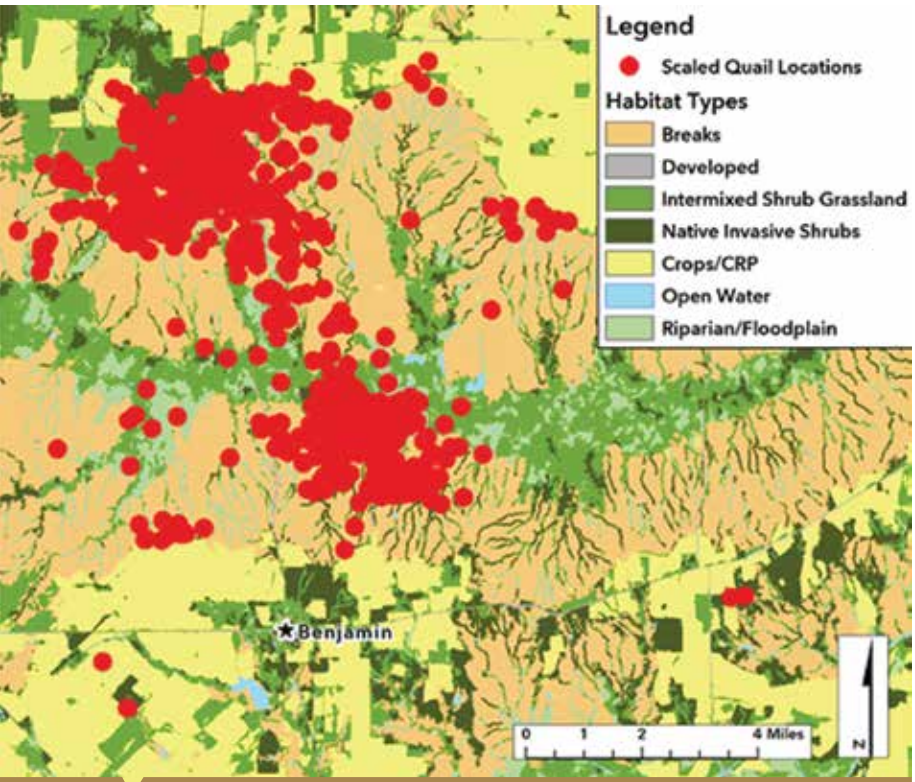


Figure 3. Map depicting approximately 3,000 locations of translocated scaled quail hens released from two points in the South Fork Wichita River Drainage, 2016-17.

Hens released in 2016 exhibited 55% survival during the monitoring period and initiated 54 nests, of which 50% were successful. Seventy percent of 2016 hens dispersed <3 km and the farthest dispersal distance recorded was 8 km. Sixteen percent of hens released in April 2017 have survived through 31 October 2017 (Figure 2). Hens initiated 47 nests in 2017 and nesting success was 34%.

Although, survival and nesting success was lower in 2017 compared to 2016, it was comparable to survival and nesting success on a resident (i.e., non-translocated population) on RPQRR. Dispersal in 2017 was similar to 2016 with the exception that the farthest dispersal distance we recorded was 15 km. Future analyses will use a multi-state framework in Program MARK to estimate weekly hen survival and movement probabilities of radio-tagged hens based on delayed release treatment and source population. Additionally, we will use nest survival models in Program MARK to evaluate nest survival as a function of delayed release treatment and source population.

WAGGONER RANCH

PILOT SCALED (BLUE) QUAIL TRANSLOCATION

Jason Davis W. T. Waggoner Ranch

The Waggoner Ranch is located on the far northeastern edge of historic blue quail range. Historically, it is believed that the quail population on the ranch was as much as 20-40% blue quail, though none have been observed over the last several decades while bobwhites are still common. As such, 100 wild blue quail were translocated on the ranch in partnership with the Rolling Plains Quail Research Foundation during May 2017. Quail were trapped in Borden County, transported to the release site, and held in surrogators 4-weeks prior to release.

We fitted 20 hens with VHF radiotransmitters (1 censored) and monitored them 2-4 times per month through September when the last known live hen was killed or disappeared. We recorded one attempted nest in a prickly pear, however after three weeks the nest was depredated. The quail dispersed long distances making tracking of live collared hens difficult. Five hens (26%) dispersed off site and were never found despite searching a wide area. Three hens (15%) were located only intermittently. Released quail also experienced a high mortality rate. Eleven (57%) of the hens were recovered as confirmed mortalities.

