

# Quail Call



Tall Timbers Quail Research Report | 2019

## Game Bird Program Update

By Theron M. Terhune

In spite of Hurricane Michael trying to spoil the late hatch in 2018, life is good in the Red Hills and Albany regions right now, especially coming off the heels of an excellent 2018–19 hunting season, with great hunting conditions (wet and cool) throughout much of the season. Good-to-average overwinter survival, combined with an uptick in cotton rat numbers, catapulted birds into the breeding season, leaving a taste of optimism in the air for a good hatch. Most of the private quail plantations have already cleaned up or are nearing completion following the hurricane aftermath, leaving an abundance of downed trees and debris in the woods. Thankfully, good late winter and early spring rains helped the cover to quickly rebound following piling and burning, but the rains seemed to come to a halt rather abruptly in May. Time will tell, of course, how good the hatch will be as we have learned time and again that anything can happen, but we remain optimistic entering the 2019 breeding season.

Life is also good in the Game Bird Program. Over the past couple of years, a lot has happened in the Lab. Since the last Quail Call, we have had six graduate students either graduate or completed their thesis: Bobbi Carpenter (UF); Ryan Haley (DSU); Angelina Haines (AU); Kyle Lunsford (UGA); Brad Roberts (UGA)

— UPDATE CONTINUED ON NEXT PAGE

## Inside

### TALL TIMBERS AND ALBANY QUAIL

Status of the quail population.....	3
Fresh from the Field .....	5
Stoddard-Burleigh-Sutton Award	7
Fresh Off the Press .....	8

### RESEARCH PROJECT UPDATES

Park Cities Quail Grant .....	13
Hawk density and its impact on bobwhite survival .....	14
Impacts of red-imported fire ant control on small mammals .....	15
Water impacts on bobwhite nesting and chick resource use .....	16
Roost site selection and bobwhite chick survival .....	17
Understanding limiting factors on public lands .....	18
Trapping Survey Results.....	19
Predator Index.....	23
Grid-blocking study update.....	25
Quail-nomics 101 .....	28

### BEYOND THE RED HILLS

Carolina Regional Quail Project ....	31
Central Florida Rangeland Bobwhite Initiative .....	32
Translocation Update .....	33
Supplemental Feeding in Texas Winters.....	33

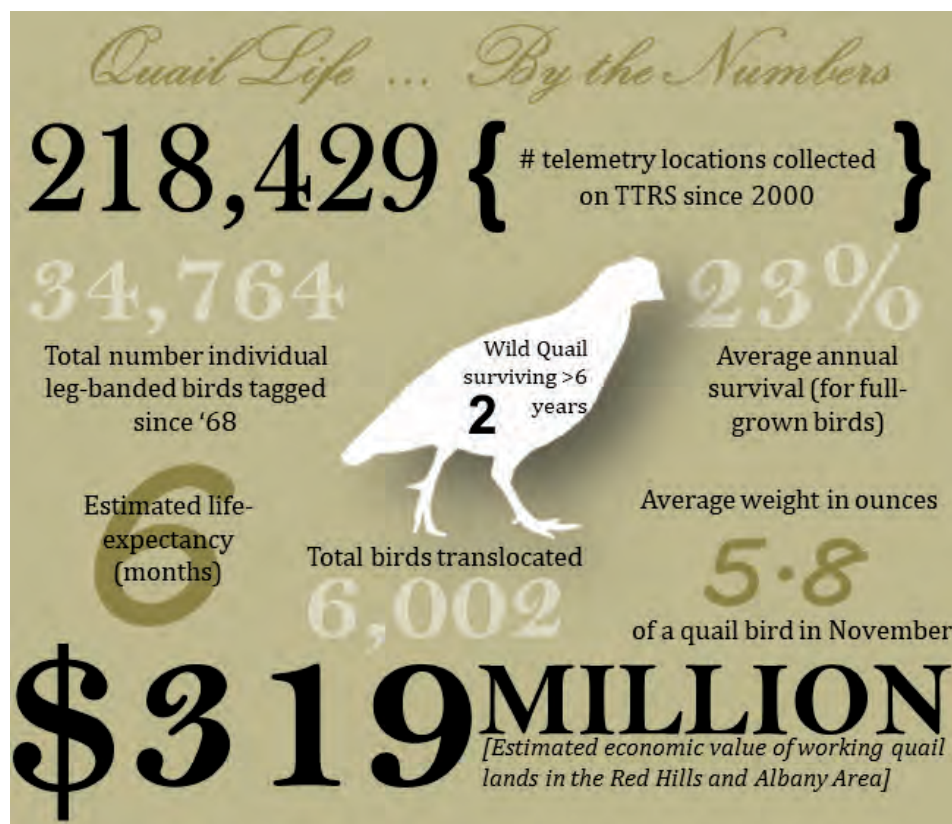
### TOOLS & TECHNOLOGY

PDF Map App.....	35
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### OTHER NEWS

2019 Turkey Invitational .....	36
Game Bird Research Team.....	39

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and David Sisson (UGA). In case you weren't aware, our students are the pulse behind all the great research being conducted here at Tall Timbers. They provide fresh insight and a different perspective into the way we do business. We are so proud of these students and excited about what was learned through their research. Congratulations students, we look forward to seeing you infiltrate the workforce and do great things in the name of quail and wildlife conservation!

You can read about some of their work here in this edition of the *Quail Call*, while the results of others you will hopefully see in the near future in either an upcoming eJournal or a future *Quail Call*. We are also excited about what we will continue to learn going forward with a new crop of graduate students, four MS and one PhD, starting last year or this year, with their research already underway. See "New Research Projects" in this issue for more details.


Chick ecology remains our biggest and most important research task at hand. As such, we continue to capture, tag and monitor bobwhite chicks on four different study sites along the east coast. We are also collaborating with key partners in Texas to understand limiting factors associated with brood habitat use, foraging and diet composition, and individual chick survival. Earlier this year, we published the largest study, to date, on bobwhite chick survival. This study was a 19-year assessment with more than 3,500 chicks wing-tagged at 3 or 11 days of age; this work will serve as a springboard for future brood and chick ecology studies. In this study, we learned how rainfall can impact chick survival and, as a result, have wired together a weather station network in the Red Hills region with 28 stations already deployed. We look to expand the network into the Albany area and other regions this year and next. The weather station network will assist us in understanding regional and site-level variation in important weather parameters

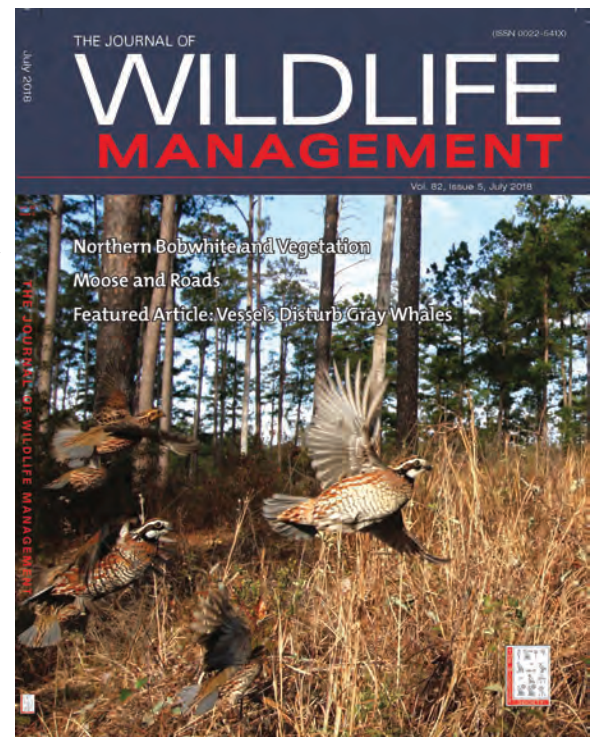
(namely rainfall, temperature and humidity), affording us the opportunity to integrate our regionally and locally specific results on chick survival into a spatially-informed map of predicted chick survival and fall recruitment outcomes, as well as hunting abundance predictions for the entire region.

In other news, we launched a new research initiative in central Florida, with an emphasis being bobwhite management on working range and ranchlands on private and public properties. This initiative is setup as a long-term research project where we will have radio-tagged birds on two local ranches nearby Kenansville, Florida, to collect data on bobwhite demographics unique to the ranchland and cattle landscape, which once held good numbers of wild birds. See the "Central Florida Bobwhite Research Initiative" for more details, and let us know if you or someone you know has a ranch in central or south Florida that we can get plugged in and integrated into our research and management program.

Finally, we often take for granted the amazing culture we have here in the Red Hills and Albany regions; now this culture is even expanding into central Florida, the Carolinas, and the Mid-Atlantic region. The plantation community not only serves as a litmus test for the research we do, but is also a major source for some of the most pragmatic management ideas and techniques, and this same private-lands community also provides a conduit to broad-scale management application, practical "peer-review" and "ground-truthing" of our research results. As such, you will see in this *Quail Call* some articles on "old" topics such as predator control (with some new twists, such as the industry standard trapping program on working quail properties), grid-blocking

impacts on bobwhite demographics and hunt success, and supplemental feeding. While old hat to many of you reading this, the fact that these results have been accepted and are now published in the more prominent wildlife journals, of which state and federal biologists value, is a game-changer for management on public and private lands alike. Over the past 18 months, the Game Bird Program has authored or co-authored 5 papers in *The Journal of Wildlife Management*. In fact, in 2018, a northern bobwhite covey flush on Tall Timbers was featured as the cover art on *The Journal of Wildlife Management*—a rarity indeed. These papers provide biologists the science-based evidence and backing needed to effectively manage for bobwhite in the 21st century as well as help to guide policy and state regulations for game birds.

We are thankful and blessed to have such a wonderful community of landowners and managers with which to work and whom help to shape this research. Thank you for your generous support of our research! I hope you enjoy this *Quail Call* and would love to hear how things are going with you and your property. 





## TALL TIMBERS AND ALBANY QUAIL

### Status of the quail population in the Albany area and Red Hills region

By Clay Sisson and Theron M. Terhune

In the Albany area, last summer's (2018) per capita nest and brood production by radio-tagged birds was about average, but was also coming off the heels of good survival through the previous winter. In fact, it was following an unprecedented, 3-year string of unusually high seasonal and annual survival (see Figure 1). Therefore, an average hatch does not necessarily forecast an average hunting season as we continue to learn year in and year out that there is more to population performance than simply annual production.

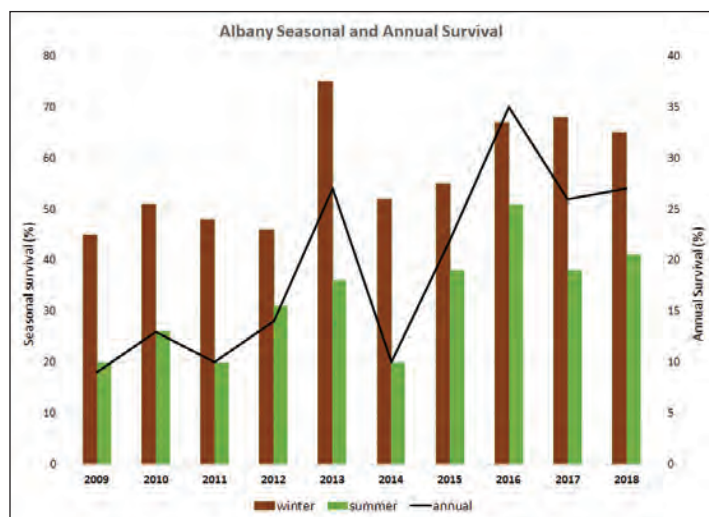


Figure 1. Albany area seasonal and annual survival for the last 10 years (2009-2019).

We have preached the importance of “carry over” many times along with our motto of DEAD HENS DON’T NEST. Having multiple years in a row of good survival is like compounding interest. This sustained level of good carryover has been possible due to great habitat conditions, conservative harvest, high cotton rat numbers, supplemental feeding, and predator control. With spring densities like we have had the last few years we rarely see (or need) high production to maintain high density populations.

In 2018, we experienced a good wet growing season, which typically bodes well for the sandy sites in the Albany area. Over 23 inches of rain fell during the breeding season (June–September), and we ended up 17 inches ahead for the year. This provided abundant cover growth, good insect numbers, and brood sizes slightly above average. Interestingly, we also had an unusually high number of half-grown chicks brought to our office that were suffering from avian

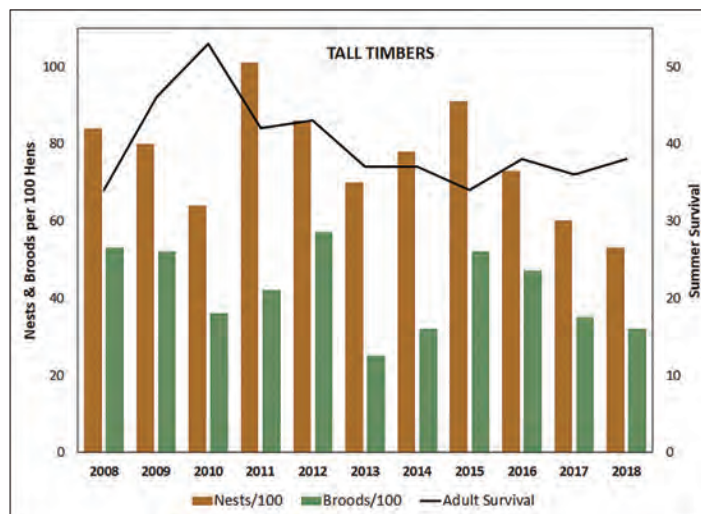


Figure 2. Tall Timbers hatch history for the past 11 years.

pox. This was obviously a concern at the time, but did not prove to have any serious impact on the population. Despite having only average production, the end result for 2018 was continued high density fall populations on most Albany area properties.

In the Red Hills region, the story was similar in some ways to Albany but different in others. At Tall Timbers, we observed a decreasing trend in per capita production (nest produced per hen and broods produced per hen – see Figure 2) over the past 4 years. At Dixie Plantation, we have observed an opposite trend such that per capita production has been steadily increasing along with increasing breeding season survival (see Figure 3). However, adult survival has remained

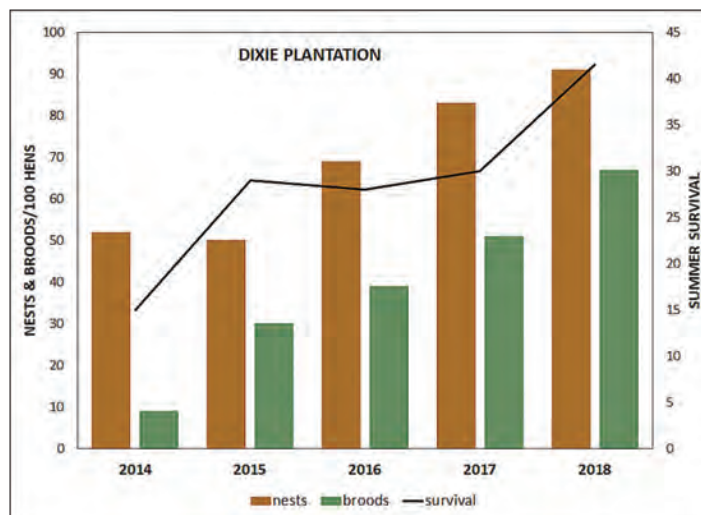


Figure 3. Dixie Plantation hatch history for the past 5 years (2014-2018).