DOES ACCESS TO FEEDERS

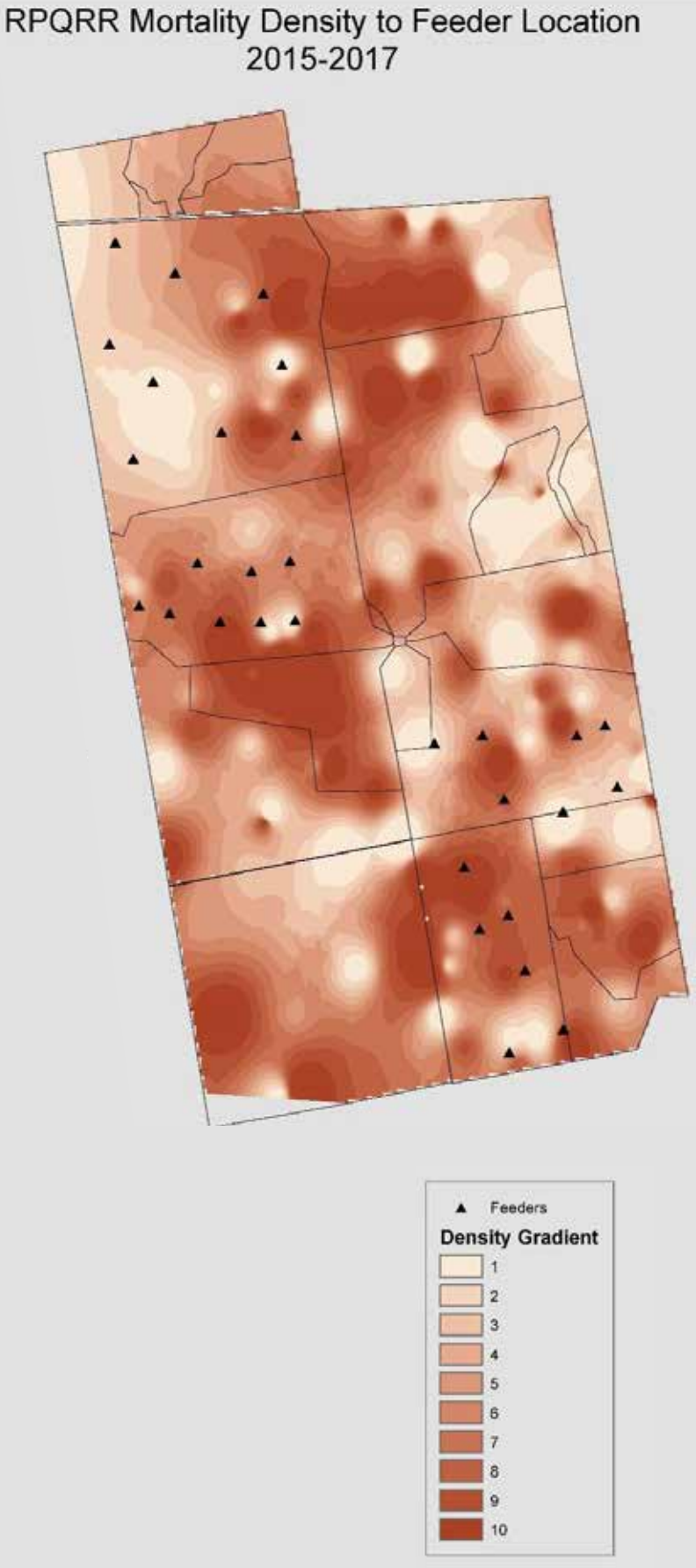
PREDISPOSE QUAIL TO PREDATION?

Jason Davis
W. T. Waggoner Ranch
Abilene Christian University

Dale Rollins
Rolling Plains Quail Research Foundation

Aggregation is an expected outcome of supplemental feeding regimes for northern bobwhite and scaled quail as birds are drawn into the food source.

While concentration of quail can be desirable for hunters, it may be offering predators an advantage as well by making quail more predictable. We wanted to determine if quail on the Rolling Plains Quail Research Ranch were more likely to be depredated when in proximity to long-term feeder locations. To address this, we 1) used ArcGIS to analyze 553 mortality locations collected via radio telemetry and GPS since March 2010, and 2) we will be monitoring feeder activity on 10 of 28 stationary feeders year-round for a 24-month period using Bushnell Trophy Cam HD game cameras.



Monitoring birds with radiotelemetry

MONITORING TEXAS HORNED LIZARDS

(*PHRYNOSOMA CORNUTUM*) 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.

Figure 1. Texas Horned Lizards captured at RPQRR.

We began preliminary data collection in the summer of 2010 and have continued through the 2017 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.

Figure 2. Dallas Zoo staff, Roman Kantorek and Bradley Lawrence, capturing and handling Texas Horned Lizards in the field.

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.

To date we have spent roughly 965 hours sampling roads resulting in close to 1700 captures. Approximately 1150 have been PIT tagged and 148 have been recaptured at least once. The total number of lizards captured in 2017 was approximately 224. This gave us 2.35 Lizards per Hour (LPH). This is up more than double from last year and above our overall average of 1.76 LPH.

We were able to spend a few more days during peak activity times this year than we did last year. That may account for the much better numbers this season. The capture numbers were good throughout the summer though. Recruitment was good as well. Rodent issues and numbers that we noticed last year were all but absent this year. I will give credit to the continued healthy rattlesnake population at the ranch. We did capture and microchip several Western Diamondbacks this season as well.

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WE WOULD ESPECIALLY LIKE TO THANK PARK CITIES QUAIL FOR THEIR SIGNIFICANT CONTRIBUTIONS TO RPQRF SINCE OUR INCEPTION. OVER THE LAST DECADE, PARK CITIES QUAIL HAS PROVIDED $3.9 MILLION IN CRITICAL FUNDING THAT HAS ALLOWED OUR RESEARCH EFFORTS TO FLOURISH ... THEY ARE TRULY THE WIND BENEATH OUR RESEARCH WINGS.


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