STATUS CONTINUED—

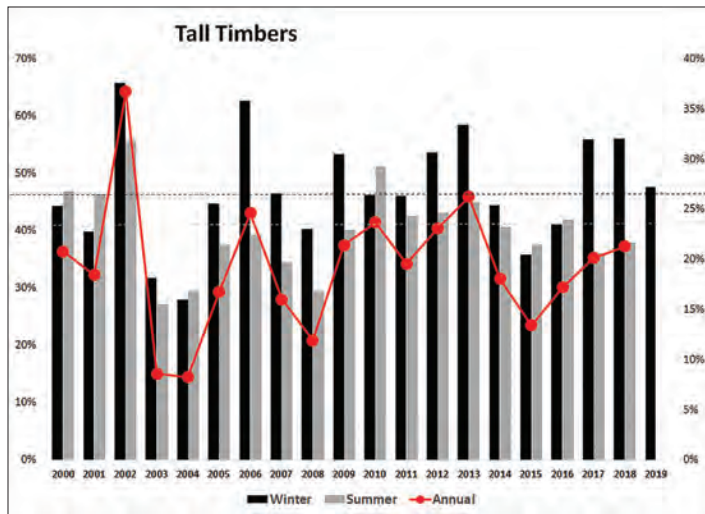


Figure 4. Tall Timbers' seasonal survival for the past 19 years (2000–2019).

good to above average (see Figure 4), and in particular, the past couple years' overwinter survival has been above average on Tall Timbers. This year (2018–19), overwinter survival was on par with our long-term average (see Figure 4). Similarly, overwinter survival at Dixie this year was very good and well above average at 53%. Notably, Dixie Plantation has undergone substantial habitat renovations and improvements to everyday management operations, including the implementation of hardwood reduction, thinning of dense CRP pines, feed line adjustments, and changing the burn program to a block burning system.

The folks around the Albany area and Red Hills regions were excited back in the fall of 2018 about the upcoming hunting season. Observations during early season work in the woods and dog training indicated that there were a lot of birds, and the cover looked better than it had been for a long time. But then on October 10, Hurricane Michael washed ashore from the Gulf as a category 5 hurricane on its way to a direct hit on the quail plantations in the Albany area. Wind

gusts were still at 120+ mph when it tore a hole through the plantation belt. Widespread damage occurred to homes, businesses, crops, and timberland. Depending on location, timber loss on the plantations ranged from 5% on the west side of the Red Hills, up to 75% or more depending on location of a property in relation to the eye of the storm (see photos). Plantations in the Red Hills located east of highway 319 experienced high winds and had occasional blown downs, but suffered far less damage to property and trees than those properties to the west of 319. Damage was severe enough on some properties to cancel most of the hunting season and hunting was delayed on several other properties.

The storm was mostly a nighttime event and it occurred late enough in the year that birds were mostly grown and already in coveys. Amazingly, we did not lose a single radio-tagged adult bird on any of our three study sites (Tall Timbers, Dixie, and Albany) to the storm. In addition to adult birds, we had several radio-tagged chicks being monitored during this time on Tall Timbers and Dixie Plantation.

We observed less than 4% loss of our radio-tagged chicks due to the storm, which is phenomenal. The effect on the cover, however, was much more dramatic. Normally our cover that time of year is tall, lush, and green, typically requiring several heavy frosts and rain events to “cure” it and make it more huntable. The morning after Hurricane Michael, the cover was knocked back similar to what we typically observe in mid-December—even the beggarweed seeds were blown off the plants.

The properties that were able to begin hunting on time experienced good hunting weather (cool and wet), right out of the gate in mid-November. Combined with the early beat down of the cover, good bird numbers, and drains and ephemeral wetlands full of water, hunting success was good and stayed that way until mid-February. Hunting, however, was awkward at times due to the amount of debris on the ground and having to dodge trees or areas that were too wet to travel, but the good bird numbers and good weather made





up for it. Most properties were up 15–25%, and some were up as high as 57%, with many experiencing at or near record covey finds during the season, despite the hurricane pressure.

The flip side of this is that these same conditions, which improved early season hunting, also exposed the birds to the southerly hawk migration that comes through here, starting about Thanksgiving. While not extreme, we did have a dip in survival during that time. As a result, overwinter survival percentage in 2019 was not as good in the Albany area compared to the last few years (see Figure 1). However, over-winter survival (53% at Albany and Dixie Plantation and 48% at Tall Timbers) was about average to slightly above average this year based on our radio-tagged birds—we got a little spoiled over the previous few years seeing carry-over in the 65–70% range. We’ve also had good spring rains up through about mid-May, resulting in a quick cover response following burns on many properties. The raptors left in a hurry around mid-March, which has further benefited adult survival, rendering decent numbers carried into breeding season. In addition, we have been seeing and hearing a lot of reports of a large number of cotton rats. In our small mammal sampling in April, we

observed a large uptick in cotton rat numbers compared to previous years, at this same time, and is very comparable to numbers of the 2002–03 seasons. We are hopeful that this boom in cotton rat numbers continues and that this will result in good breeding season survival for adult bobwhite, yielding good production, good chick survival and result in excellent fall recruitment.

Let’s hope these good circumstances continue, but too much prosperity always makes us nervous. In the Albany area, we have had record high cotton rat numbers three years in a row now, which we know is not sustainable, but the Red Hills cotton rat numbers have been average to slightly below average, so it will be interesting to see what this summer brings.

We have also had four good growing seasons in a row, which is great, but we’re probably due for a dry one. A lot of cover was torn up this spring, as well as during timber salvage and cleanup operations as a result of the storm. It would be ideal to get consistent rainfall for land to heal and recover from Hurricane Michael. We have a good sample of radio-tagged birds “on air” and will be monitoring all of this closely—stay tuned! 🐦

## Fresh from the Field

### HOW TO LOSE A DRONE IN 10 SECONDS ...

Well, we admit, we are still trying to figure out this whole drone research thing! On May 17, 2019, business as usual on our Central Florida Research study site flying drones to map vegetation density and water levels. Only this day we had a little glitch in connectivity between our drone and the receiver — then poof, the drone develops a mind of its own and disappears out of site! The \$2000 drone was toast. Luckily, we were able to recover the drone after several hours of searching from horseback, and save the \$6,000 sensor (see red box in picture).



PHOTO: ANDREW WARD

PHOTO: KATIE HOOKER



### GOLDEN MOUSE TAKES A BETTER VIEW...

“Who in the world just bit my ear!” says the golden mouse. After being captured in a small mammal trap, ear-tagged and released, this golden mouse ran to a hickory sapling and climbed high to apparently get a birds-eye view of what just happened.

—FRESH FROM THE FIELD CONTINUED ON PAGE 6



## FRESH FROM THE FIELD CONTINUED—

## MALE BOBWHITE SUPPORTS TRAPPING TOO

Apparently, this male bobwhite likes the idea of trapping or maybe he is trying to decide if that is a chicken egg or a quail egg.



PHOTO: THERON TERHUNE

## OH RATS!

During ant sampling last year on a private property near Albany, Georgia we found a cotton rat stuck in a vial trying to get an “easy” meal. That rat really wanted that hotdog! Good intentions, poor execution. Thankfully we arrived in time to rescue the rat.



PHOTO: THERON TERHUNE

## PRIVATE LANDOWNER GETS IN ON THE BURNING ACTION...

On a study site where translocation has taken place over the years, a private landowner enjoys the excitement of dripping fire to keep bobwhite happy in Maryland.



PHOTO: THERON TERHUNE

## FIRST BOBWHITE HEN GPS TAGGED ON DIXIE PLANTATION

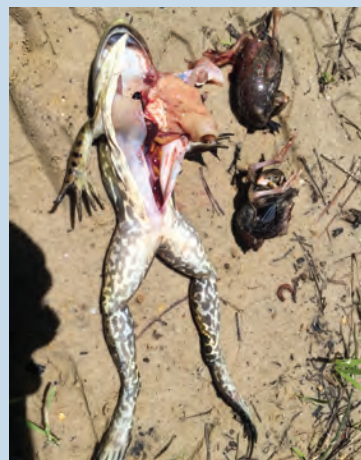
Game Bird Biologist, Alex Jackson, successfully GPS-tagged several bobwhites, ahead of the Continental Field trial, to evaluate how coveys respond to a large gallery of horses and hollering dog handler, during one of the few remaining wild bird dog trials in the country.



PHOTO: THERON TERHUNE

## CHEEKY BULLFROG ... CHOKED UP ON QUAIL CHICKS

On our research site in North Carolina, we recently found a radio-tagged bobwhite chick and a second banded chick eaten by an American Bullfrog. This is no doubt an anomaly, but showcases that life as a quail is not easy. We have always said that anything and everything eats a quail bird. But, who would've thought that a bullfrog would become a predator of quail chicks.



PHOTOS: JUSTIN HILL



## WHO FLUSHES WHO?!


A Sandhill Crane on our Central Florida study site lands near a camera trap only to flush a covey of birds.



PHOTO: CENTRAL FLORIDA BOBWHITE RESEARCH TEAM



## Game Bird Biologist Receives Award

We are very proud that our own, Diana McGrath, received the **Stoddard-Burleigh-Sutton** award from the University of Georgia this past year for her outstanding contributions in ornithology and wildlife conservation. Diana published three research articles in the flagship wildlife journal, *The Journal of Wildlife Management*, published by The Wildlife Society. She has also published to popular press articles from her master's research. In addition, Diana excels in sharing our research conducted by the Game Bird Program with undergraduate students from academic and other non-profit institutions during on-site field tours here at Tall Timbers. More recently Diana was one of our wonderful women in science at Tall Timbers who was recognized in *Tallahassee Woman* magazine. CONGRATULATIONS Diana! 





# Fresh Off the Press

## Tall Timbers Published Key Papers on Nest Predation and Quail

By Bill Palmer



Armadillo depredation

In the early 20<sup>th</sup> century Herbert Stoddard's research and experience on quail lands led him to suggest that to maximize bobwhite populations over time, nest predators, such as raccoons, armadillos, and opossums needed to be "controlled." Stoddard recognized that the predators of these predators, like wolves and panthers, had been extirpated allowing these "mid-sized" mammalian predators to increase. While Stoddard was not specific about how many nest predators is too many, his caution to pay attention to their abundance was largely followed by landowners over many years. However, his ideas, while generally published in his famous book flowed against a tide change of societal views on predators. The value of wildlife was changing from largely utilitarian to a mix of values, including aesthetic and ecological. The conservation and hunting community were beginning to change the long held opinion that predators were bad, and legal protection was rightly afforded to them. The protection afforded many predators, as a result of changing opinions, swung the pendulum from wanton waste of predators to hands-off, and largely closed the door on legal predator control as a management tool for over half a century.

Fixing the problem of needless killing of predators created a dilemma for wildlife management in that controlling predators to benefit a game species, or any other species, became taboo. Dozens of scientific articles and books were published on the topic, including classics like *Of Predation and Life* and *A Sand County Almanac*. Stoddard's observations about predator control was based on years of experience in the field

and working with managers of quail properties, however it was not proven in the scientific literature. In fact, just the opposite occurred as scientific papers suggested that reducing predators would release certain prey species and do harm to habitats. Fears of boom and bust cycles of prey species, and diseases causing die-offs in prey populations released from predation, resulted in strict regulations that limited landowners' ability to legally deal with predators. While the biology had some truth to it in some systems of predators and prey, it did not seamlessly transfer to bobwhite management or many other situations. Wildlife management policy is largely based on science and the published scientific literature, as a result, there was little support for management of nest predators.

Over the last year, the Game Bird Program at Tall Timbers has published three important papers on nest predator management that for the first time demonstrate that controlling nest predator abundance through trap and removal results in greater recruitment of young and higher, more stable fall bobwhite abundance. These papers address the management results of reducing nest predators by trapping, the effectiveness of monitoring nest predators, as well as developing an "industry standard" for what is typically done on managed quail lands that now can legally implement nest predator control systems. Two of these are presented in more detail in this same volume of *Quail Call* (see articles by Jackson et al., on page 23 and Sisson et al., on page 19). Collectively, this research supports more recent policies allowing landowners who conduct habitat management to implement a monitoring and trapping program to keep nest predators at reasonable levels, so that reproductive effort can offset annual adult mortality.

The first paper broadly compared predator activity and subsequent reproductive performance of bobwhites for 8 years on 11 sites across the Southeast, on trapped and untrapped sites. This study demonstrated that trapping was effective at reducing predator activity, and that bobwhite reproductive performance was improved where predator numbers were reduced (see Jackson, et al., on page 23, for more details). This study was observational, not an experimental study, but it provided the background knowledge needed to fully investigate the effect of trapping and nest predator reduction on reproductive effort and bobwhite population response.

Given that we observed lower reproduction at higher nest predator abundance, we asked if trapping to reduce nest pred-



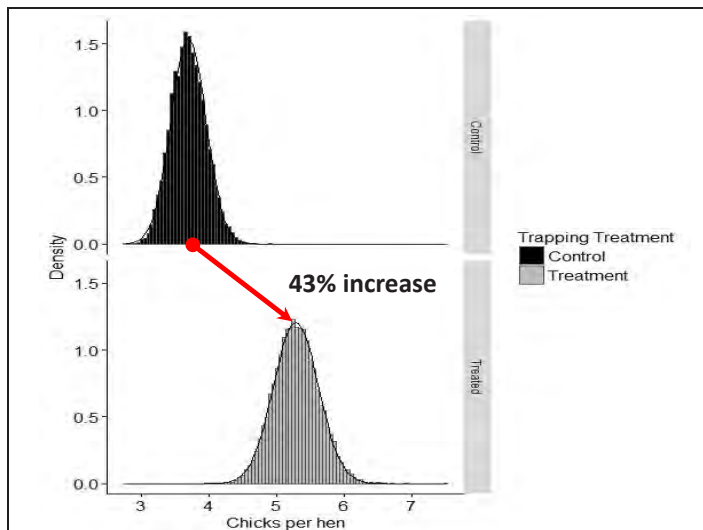


Figure 1. Trapping treatment

ators would increase fall populations. We recently published the second manuscript, which was a controlled “cross-over” experiment in which we had study sites that were trapped compared to a control site that was not trapped, but half-way through the study, we experimentally switched treatments so that untrapped sites became the trapped areas. This study was published in *The Journal of Wildlife Management*, which is an informational conduit for many state and federal biologists across the nation. In this study, there were two study areas located in the Red Hills and two located in the Albany area.


The results from this 7-year study revealed a 43% increase in chick production (see Figure 1), on average, and more importantly an 18% average increase in fall bobwhite abundance, when predators were reduced through trapping. To put this into perspective, on a 5,000-acre property at average densities (1–1.5 birds per acre), for the Red Hills and Albany regions, this would add an average of some 1,000 quail to the fall population, which is not at all inconsequential. A second finding was that in years in which there were regional declines in abundances due to weather or other factors, study sites with lower nest predator abundance maintained bobwhite densities rather than decline. There was some variation across sites and years, but this was expected as events like drought and annual changes in cotton rat populations can have large impacts on bobwhite populations as well. It was clear in this

study that keeping nest predator activity low (<10% scent station visitation rates), facilitates high chick production each year and helps offset things managers cannot control, such as weather. This was the first scientific study to show that bobwhite abundance was increased by controlling nest predators.

The third effort regarding predator control was surveying plantation managers to determine the “industry standard” of nest predator trapping on managed quail land and its associated costs (see the article by David Sisson on page 19, in this *Quail Call*). This survey compiled the common practices used on working quail plantations and yielded some surprising results, especially the relatively low costs for such a big return on investment. In particular, this paper helped to debunk a prevalent myth in many circles that maintaining an annual trapping program is highly expensive relative to other management actions. These economic and logistical considerations help landowners and managers determine what type of trapping program they need.

Today, with no shortage of nest predators, and catastrophic declines in bobwhite and other species across much of the South, the tide has begun to turn back on the role predators play in affecting other wildlife populations. The Game Bird Program has been part of this conversation for several decades. However, more than just quail biologists are asking what role nest predators play in controlling other ground nesting birds, reptiles and amphibians. The role of coyotes on deer recruitment is receiving significant scientific attention as well.

Our view is that predation is one of many issues that needs to be addressed to achieve and maintain high bobwhite numbers. Our approach to predation management starts first and foremost with sound habitat management. And, then in cases where meso-predators have escalated beyond a point that suppresses bobwhite reproduction, implementation of predator control can tip the scales back toward a balanced system profiting bobwhite. This does not make predators “bad” or any less of value than another species—those are human ideas. The system ebbs and flows as it does, but anthropogenic influences on the landscape have altered ecosystem balance, and sometimes it is our responsibility to keep it in check. The key is to have unbiased science, along with long-term data, to understand the many factors that can affect bobwhite num-

bers, to tease apart the role predators play, and sound policies to deal with their impacts on prey species. 



PHOTOS BY THERON TERHUNE



# Fresh Off the Press

## Long-term Banding Study Provides Benchmark Survival Estimates for Bobwhite Chicks

By Theron Terhune, Bill Palmer and Shane Wellendorf

It is often said that good things come to those who wait! Well, it took 19 years to amass a dataset with enough recaptures and recoveries of banded chicks to effectively and accurately estimate survival using mark-recapture techniques. However, I hate to say it, but what we learned is not all the best of news. There is some good news, which is that we have gone from not knowing much at all to knowing a little, and more importantly, the foundation has now been laid from which we can build and begin to peek around the corner into the unknown of chick ecology.

In this study, occurring from 1999–2017, we banded 3,576 unique bobwhite chicks, but only recaptured 694 of those individuals—that is less than 1 out of 5 individuals recaptured. Why is that you ask? Making a long story short, it is not because they are hard to capture or harvest, but because they are just especially good at dying! Based on this 19-year study, most chicks never see the first hunting season. In fact, on average, only about 30% of all chicks make it to October, if they hatched in early-July, and even lower if they hatch in May or June. This study unearthed three noteworthy findings: (a) fall abundance is sensitive to chick survival; (b) weather, namely rainfall, impacts chick survival more than we expected; and, (c) hatch timing impacts chick survival.

### FALL ABUNDANCE IS SENSITIVE TO CHICK SURVIVAL

Chick survival varies quite a bit from year to year (see Figure 1), which could be attributed to many factors such as weather, alternative prey abundance, and insect availability. We found that average daily survival rate was 0.9887, which translates into a 30-day survival estimate of 71% and a 90-day survival estimate of 36%. During some years, however, as few as 14% and as many as 86% of chicks survived to 3 months of age. In 2002, for instance, chick survival was highest (>86%), which consequently overlaps a peak in cotton rat abundance, indicating that alternate prey abundance can offset predation pressure on bobwhite chicks.

Some high-tech population modeling shows that a minimum 30-day chick survival rate of 67% is needed to break even in fall abundance. In this study, we only observed this minimum survival rate in two out of every three years suggesting that one in three years, on average, chick survival is too low to maintain a stable population, and this is in what is considered good quality habitat! We also found that

during 78% of years when daily survival rates were higher than average (see Figure 1) a population increase occurred, and during 70% of the years when daily survival was below the long-term average, a decrease in fall abundance occurred. Taken collectively, based on our number-crunching, a 10% increase in chick survival would yield about a 24% increase in fall abundance—a rather large return to the gun! Therefore, fall abundance is highly sensitive to chick survival and chick survival is ostensibly very important to population growth.

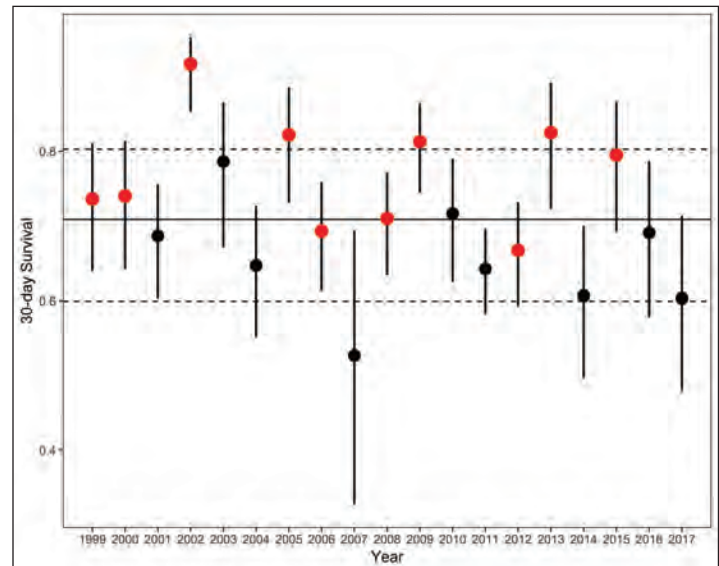


Figure 1. Annual variation in 30-day survival rates of northern bobwhite chicks on Tall Timbers. Solid black line indicates average 30-day chick survival and dashed lines indicate 95% confidence intervals. Red dots indicate those years where fall abundance increased.

### WEATHER IMPACTS CHICK SURVIVAL

For many years now we have speculated that heavy rainfall events have deleterious impacts on quail chicks. This study revealed just how detrimental both the number of rainfall events and the amount of rainfall can be on chick survival. We found that chicks are particularly vulnerable to rainfall during the first 30 days of life, post-hatch. For example, our results indicate for every rainfall event greater than a quarter-inch that a brood encounters during its first 30 days following hatch, there is an average of 12% reduction in chick survival, and cumulative or successive rain days can exacerbate brood loss (see Figure 2).

Similarly, for every 2 inches of rainfall that a brood encounters during the first 30-days post-hatch, chick survival



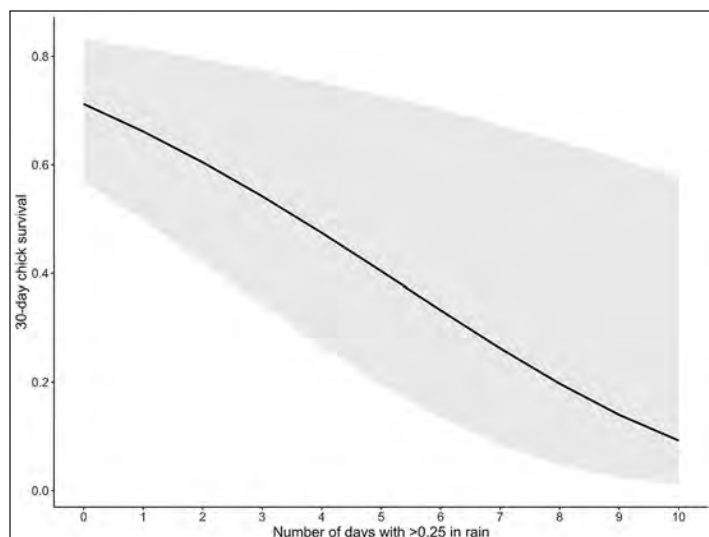


Figure 2. Thirty-day bobwhite chick survival estimates relative to the number of significant (>0.25 inches) rain days.

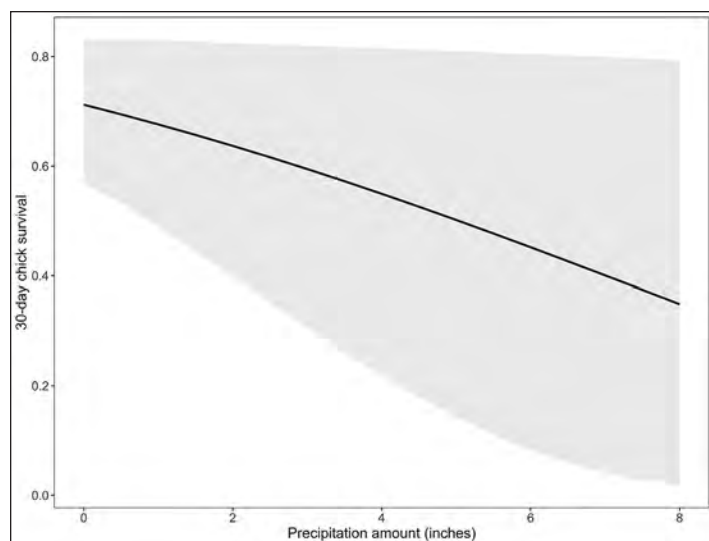


Figure 3. Thirty-day bobwhite chick survival estimates relative to the precipitation amount.

decreases by as much as 16% (see Figure 3). These numbers truly underscore why a wet June and July can be too much for bobwhite chicks, and are generally not good for overall fall recruitment. Notably, this study was conducted at Tall Timbers in the Red Hills, where the soils are more clay-based which binds moisture and moderates temperatures better than the sandy, low-fertility soils of the Albany region. As a result, bobwhite chicks on properties with well-drained soils, like in the Albany region, may very well cope with rainfall events better than those in the Red Hills region. However, research in the Albany region is warranted to fully understand how rainfall impacts bobwhite chick survival.

In contrast to abundant rainfall, lack of rainfall and extreme heat are known to also impact reproduction. For example, the effect of droughts on bobwhite abundance, adult survival, and adult reproductive effort and success has been documented in Texas, but drought effects on bobwhite chicks and fall recruitment have not been demonstrated. In the

Southeast, extended periods of droughts are infrequent and rarely affect bobwhite abundance compared to those more commonly experienced in Texas. Although we did not find that temperature alone affected chick survival in our study, we did observe that when precipitation events coincided with low temperatures, chick survival was reduced, but chick survival was not as heavily impacted during rain events occurring at higher ambient temperatures. Although our sample size was limited, bobwhite chick survival was lowest (14.6%) during 2007, which was the only significant drought year in our 19-year study. This suggests that extreme drought conditions likely do inhibit chick survival and population recruitment. Precipitation events combined with cooler temperatures may limit daily foraging opportunity and increase thermoregulatory demands of bobwhite chicks, which underscore the need for providing adequate foraging grounds, such as burned pinel woods in the Red Hills and/or brood fields in the Albany area, located near thermal cover (e.g., woody protective cover).

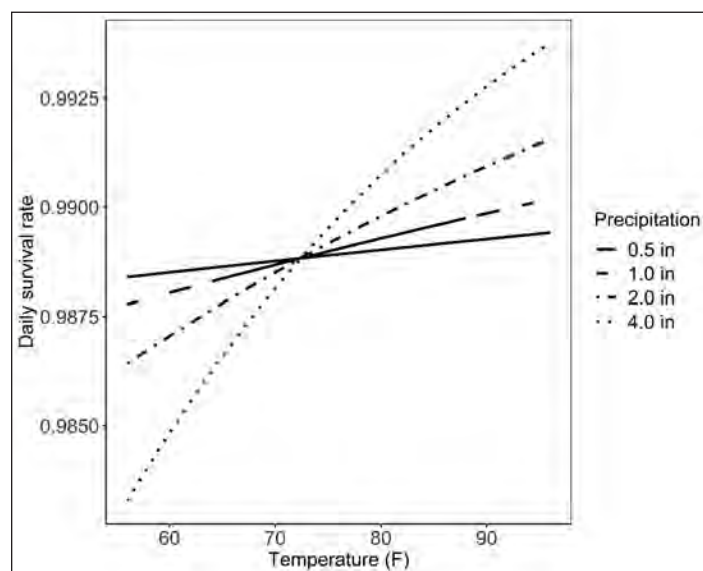


Figure 4. The interaction of temperature and precipitation effects on bobwhite daily chick survival on Tall Timbers

### HATCH TIMING IMPACTS CHICK SURVIVAL

Many ascribe to the notion that a late hatch can make you or break you. We found evidence to support this belief—late-hatched individuals survived better than those that hatch early in the breeding season (see Figure 5a). Even though there are fewer hens and nests hatching in the late season, the higher chick survival increases the numbers of chicks that can be added to the autumn population. This finding is an interesting ecological phenomenon, since in many previous ecological studies, the opposite is the observed. So, why the differential survival? We don't know for certain but we have three prevailing theories.

First, cover conditions differ greatly early in the season compared to late, resulting in reduced pinch-points later in



## BANDING STUDY CONTINUED -

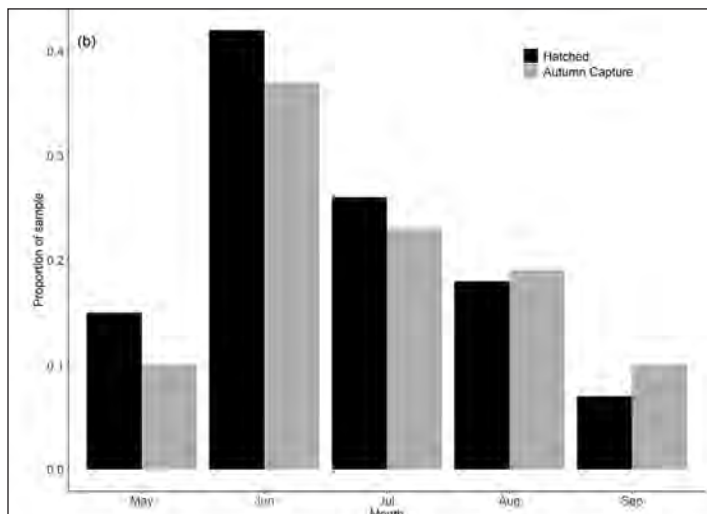


Figure 5a. Northern bobwhite proportion of total chicks that successfully hatched each month during the breeding season (black-shaded bars; nests located by tracking the radio-tagged adult), and the proportion of captured chicks recaptured during autumn trapping (derived from backdating age of chicks at time of capture using primary feather growth and development) during autumn trapping (gray-shaded bars) in November on Tall Timbers.

the season. In other words, more cover late in the season yields abundant cover and food resources, and a broader distribution of predation risk across the landscape, compared to early in the season, when recently burned sites may provide good foraging opportunity, but lower-quality protective cover.

Second, typically weather conditions are better late in the season. Temperatures are warmer in July through September, and there is less abundant rainfall, barring no hurricane or tropical storm events. Although we did not find that temperature alone directly impacted chick survival in our study, we did find that there was an interaction between temperature and rainfall, such that when temperatures dipped below 70 degrees F during rainfall events, survival decreased dramatically (see Figure 4). Warmer temperatures seem to allow chicks to better cope with rainfall events and, notably, this effect seemed to only be important during the first two weeks following hatch, indicating that chick age and size likely are important to overcoming nutritional and thermoregulatory burdens during adverse weather conditions. Therefore, timing of the hatch in relation to heavy rainfall events is important!

Third, brood mixing late in the season is more common, with mega-broods beginning to form as early as early July and increasing throughout the late summer months. Brood mixing profits recently hatched chicks late in the season by reducing predation risk with heightened numbers, benefiting thermoregulation, and by behavioral learning from older, “more experienced” chicks. When we combine these factors with the arithmetic of having to survive for a less amount time when hatching late, compared to early, we see a propor-

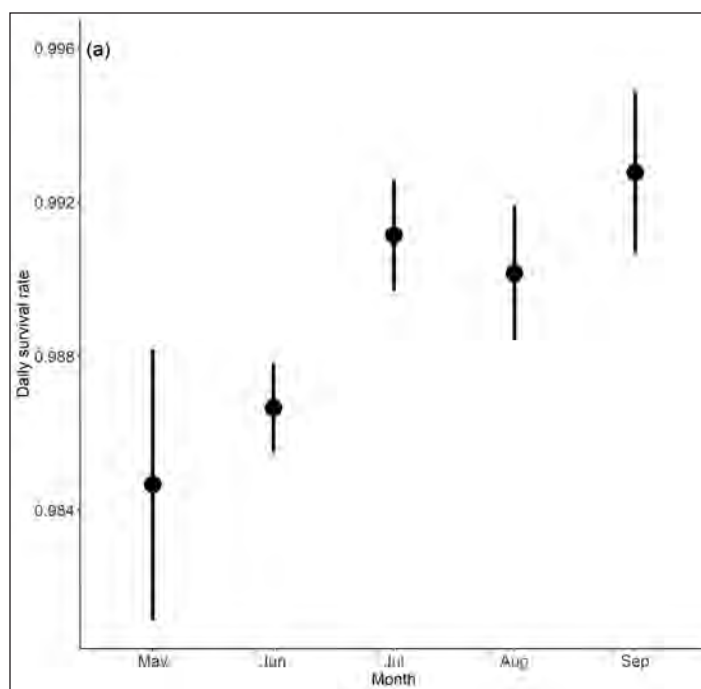
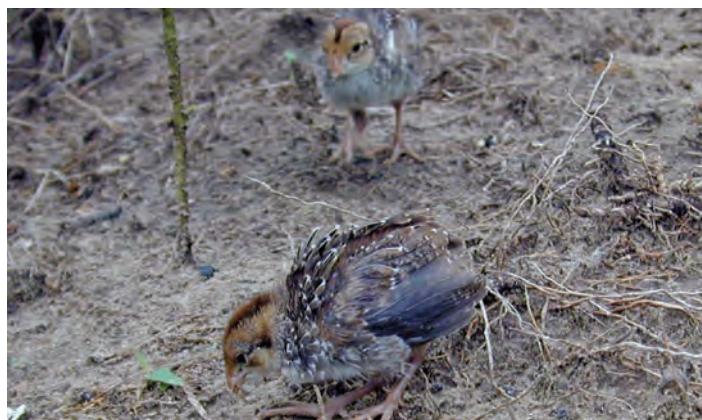


Figure 5b. Northern bobwhite average daily survival rates (and 95% CI) for patagial-tagged chicks delineated by month on Tall Timbers.

tional shift in the amount of a hatch cohort for later-hatched individuals (see Figure 5b).

## SUMMARY

Chick ecology still remains the largest gap in knowledge in bobwhite management and conservation, and while this study illuminated the pathway to some answers, we still remain very much in the dark on how to best manage for optimal bobwhite chick survival. Taking the glass half-full approach, this study corroborated the notion that we have a lot of room for improvement when it comes to understanding the many factors affecting chick survival. The future of research holds a world of opportunity to learn and understand how we can better manage to improve chick survival.



## NEXT STEPS AND FUTURE RESEARCH

A logical question at this point—knowing that chick survival is low and that weather, especially rainfall, impacts on


## BANDING STUDY CONTINUED –

survival can be very bad—is how do we improve chick survival?

This is a pivotal question for our current and future research investigations. Important topics at hand are related to understanding thermoregulation, nutrition impacts on growth and development, and habitat management associated with roost site selection and foraging grounds. Research radio-tagging chicks began about four years ago with the development of our modified suture technique. The chick radio-tagging technique affords us more fine-scale temporal data on chick survival, as well as individually-explicit information about how habitat use, foraging behavior and group dynamics impact brood survival.



A Tall Timbers' weather station.

We have also begun building a weather station network in the Red Hills region—so far we have 27 weather stations deployed on the Red Hills—which we will be able to integrate weather parameters, like rainfall and temperature with chick survival estimates on our study sites at Tall Timbers and Dixie Plantation, to better predict fall recruitment, population response and fall hunting abundance. This, in turn, will hopefully improve our ability to set adaptive harvest targets for individual properties, complementing data from fall covey call counts. 

## RESEARCH PROJECT UPDATES

## Game Bird Program Receives Park Cities Quail Grant for Research on Bobwhite Chick Ecology in 2018–19


After Texas Quail Unlimited (QU) dissolved their chapters in the early 2000s, a group of quail conservation leaders agreed to form **Quail Coalition** following the disbandment. In the past 12 years, **Quail Coalition** has grown to 12 chapters and over 3,500 members. The largest chapter, the Park Cities Chapter, is based in Dallas, Texas and has raised and donated roughly \$7 million to quail conservation.

Run by a group of Dallas area volunteers passionate about the quail sporting tradition, the group is able to donate virtually 100% of every dollar raised towards quail research and youth education. The Chapter's main fundraising effort is an annual banquet, which has been deemed by sports writers as "Conservation's Greatest Night." The banquet, which is held during March in Dallas each year, gathers over 1,000 quail enthusiasts from across the country for a night of comradery, hors d'oeuvres, a quail dinner, silent and live auction—an effort that netted \$1.7 million for quail conservation this year.

In the past, beneficiaries have included the National Bobwhite Conservation Initiative, Rolling Plains Quail Research Ranch and Foundation, Quail Tech Alliance, UNT Quail, Texas Brigades, Wounded Warriors, Texas A&M AgriLife Research and Extension, Texas Tech TIEHH, and Sul Ross Borderlands Research Institute.

This past year (2018), the Game Bird Program at Tall Timbers joined this prestigious list by receiving a research grant to further our knowledge of bobwhite chick ecology.

The chick ecology study is a collaborative effort between Tall Timbers and researchers in Florida, Texas, Missouri, and North Carolina.

To learn more about **Quail Coalition** and their various chapters, see <https://quailcoalition.org/> 



THANK YOU TO PARK CITIES QUAIL  
FOR SUPPORTING OUR RESEARCH!



## NEW RESEARCH PROJECT

## Temporal and spatial oscillations of hawk density and its impact on northern bobwhite survival in the Southeast

MS STUDENT AT THE UNIVERSITY OF GEORGIA: JUSTIN RECTENWALD

It is understood that raptors pose a significant threat to Northern Bobwhite populations. The most common threat-specific raptors include accipiters (e.g., Cooper's hawk), buteos (e.g., red-tailed hawk), owls, harriers, and falcons. Since the migratory bird treaty act protected raptors in 1972, raptor abundance has increased precipitously in the Southeast and throughout their range. Previous work at Tall Timbers has demonstrated that avian predation accounts for the majority of known-mortalities in both over-winter and breeding seasons.

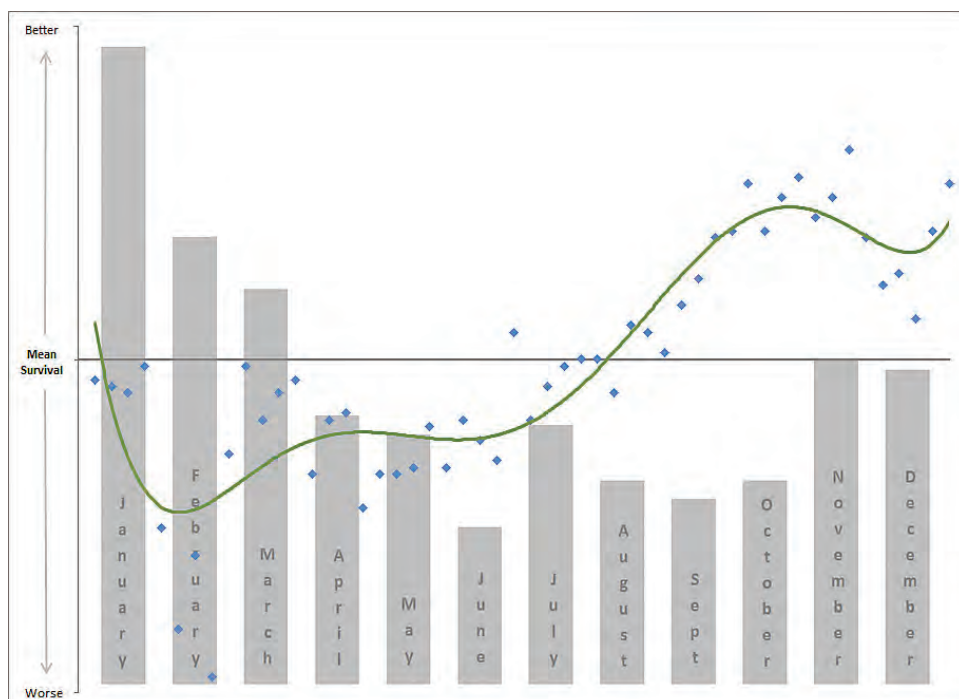
Despite the fact that the relative abundance and annual migration of raptors impacts bobwhite survival, the annual and seasonal patterns of raptor abundance is not well-understood in the Red Hills and Albany areas. Intuitively, avian-specific mortality events have been documented to be highest during the peak of breeding season, and when wintering populations of raptors are highest. Survival estimates from long-term studies in the Southeast are essential and are needed to clarify the relationship between quail and predators relevant to the timing of management activities.

The intent of this study is to understand seasonal, annual, and spatial variation of predator-prey dynamics between threat-specific raptors and northern bobwhites using a long-term data set on Tall Timbers Research Station (TTRS), Dixie Plantation, and a private plantation near Albany, Georgia.



Justin Rectenwald

This study will provide insight into fine-tuning the timing of habitat management techniques such as prescribed fire, fall field management and mowing to mitigate the predation risk of bobwhite to raptors. 🦅



Weekly bobwhite survival rates of quail on Tall Timbers relative to the overall average weekly survival (gray line at zero; green line represents annual weekly trend in survival), for the last 14 years combined (2004–2018). Weekly survival rates are overlaid on the monthly raptor count. A point above the gray line indicates that survival is above the weekly average whereas a point falling below the gray line indicates that survival is below the overall weekly average.

## NEW RESEARCH PROJECT

## Spatiotemporal impacts of red-imported fire ant control on small mammals in the Southeast

MS STUDENT AT AUBURN UNIVERSITY: MORGAN MOREHART

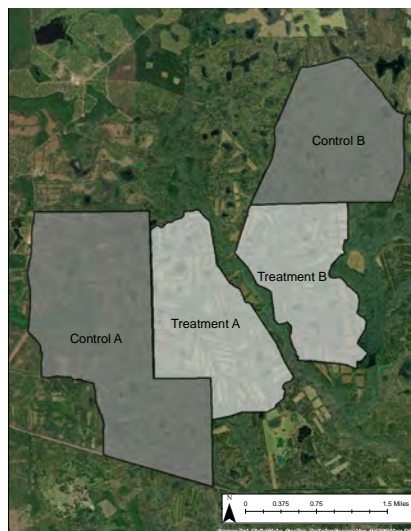
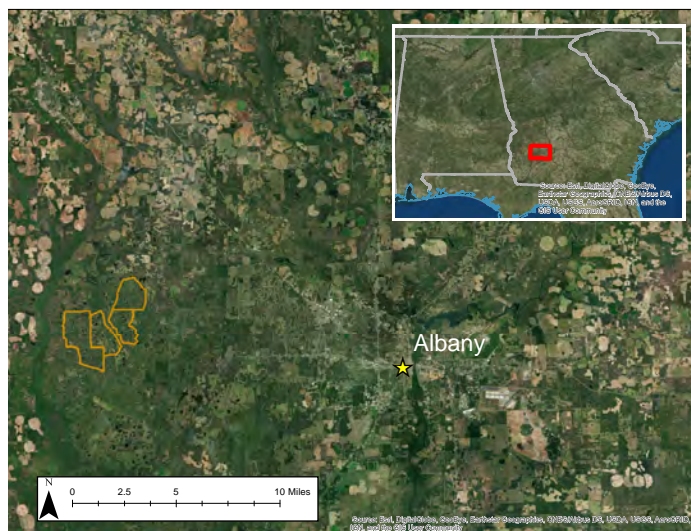
Red-imported fire ants (RIFA) are an invasive species in the southeastern United States that thrive in disturbed areas. RIFA arrived near Mobile, Alabama around 1930, and have been rapidly expanding their territory since. In their original range in South America, RIFA adapted to take advantage of natural disturbances. In places where RIFA have invaded, human, rather than natural disturbances opened an avenue for them to not only survive but to thrive. They utilize high reproductive output and effective dispersal capabilities. In addition to human-induced dispersal, RIFA have become one of the most prolific ecosystem invaders over the past several decades. In fact, they are estimated to account for \$1 billion per year in economic impact—negatively impacting livestock and crops.

The purpose of this research is the second rung of a long ladder of research needed to understand how RIFA impact the working bobwhite landscapes in the Red Hills and Albany areas. Native ants are well-known ecological engineers, benefiting scores of plants and animals. RIFA have been linked to decreases in native ant communities and other invertebrates as well, which likely have negative impacts on species dependent on insects for growth and development, like bobwhite chicks. Therefore, the first phase of research was to understand how RIFA impacted both bobwhite nesting and native ant communities. In that study, we found that the overall impact on bobwhite nest loss was inconsequential, with only about 3-5% nest loss, on average, per year. However, we did observe a higher prevalence of exotic ants and lower prevalence of native ants where red-imported fire ant abundance was high. Similar to native ants, small mammal communities



*Morgan Morehart with a recently tagged cotton rat.*

are important ecological drivers, as they influence vegetation composition and are a primary prey in our ecosystems in the Southeast. The altricial or semiprecocial young of small mammals could be at risk of depredation by red-imported fire ants, which could suppress cotton rat abundance. Previous research has indicated a change in habitat use by cotton rats in the presence of RIFA; old-field mice, cottons rats, and deer mice have also been shown to alter foraging decisions in the presence of RIFA. These changes in behavior could lead to increased risk of mortality and influence survival of bobwhites and bobwhite chicks. This research project will provide insight to the efficacy of a chemical treatment, Extinguish Plus™, to controlling red-imported fire ants, and provide information toward understanding spatial and temporal recolonization rates of fire-ants post-treatment, as well as how a reduction in fire ants impacts the small mammal community.



*The study areas for this research are located on private properties west of Albany, Georgia. We have two treatment areas (treatment A and treatment B) that are separated by a buffer zone (creek swamp) to minimize movement of individuals across replicates. The controls sites A and B are paired with and adjacent to the treatment sites.*



## NEW RESEARCH PROJECT

## Evaluating predation risk, food availability and thermal environmental conditions relative to water level change in Central Florida

MS STUDENT AT THE UNIVERSITY OF GEORGIA: ANDREW WARD


The amount of available land area with surface water changes temporally and spatially throughout the bobwhite breeding season in central Florida—essentially none at the beginning of the breeding season, to as much as 90% in July. In addition, bobwhite nest 4-5 weeks earlier in central Florida, which is thought to be an evolutionary response to flooding associated with the apparent increased risk of nest loss and brood loss, resulting in an overall reduction in reproduction. However, several possible explanations may explain the variation in nesting ecology of bobwhites under these conditions.

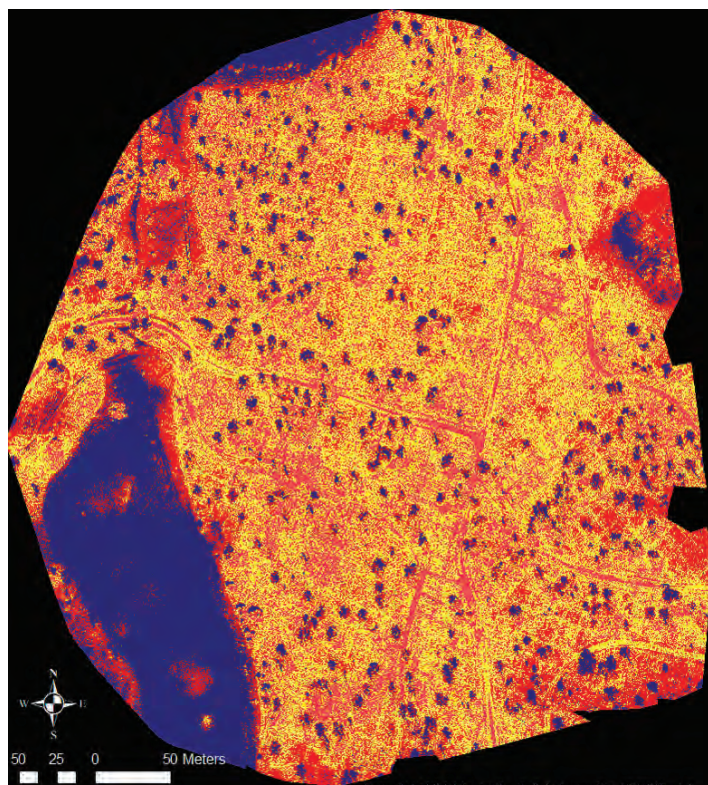
For example, given that the variation in timing of rain events, and the ephemeral nature of subsequent flooding, bobwhites may alter nest site selection. Under this scenario, one might predict that the exposure, or risk of predation of nests to surface water will not change in response to increasing surface water. Alternatively, one might hypothesize that bobwhites use environmental cues to alter nest site selection in anticipation of future surface water conditions, and therefore predict that exposure of nests to surface water will decrease as surface water increases through time. In addition,



Andrew Ward

given that increased water levels decrease area for nest sites and brood rearing areas, nests and broods may be more susceptible to predation, as a result of less areas for meso-predators to search and locate nests and chicks.

In this study, we are using unmanned aerial vehicles (UAVs), aka drones, to fly the study site weekly in order to map changes in water levels in association with nesting activity and brood rearing activity. 



Above, drone collected Enhanced Vegetation Index classification used to map vegetation and water levels. At right, central Florida rangeland.





## NEW RESEARCH PROJECT

## Linking roost site selection and diet composition to Northern Bobwhite chick survival

PHD STUDENT AT THE UNIVERSITY OF GEORGIA: BRAD KUBECKA

Despite being one of the most studied game birds in the world, certain aspects of bobwhite life history, such as brood ecology have yet to be fully understood. Some population models suggest that chick survival is among the strongest driving factors of bobwhite population dynamics—even more so than total number of clutches laid, nest survival, or egg hatchability.

The current literature includes a surplus of information on adult ecology based on diurnally collected data, but only a handful of studies describe roosting behavior of broods. Those that do are limited to winter months, adult birds, or brood-rearing adults, without direct empirical linkages of roost sites to measures of fitness.

Research from grey partridge (*Perdix perdix*), red partridge (*Alectoris rufus*), and pheasant (*Phasianus colchicus*) in the United Kingdom have documented distinct relationships of roost site selection and chick survival, though no study to date has attempted to evaluate these relationships in bobwhites. Because a large majority of daily activities by broods includes roosting (10 of 24 hours



12-day old radio-tagged chick.

during summer days), it is important to understand roosting behavior of broods to help stakeholders adapt management techniques to increase chick survival and fall recruitment.

In a similar vein, food resource availability has been documented as being correlated with chick survival of other game birds, such as grey partridge, ring-necked pheasant, red-legged partridge, and greater sage grouse (*Centrocercus urophasianus*), but no study has sufficiently evaluated bobwhite chick survival as a function of diet or foraging ecology. Primarily, this is due to the inability to non-invasively sample fragile neonates, and in part, to the elusiveness of the species, and previously limited techniques for tracking young chicks. However, new techniques, such as suture-tagging bobwhite chicks and DNA metabarcoding, have opened a new window into brood ecology and diet analysis, respectively.

Analyzing diets via fecal samples using DNA metabarcoding (a molecular technique, which infers species composition of an environmental sample by amplifying, sequencing and evaluating target genomic regions of DNA), is becoming an increasingly popular method to non-invasively describe animal diets

and construct elaborate food. While useful and more efficient than morphological identification of food substrates within fecal samples, results from molecular techniques are subject to limitations, such as DNA degradation and contamination, especially in birds where fecal droppings might be more vulnerable to exposure given their relatively small surface area to volume ratio. Thus, the goals of this study is to conduct both field-based and controlled experiments to: 1) understand the limitations to DNA metabarcoding for describing bobwhite diets from field collected fecal samples; 2) describe diets of wild bobwhite neonates; 3) describe roost site selection and roosting site fidelity; and, 4) link survival of bobwhite neonates to roost site selection and diets in field experiments. 🐦



Brad Kubecka



Bobwhite brood roost site location. Feces (white and brown specks) will be collected for DNA metabarcoding diet analysis.



## NEW RESEARCH PROJECT

## Understanding bobwhite demographics in relation to nutritional supplementation and resource availability on public lands in Florida

MS STUDENT AT THE UNIVERSITY OF GEORGIA: SHELBY SIMONS

This research project is a collaborative effort with the Florida Fish and Wildlife Conservation Commission (FWC) and other agency partners (U.S. Forest Service, Florida Forest Service and Florida State Parks). During the past several years, project collaborators have successfully implemented standard habitat management practices on numerous public lands (e.g., Apalachicola National Forest, Osceola National Forest), throughout Florida. As a result, northern bobwhite response to habitat management on these sites has been observed, but the magnitude of bird response has been variable both temporally and spatially. In addition to this observed variation in fall abundance, spring point counts indicate good numbers of bobwhites during early breeding season, but coveys are often not heard in these same areas during fall covey counts. This suggests that bobwhites are either: (a) not calling during the fall census (and, therefore are not being detected); (b) leaving the study site altogether due to deficient resources; and/or (c) not surviving from spring to fall.


While it is not uncommon for low-density sites to experience suppressed calling behavior and calling rates during the fall, point counts are conducted using playbacks, which are known to successfully elicit calling by bobwhite coveys. It is



*Shelby Simons*



unlikely that bobwhite coveys are going undetected by both researchers and hunters, potentially indicating that birds have low site fidelity and are as a result leave the study site during the fall/winter time periods. Low site fidelity may result from lack of winter cover or lack of food availability in these areas.

Therefore, understanding bobwhite movement, habitat use, and site fidelity is critically important to champion population recovery and refine habitat management on public lands. Nutritional supplementation will be applied to two treatment areas on the Apalachicola National Forest and compared to two control sites (no nutritional supplementation). Bobwhite survival, movement, habitat use, and site fidelity will be assessed during the breeding season and transitional time period to early autumn. This information will further increase our knowledge of bobwhite ecology related to food availability and cover resources as well as help to identify potential limitations of certain management practices on public lands. 

## RESEARCH UPDATE

## What is the Common Practice for Mammalian Nest Predator Trapping on Private Plantations in the Southeast?

By David A. Sisson, Clay Sisson, Bynum Boley, James Martin, and Theron Terhune

Nest predator management is commonly practiced on intensively managed quail plantations in the Southeast. Recent research conducted by Tall Timbers and The University of Georgia (UGA) has validated this practice by demonstrating that trapping for mammalian predators (e.g. Opossums, Raccoons, Armadillos, Bobcats, etc.) can be beneficial to Northern Bobwhite reproductive success and population performance (see articles in this *Quail Call* newsletter for more details). While found to be beneficial, little is known about typical trapping programs and the costs associated with this type of intensive quail management. Tall Timbers and UGA collaborated to survey private plantations in the Red Hills and Albany areas, as well as a handful of properties in Alabama and the Carolinas, to better understand the range of management practices associated with nest predator management. Many of the survey questions were generated from questions we commonly receive from new landowners and managers in the beginning phases of a predation management program. Our goal was to document common practices for nest predator trapping, estimate annual per acre cost, and learn some of the motivations behind predator trapping on quail plantations.

We created a survey consisting of 42 questions and distributed it to plantation managers through an online source, as well as through email and in-person delivery. Forty-three surveys were returned representing over 258,000 acres of managed quail land. These properties ranged in size from 1,100 to 29,000 acres, with an average of 6,000 acres of managed quail habitat. All the properties that completed a survey stated that they currently had a trapping program in place. Many of the properties surveyed had a trapping program in place for an average of 15 years. Average manager age on these properties was 50 and the average number of years spent managing the current property was 11.

### COMMON PRACTICES

**Season:** On the plantations surveyed, trapping typically is either year-round or seasonal (the bobwhite breeding season – after burning, before blocking). These two categories broke down evenly with 50% of properties trapping year-round and 50% trapping seasonally (Figure 1).

**Style:** The most utilized trapping method on the properties surveyed was a combination of both box traps and leghold traps (69%). Twenty-six percent used only boxtraps and 5% used only legholds. In many of these cases, box traps were

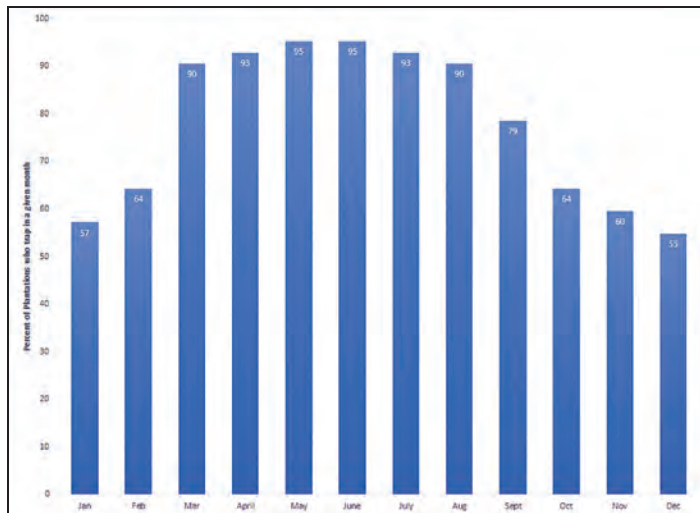


Figure 1: Percent of properties who trapped in specific months throughout the year

used more frequently than legholds with an average ratio across these properties of nearly 4:1. However, managers often stated that leghold traps were “Very Effective” and that boxtraps were only “Moderately Effective.”

**Effort:** Trapping density averaged 1 trap per 46 acres of managed land, or about 20-25 traps per 1000 acres. This was consistent across property size showing little difference in effort based on total acreage (Figure 2). Trapping was typically conducted by a combination of in-house employees and contractors (51%), or solely by in-house employees (40%). The average number of “in house” hours per week spent working

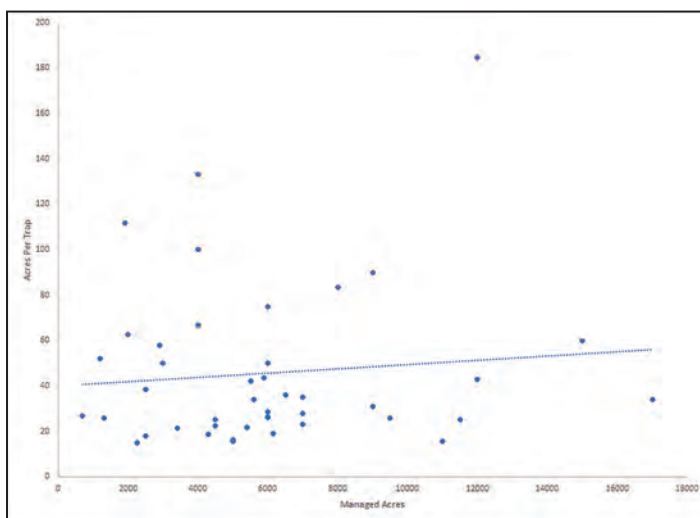


Figure 2: Relationship between total acres managed for bobwhite and acres per trap ratio



with traps reported by these properties was between 20 and 24 hours. Most (78%), contract trapping lasted between 2 to 15 weeks during the bobwhite breeding season while the remaining eighteen percent of contracting was used on a year-round basis. The average contractor weekly rate was \$1405.

**Baits:** A wide variety of baits were reported used by the survey participants, so we separated them into 3 categories: visual, scent based, and a combination of the two. Most properties (64%), used a combination of visual and scent baits in their trapping program. Most properties stated that effectiveness of bait and its longevity were the main reasons behind bait choice (Figure 3). Several managers commented that the longevity of their bait related to resistance to ants.

**Catch Rate:** The average catch rate was 1.13% per night, which resulted in an average of 1 animal caught per 17 acres of managed land annually. The capture success trend (Figure 4), indicates that as the number of trap nights per acre

increases, the acres per animal caught decreases. Essentially meaning that more traps for more nights equals a higher catch rate and annual catch. We observed a diminishing rate of returns after properties reached 17 trap nights per acre, which is a very high trap density of roughly a trap per 20 acres or 50 traps per 1000 acres, nearly double the average trapping density. Total number of animals caught was generally determined by trapping effort (number of trap nights), with the larger properties typically having the highest number of trap nights and therefore the highest catch. There were some exceptions to this general rule as isolated properties or properties just starting a trapping program tended to catch large numbers disproportionate to their size. Opossums and raccoons made up over 70% of the annual catch on most of these properties with armadillos, coyotes, bobcats, and foxes making up 20% and 5% was considered “other.”

**Monitoring:** Forty percent of the properties surveyed reported conducting a Predator Index survey to monitor annual fluctuations in predator activity levels. These surveys averaged a Predator Index of 13.4 (see the *Quail Call* article, “What can the Predator Index do for you?” to gain a better perspective of what this number means).

## COST

We divided the cost of trapping programs into two categories: (a) startup or “capital” cost and (b) annual operating costs. Average capital investment cost was \$3.89 per acre; this cost was mostly determined by the cost of an individual trap and therefore varied based on trap type purchased. The average price range of box traps was \$60–80 and legholds were between \$10–30. Notably, this was prior to steel prices going up! Implementing a telemetry system had the highest capital cost with a cost of up to \$305 for a trap and telemetry system combination. Using the estimated 20 traps per 1,000 acres constant, we can assume based off the reported prices that capital investment cost per thousand acres will be \$1,400 for boxtraps, \$400 for legholds, and \$6,100 for a telemetry system. Investment cost will be higher still if ATVs, rifles, etc. are purchased just for the trapping program.

The average annual trapping cost per acre on the surveyed properties was found to be \$2.93. There was very little variability in annual cost relative to property size based off the results of this survey. Larger and smaller properties showed similar annual cost per acre regardless of total acreage (Figure 5). The bulk of annual expenses came from manpower and/or contractors, 44% and 55% respectively (Figure 6). If a property used in-house employees then they spent more on gas, bait, etc., whereas if they used contractors these costs were part of the contractor’s weekly rate. On average, it cost \$44 per animal caught based off annual trapping expenses and predators caught.

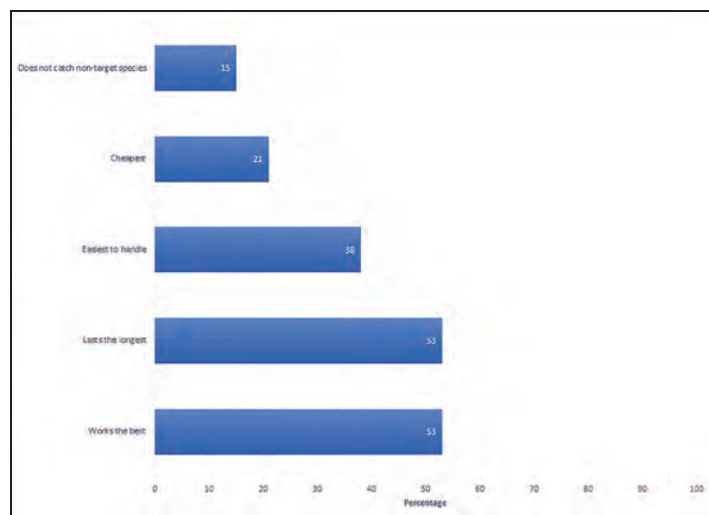


Figure 3: Percentage of properties who selected these specific reasons for bait choice

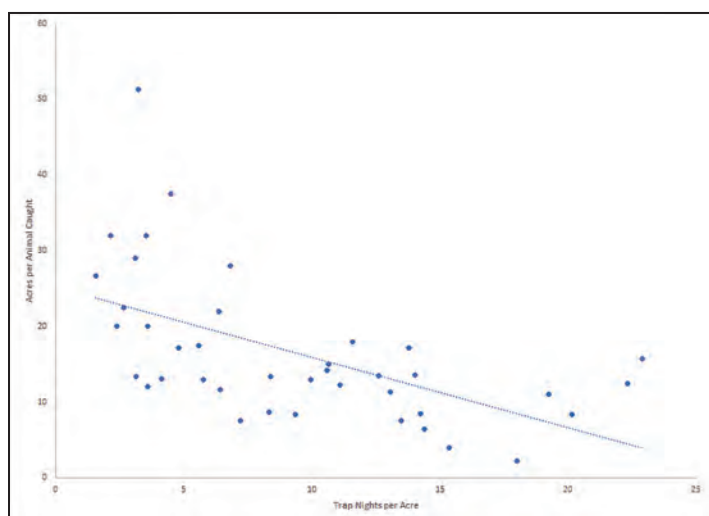


Figure 4: Effectiveness of trapping based off trap nights per acre compared to the number of animals caught per acre

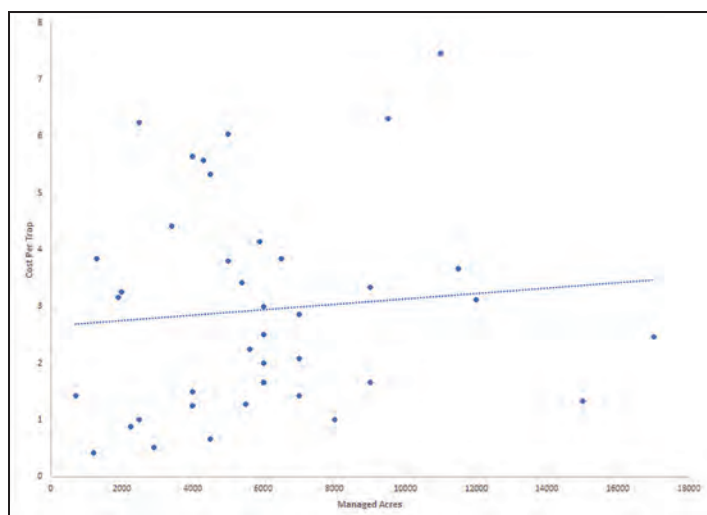


Figure 5: Cost per acre compared to managed acres

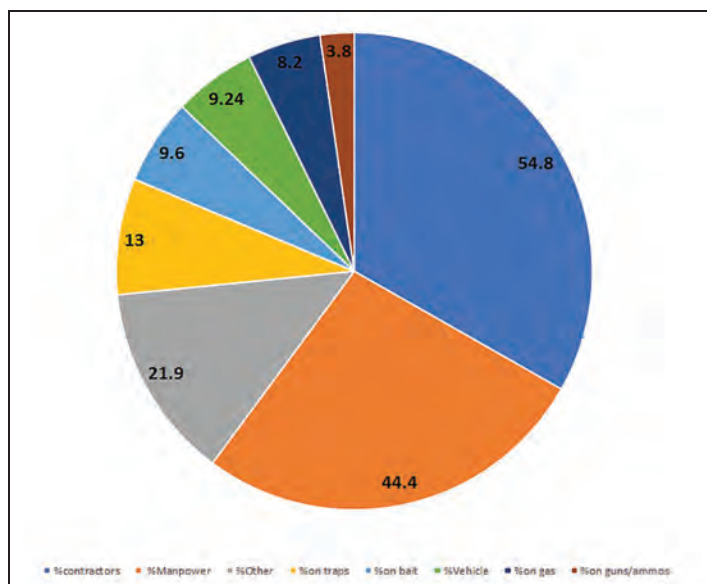


Figure 6: Breakdown of average spending on plantations surveyed

## MOTIVATIONS FOR TRAPPING

Several motivational questions asked in this survey gauged why managers implement predator trapping on their properties. Most managers stated that mammalian predator trapping was “Very Effective” when it came to impacting the success of the quail population on the property and no manager stated that trapping was anything less than “Moderately Effective”. Most managers agreed that trapping was an essential part of their quail management and wasn’t something they did “just because” (Figure 7).

## Evaluating the Trap Telemetry System (TMS)

A question often posed by managers when asking about starting or revamping a trapping program is if the telemetry system is cost effective. The telemetry trapping system allows a trapper to check a signal from single location using a receiver which picks up a signal emitted from a telemetry-sending unit on a box if a trap has been “tripped” over night.

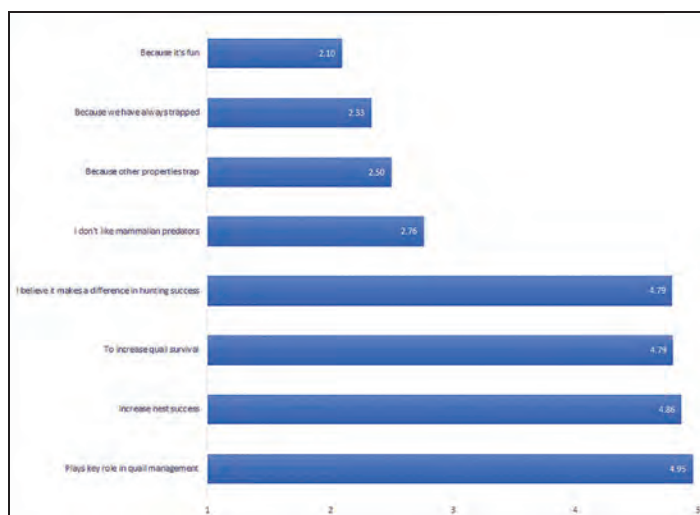


Figure 7: Manager attitudes and reasoning behind predator trapping. 1=Strongly Disagree, 3=Neither Agree or Disagree, and 5=Strongly Agree

In theory, while the initial startup cost is much higher, this system will save money on manpower hours needed and will allow for traps to be placed in areas where they would not be placed normally due to accessibility issues. In addition to accessibility, the trap telemetry system more effectively, 16% more, facilitated annual removal of predators given that more traps and better spatial coverage could be run in the same amount of time as non-telemetry trap system.

Eleven survey returns came from properties using a telemetry system, which is nearly a complete sample of these properties and is therefore over representative in the survey returns. Startup cost for a telemetry system was obviously higher, and the annual operating cost for trapping on these properties was also higher (Table 1).

The survey did not ask some questions that could have delved deeper into this issue, however it is our hypothesis that the properties who implement this system are often people who are very invested in predator removal to benefit bob-white abundance. In a similar vein, these same properties also frequently hire contractors to intensively trap their property, trap longer, and put forth an overall higher effort into baiting, moving, and other aspects of trap maintenance. This results in these properties having a higher annual cost per acre for the entire trapping program. If you compare just the cost of running box traps, it is very similar between telemetry and non-telemetry properties.

While not shown to be a time saver overall, the properties using this system were able to run nearly twice as many traps in the same amount of time, creating higher trap densities that resulted in a lower acre per predator caught value and a higher total catch (Table 1).



### So, is a Telemetry Monitoring System beneficial or right for you?

We believe the answer to this question comes down to economics, size of the property, and time-availability. The original concept behind the Trap Monitoring System (TMS) was to save time (man-hours) running traps such that added cost of the telemetry system would be recouped over weeks, months and years given that less overall time would be spent driving around checking traps. However, the survey results indicated that the cost was \$1.22 more per acre to implement the trap monitoring system (see Table 1).

Digging a little deeper revealed that several properties, instead of cutting the time spent on running traps, either continued to run traps like the traditional non-telemetry trap system or they cleverly increased the number of traps being run and oftentimes the traps would run for longer periods of time (1.5 months longer on average). The trap monitoring system affords increased flexibility to run more traps for a longer period of time, with equal man-hours spent running trap lines. However, this results in higher input costs both in capital expenses (more traps, more telemetry units) and operationally (more bait, longer trap lines, more fuel, etc.).

In the spirit of understanding the true value of the Trap Monitoring System, compared to the traditional (non-telemetry) system, we used data from the survey to estimate cost per trap for trapping equipment, bait, travel (vehicle plus fuel), and manpower (hours per trap) standardized by trap density (i.e., same number of traps used for TMS and non-telemetry system on a per acre basis) to project time to recovery of costs for the TMS.

The biggest difference between the 2 methods was the labor and fuel costs required to “check” traps where telemetry traps required only three-fifths of the time (12–15 hours versus 20–24 hours per week), required for conventional traps.

Practices	Telemetry	No Telemetry
Annual Cost Per Acre	\$3.83	\$2.64
Capital Investment Cost/ Acre	\$10.55	\$2.13
Catch Rate per 100 Traps Per Trap Night	0.84%	1.24%
\$ per animal captured	\$44.72	\$43.13
Acres Per Predator Caught	13.3 Acres	18.4 Acres
Acres per Trap	28 Acres	48 Acres
Average Months Trapped	10.5	9
Hours Per Week	20-24	20-24

Table 1: Comparison of basic practices and cost between properties with and without a telemetry system

Based on this analysis, our results indicate that the larger the property the more efficacious it is to invest in the trap monitoring system such that you recoup your costs faster compared to smaller properties (see Figure 8). It would take approximately 8 years to recoup your cost of the upfront telemetry expenses on a 1,000-acre property, compared to only 6 and 4 years for a 5,000 and 20,000-acre property (see Figure 8).

With that said, by the sixth year of using the trap monitoring system on 5,000 acres or larger, the trap monitoring systems results in a net annual gain in cost savings. Finally, standardizing manpower (keeping hours consistent), can result in as much as a 34% increase in annual capture effectiveness (i.e., total number of individuals trapped), on a property using a trap monitoring system, given the increased number of traps and improved spatial coverage. In summary, the trap monitoring system can improve predator reduction effectiveness, and be a win financially, especially for larger properties, if the system is used as designed.

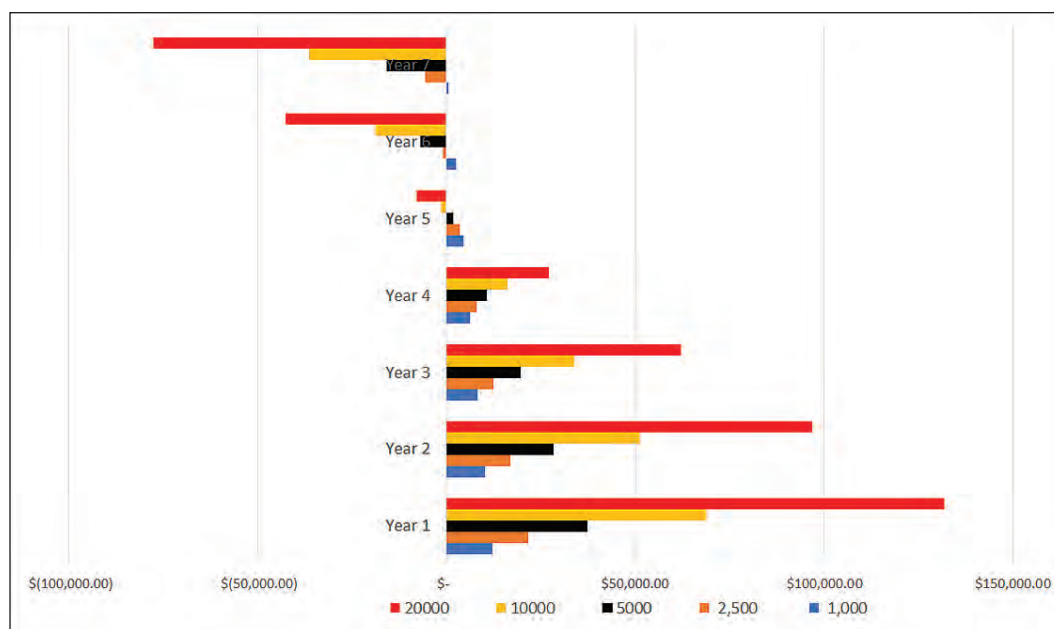


Figure 8. Time (years) to recoup costs associated the cost of trapping by property size (acres).

## What is a “Typical” Trapping Program?

While the survey results show that trapping effort varies among the quail plantations, it also revealed to us that there are some constants that may serve as good guidelines: using 20-25 traps per thousand acres of managed land (this could be box traps, legholds, or a combination), trapping at least during the bobwhite breeding season (between the burning and blocking seasons), and hiring an effective contractor to trap prior to and/or during the peak breeding season for as long as possible (between 5–15 weeks is typical).

Managers favored a combination of visual and scent attractants to be used as bait. The expectation is to catch one mesopredator for every 17 acres, or roughly 60 predators per 1000 acres per year. This number may be higher if the property is isolated or if the trapping program is just beginning.

The best way to evaluate a trapping program is to utilize a Predator Index survey over time to analyze differences in the index (see “What can the Predator Index do for you?” article in this *Quail Call*). Expect the annual cost per acre to be ~\$2.90, and for labor to be about 20–24 hours per week for non-traditional trapping methods, and a minimum of 13–15 hours for the trap monitoring system, if used as designed. It is important to note that while there is some variance in annual cost per acre when trapping, that even on the high end of annual cost per acre, trapping makes up a much lower percentage of the annual budget than many other standard management practices conducted on these properties.

A recent analysis by Tall Timbers revealed that an average management cost on these properties is about \$100/acre annually, meaning that a trapping program would make up only 2–4% of an annual operating budget.

There is still much to be learned about the benefits and best ways to effectively trap mammalian predators on quail plantations. In particular, a deeper look into the pros and cons of the telemetry system would be beneficial. Evaluating effectiveness of different trapping programs using the predator index, and other pertinent considerations, such as types of baits and frequency of rebaiting, could also be looked at. Understanding the benefits of utilizing legholds versus box-traps, as well as timing and duration of trapping should also be explored further. Finally, we would like to thank all the managers who took the time to complete this survey. 🐾



## RESEARCH UPDATE

## What can the Predator Index do for you?

By Alex Jackson, Bill Palmer, D. Clay Sisson, Theron Terhune, and James Martin

A primary goal among bobwhite managers in the Red Hills and Albany regions is maximizing bobwhite population performance. In addition to habitat management a variety of practices are implemented to achieve this goal, ranging from supplemental feeding to mammalian nest predator control. Although widely practiced by bobwhite managers in the Red Hills and Albany regions, prior to the past year, little evidence existed in the scientific literature evaluating the efficacy of this practice to improve bobwhite reproduction and ultimately bobwhite density in the fall. Predator control remains a contentious topic, however, among wildlife biologists, academicians, and some natural resource managers. Given that predator control is sometimes viewed as an unnecessary management tool, we found it important to explore the use and impacts of this culturally implemented practice. Also, we view it as our responsibility to publish research on contentious issues, so that policy at the state-level can be informed by rigorous scientific evidence, affording landowners and managers the opportunity to implement important management practices to maximize the benefit to bobwhite.

The first step to evaluating the effects of predator control on bobwhites is having a meaningful metric to capture relative predator abundance (or activity), and using that method to evaluate whether reducing predator activity via predator control links to bobwhite demographic response. A common technique used to evaluate predator activity and the efficacy

of predator control programs is a scent-station survey. This survey method consists of a 1.0 m diameter area cleared of debris and covered with a mixture of sand and mineral oil to provide a substrate to identify predator tracks (Figure 1).

A single fatty-acid scent tablet is placed in the center of the station as an attractant for passing predators.



Figure 1. A single scent-station used to conduct the Predator Index surveys.



### PREDATOR INDEX CONTINUED –

Stations are placed along roads or other linear features and located approximately 500 meters apart, with 30-40 stations per site.

Surveys are generally conducted in early October and run daily for five consecutive days for a given property. The Predator Index is determined separately for each property by dividing the total number of target species visitations by the total number of scent-station nights. For example, 40 scent stations run for 5 nights would equal 200 scent-station nights; thus, 20 target species visitations, would result in a Predator Index of 0.1 or 10%.

Using the scent station survey, our goal was to study relationships between the Predator Index, predator control, and bobwhite demographics. We collected data on 11 sites where we were monitoring radio-tagged bobwhites in three south-east states (GA, FL, AL), over an 8-year period. Combined, there were 37 site-year combinations when predator control occurred, and 20 site-year combinations, when predator control did not occur. Bobwhite reproductive information was collected from 3,935 radio-tagged bobwhites, resulting in 2,499 nests. We conducted 57 scent station surveys and calculated the Predator Index for each site, for each year data were present, as the average number of station visits per night by common meso-mammalian nest predators, namely raccoons, opossums, armadillos, bobcats, and foxes.

We found that predator control was effective at reducing the Predator Index (i.e., predator activity). The average Predator Index for non-trapped sites was 0.21 compared to 0.10 for trapped sites. This is important because it clearly demonstrates a positive relationship between trapped sites having lower predator activity than sites not trapped—an approximate 2-fold reduction in predator activity on trapped areas. A general guideline is that a Predator Index below 10%

typically will maximize nest success, and will not be limited by predation.

Having demonstrated that predator control is effective at reducing predator activity, our next step was to explore relationships between nest predator reduction and bobwhite reproductive performance. We explored relationships between predator control and nest success, nests produced per hen, broods produced per hen, and chicks produced per hen. We found that predator control had a positive effect among each of these reproductive demographics. Nests were 1.33 times more likely to hatch on trapped sites versus non-trapped sites. Additionally, on trapped sites, every 100 hens produced 14 more nests, 12 more broods, and 109 more chicks than on non-trapped sites (Figure 2).

### TAKE HOME MESSAGE

Using the Predator Index is a cheap and effective way to quickly gauge predator activity on your property, and help to make the decision on the trapping effort needed to maximize reproduction and limit predation. In addition, the Predator Index provides a crude assessment of predator composition, which can inform the type of trapping needed. For example, if a high number and larger proportion of the scent-station hits are coyote, bobcat and foxes, then leg-hold (steel) trapping may be warranted, whereas box traps may be more effective at reducing predator activity when there is a higher proportion of raccoon, opossums and armadillos. There are factors that may bias the utility of the Predator Index, such as weather (lack of or too much moisture), moon phase, and scent-station placement. Also, since this technique is only an index having more data, data over multiple years and conducting the survey consistently from year to year will make the Predator Index more useful, and more reliably inform management decisions.

We must note that the data used to conduct our analyses came from well-managed sites, where bobwhite habitat is prevalent on a landscape scale, and Predator Index data, both trapped and non-trapped sites, are on the low-to-mid range of the survey scale (i.e., 0–1). Looking at the data from all Predator Index surveys conducted by Tall Timbers and affiliated sites across the Southeast (Figure 3), reveals this is far from the case everywhere. Predator indices of 0.30-0.40 are not uncommon, and we have seen indices as high as 0.87.

We can only surmise what impact predator numbers this high would have on quail reproduction. It is a fact that for most of the Southeast, the only way to have a low Predator Index is to have an effective trapping program. The bottom line is, our research has demonstrated that predator control is effective at reducing predator activity as measured by the Predator Index, and a reduction in this predator activity at increasing bobwhite reproductive output.

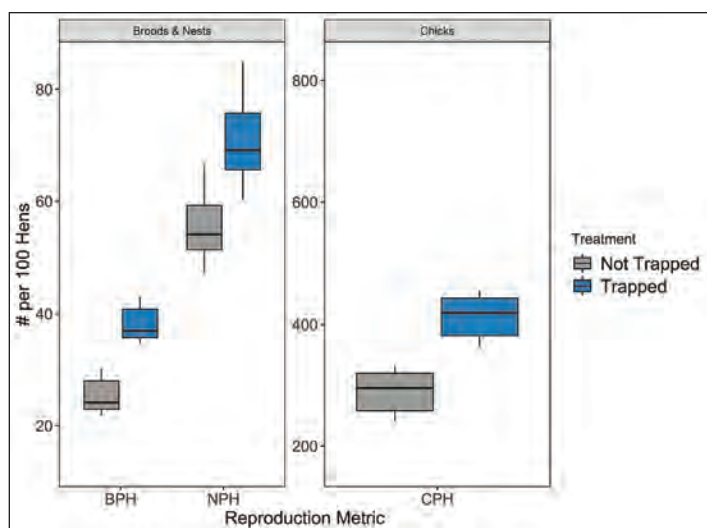


Figure 2. Predicted number of nests (NPH), broods (BPH), and chicks (CPH), produced per 100 hens on trapped study sites versus non-trapped study sites.

## RESEARCH UPDATE

## Grid-blocking impacts on hunt success and bobwhite demographics

By Paige E. Howell, University of Georgia; Theron M. Terhune, Tall Timbers; and James A. Martin, University of Georgia

Hunting the piney woods of the Red Hills region and Albany area is like a dream for a quail hunter. But one thing that pricks us awake is the waste-high briar patch to bust through to locate a bird dog on point!

The conventional hunting path organized in a checkerboard arrangement (Figure 1), known as “grid block,” can be a godsend to hunter and bird dog alike, especially in rank cover conditions. Beyond the modern-day conveniences for the hunter, grid-blocking can also be effective cover management! Grid-blocking helps to achieve multiple management objectives, including reduction of hardwoods, maintaining a grass and forb-dominated understory, increasing hunter accessibility and providing travel lanes for pointing dogs. While hunt paths provide increased access for hunters and their dogs, the negative impacts on northern bobwhite populations have not previously been investigated. Mowing in the woods increases the amount of structural edge, and its timing coincides with raptor migration, both of which could alter predation risk, potentially resulting in lower survival. Loss of cover in autumn could be aggravated by winter frosts, which may act together to further reduce over-winter survival rates.

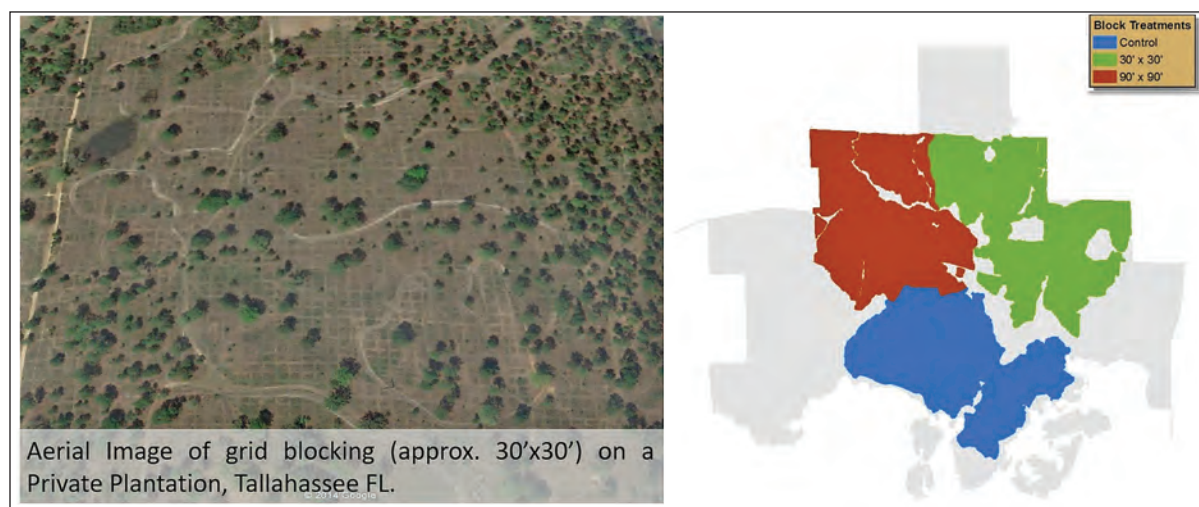


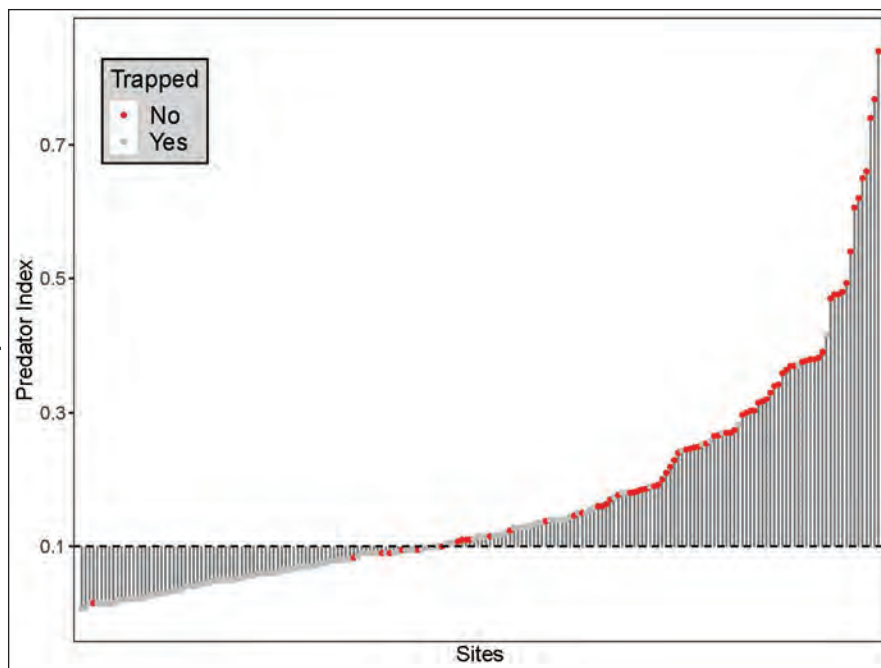
Figure 1. Tall Timbers was broken up into 3 grid block treatments mowed at 90x90 foot (burnt-orange), 30x30 foot (green), and control (no mowing; blue) spacing with each treatment area rotated clock-wise each year during 2014-2016.

— GRID-BLOCKING  
CONTINUED ON  
PAGE 26

### PREDATOR INDEX CONTINUED –

However, predator control is not a panacea for bobwhite populations. Nonetheless, it can be an effective management tool as part of a broader management prescription. As we have said before, a lot of the research we do results in proving Red Hills and Albany quail managers right—this happens to be the case once again! It appears predator control may be more than simply a cultural practice after all.

Figure 3. Predator Index surveys conducted by Tall Timbers and the Albany Quail Project demonstrating the difference between trapped sites (gray) versus non-trapped sites (red), relative to the 10% index level, below which typical nest production is expected to be maximized. Here 95% of sites below 10% were trapped compared to 5% of sites that were not trapped had an predator index lower than 10%. Conversely, 59% of sites above 10% predator index were not trapped.





## GRID-BLOCKING CONTINUED -

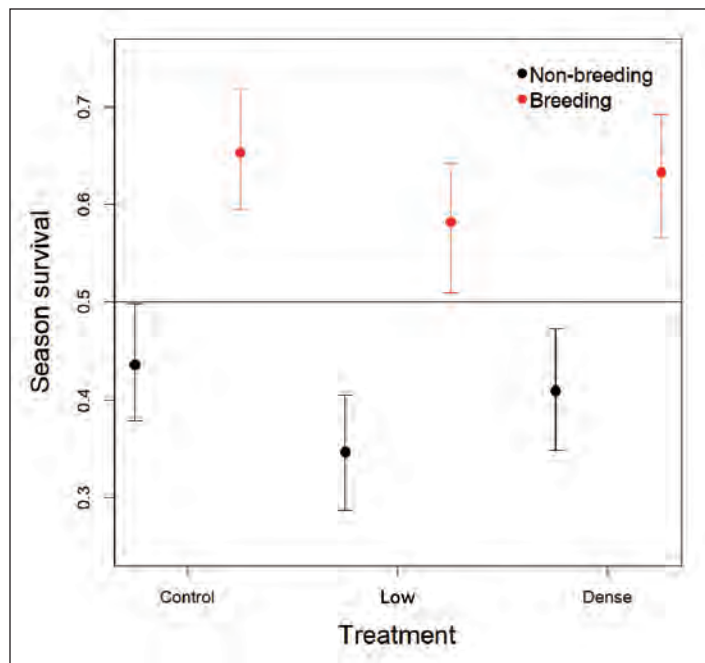


Figure 2. Seasonal survival among our three grid-blocking treatments in the breeding and non-breeding season.

We experimentally manipulated the amount of grid-blocking across Tall Timbers on three management units from 2016-2018 (Figure 1). Each year, management units were assigned to one of three mowing treatments; no grid-blocking = **Control**, moderate grid-blocking = **Low**, and dense grid-blocking = **Dense**. We tracked >50 radio-tagged bobwhites within each of the three treatments during each season each year. Birds were radio-located 2-3 times per week to determine their fate (alive or dead).

During the breeding season, we located nests and tracked the fate of each nest, the clutch size and the fate of each egg. In autumn, we conducted covey call surveys to estimate the density of birds each year, within each treatment. We also calculated the amount of edge gained and cover removed using GPS (global positioning system) and GIS (geographic information system). Finally, we quantified the effect of grid-blocking on hunt success by foot hunting, including number of coveys encountered and pointed per hour, number of wild flushes, and number of birds harvested per hour.

As expected, grid-blocking increased the amount of edge (30,066 ft. within **Low**; 49,432 ft. within **Dense** treatment), and reduced overall cover by as little as 20% removed within **Low**, to as much as 35% removed within **Dense** treatment.

We found that survival was lowest in the **Low** edge-density grids, and higher during the breeding season, regardless of treatment (Figure 2). Annual survival was about 9% higher on the control than the **Low** treatment and only ~4% higher on the dense treatment. Lower over-winter survival in the **Low** grid-blocking treatment may be due to higher avian predation, as grid-blocking creates more avenues/lanes for

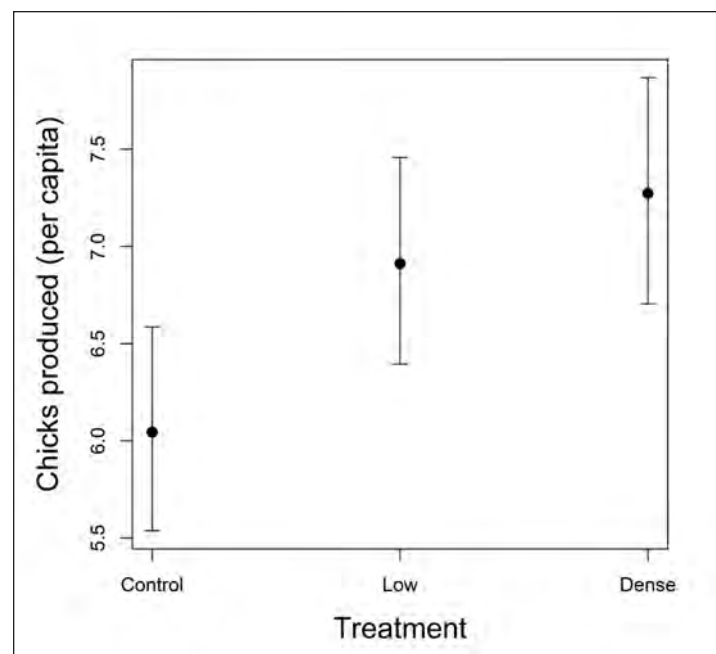


Figure 3. Per capita number of chicks produced in each of our three grid-blocking treatments.

avian predators to locate prey. However, past a certain point, increasing the number of lanes for locating prey may overwhelm the predator with choices and actually lower mortality risk, potentially resulting in higher survival as seen in the dense (30 x 30) grid-blocking treatment.

We did, however, anecdotally discover that mowing at a set distance—which we did for experimental purposes in this study—when the cover is already “thin” or “light,” can result in too much cover taken away and displacement of coveys, apparently due to a reduction in cover and perceived risk of mortality by individual coveys. On one course in the dense treatment, we observed three separate radio-tagged coveys move to the **Low** treatment within a couple of weeks following grid-blocking. This course was typically one of our better hunt courses, but quickly became our worst for that year during the **Dense** treatment, which we believe was associated with knocking down too much cover.

Despite lower survival on higher hunt path density areas, reproductive output counterbalanced survival impacts. The number of chicks produced per adult bird was lower in the areas with no grid-blocking (control), compared to areas with grid-blocking (Figure 3).

As a result of reproductive effort, autumn density was similar across our three treatments (Figure 4). In terms of hunting, we observed minimal differences in metrics used to characterize hunt success on a per hour basis among our three treatments (Figure 5), but hunter satisfaction surveys revealed strongly opinionated preferences relative to the presence of hunt paths.

Surveys conducted during the study suggested that hunters preferred to hunt in areas with mowed hunt paths and

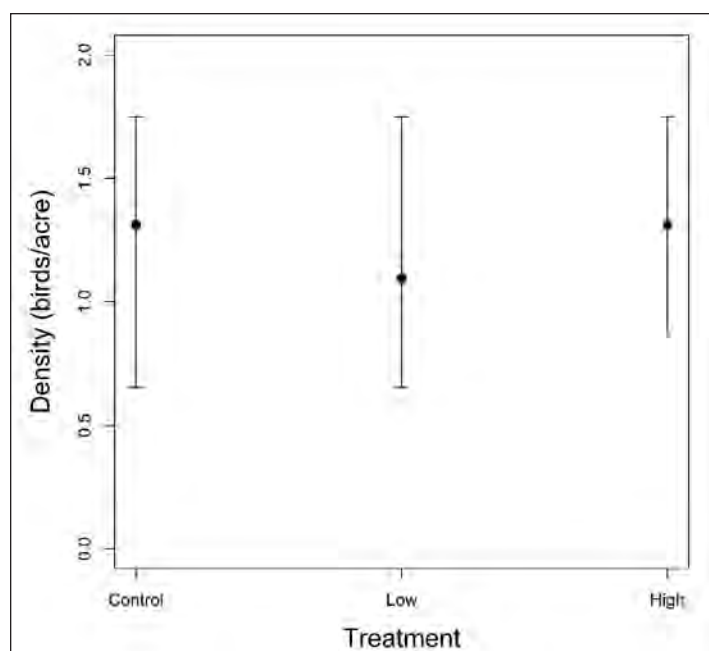


Figure 4. Autumn density (birds/acre) in each of our three grid-blocking treatments

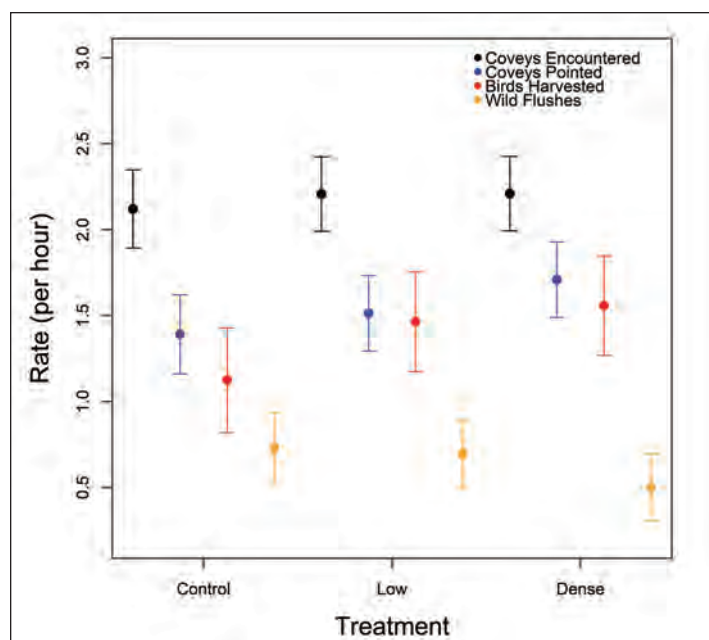


Figure 5. Hunt success (per hour) in each of our three grid-blocking treatments.

especially preferred a higher density of hunt paths. Hunters using the dense grids left comments such as, “*I want to shoot here a lot!*” Whereas hunters using the areas without hunt paths left comments including, “*The control sucks!!!*” In fact, we just about had to pay folks to hunt the control area, given that wading through the thick and nasty vegetation made it more difficult to observe the bird dogs and less than pleasant to chase down that “Usain Bolt” covey.

All in all, the total coveys moved or seen per hour was similar among treatments (Figure 5), whereas the coveys pointed per hour and birds harvested per hour followed a slightly positive trend, as hunt path density increased (Figure 5).

In addition, we observed that more wild flushes (see decreased trend in wild flushes with hunt path density in Figure 5), and less coveys were shot on areas without hunt paths (control) compared to those with hunt paths; the increased number of wild flushes balanced out the number of coveys encountered or seen. This is likely a result of hunters being able to more quickly approach and flush the covey, yielding improved shooting opportunities, more birds taken by the gun, and greater overall hunter satisfaction on areas with hunt paths.

### HOW DOES GRID-BLOCKING IMPACT BOBWHITE DENSITY?

We found that bobwhite density among all treatments was similar during all years, which is likely due to the increased chick production on areas with a higher amount of hunt paths (**Dense** treatment) during the previous hunting season.

If fewer individuals survive to the breeding season in the areas with a higher density of mowed paths, then there may be more resources available to those fewer surviving individuals, to energetically put towards chick production. Similarly, greater levels of mortality and lower overall breeding density may elicit a greater reproductive response or higher reproductive-drive at the population level. Regardless of the causal mechanism, bobwhite appear to be able to overcome any mortality deficiencies associated with grid-blocking through reproductive output.

Therefore, given the overall lack of a negative impact of grid-blocking on bobwhite density, managers with the financial means can rest easy knowing that grid-blocking is a safe management technique, which can improve hunter satisfaction without detrimental impacts on the bird population. It is important to note, however, that grid-blocking in this study was conducted in mid-October through December, therefore, future research is warranted to understand how grid-blocking in September may impact late-season broods.

### TAKE HOME MESSAGE

Our research confirms what many local managers have believed for several years; that is, grid-blocking when done properly improves hunting efficiency, increases hunting comfort and satisfaction (more hunt paths equals better access to coveys), with minimal impacts on annual bobwhite density. Although on an hourly basis there was little difference in coveys encountered, over the course of a six-hour day or two half-day hunts, grid-blocking would result in two more coveys pointed in dense grids per hunt, and one more pointed in low grids per hunt compared to control grids.

Whereas survival was highest on the **Dense** (30 ft. x 30 ft.) treatment compared to the **Low** (90 ft. x 90 ft.), we also observed that grid-blocking distance should be pragmatically flexible such that the density or thickness of cover dictates the distance between hunt paths.

– GRID-BLOCKING CONTINUED ON PAGE 28



## RESEARCH UPDATE

## Quail-nomics 101

By Theron Terhune and Clay Sisson

In the previous issue of the *Quail Call*, we published an infographic that included the “Estimated management cost to produce a wild quail in November in the greater Red Hills Region.” Since then we have received a lot of questions about that number, which stimulated some great discussion, and also made us realize that we had a typo in that infographic. The \$570 amount we reported should have been stated as the “value per harvested wild bobwhite” at the *end of quail season*, instead of the “estimated management cost per quail” in *November* in the Red Hills region. Given the keen interest and email traffic we received about the topic, and a direct request to expound on how we came up with the cost and value of a wild quail in the Red Hills, we decided to address the subject in this edition of the *Quail Call*.

Our interest in the economics behind producing and maintaining wild birds came at the heels of a translocation discussion at a national strategic bobwhite recovery and planning meeting, when a comment was made that the “contribution of translocation to bobwhite population recovery” was deemed “as insignificant.” This sentiment did not set well with us, so in the most recent National Quail Symposium Proceedings we published a paper titled “Contributions of Translocation to Northern Bobwhite Population Recovery.”

In addition to summarizing the many successful translocation projects Tall Timbers has been involved in, we investigated (1) the cost of producing a wild quail and (2) the cost and value of a harvested wild quail or one donated for translocation, which are two very different things.

In this short article we hope to clear the air regarding what we mean by the cost versus the value of a wild quail,

and explain how we came up with these numbers. We used annual operating budgets from 17 different properties in the Red Hills and Albany regions to inform the estimated management cost, opportunity cost, and derived value of a bird. Where the actual management cost per bird will inevitably vary somewhat among properties and among years, we generalize the term management cost as the average cost to manage an acre of quail habitat in the Red Hills and Albany regions. We found that the average management cost in the Red Hills and Albany regions was \$94/acre, with a range of \$69 to \$120. However, when calculating the (management) cost of a harvested bird, one must take into account overall bird density, in addition to the management cost per acre—i.e., the more birds produced from management at the same cost, the less each individual bird cost to produce per harvested bird, assuming harvest rate is consistent across properties.

## MANAGEMENT COST PER BIRD ESTIMATE (MC)

In our estimates of management cost, we included only management items (see Figure 1) in the Annual Land Management Budget that directly contributed to the production and maintenance of quail, and we excluded expenses that were not directly associated with the cost to manage quail habitat (see Figure 2). Fall abundance was determined from covey call counts or hunt success data on plantations that provided annual operating budgets. We used a maximum harvest limit of 15% and assumed a translocated bird was part of that 15%. Finally, management cost must also take into account natural attrition (mortality) of an adult quail. Taken collectively, the general calculation for management cost (MC) is:

$$MC = \left( \frac{\text{Annual Land Management Budget}}{\text{Fall Abundance} \times \text{Harvest Rate} \times \text{Natural Bobwhite Survival}} \right)$$


Therefore, for a property averaging 1.5 birds per acre (bpa) the calculation would be:

$$MC_{\text{November}} = \left( \frac{\$93.96}{1.5 \text{ bpa} \times 1} \right) = \$62.64 \text{ per bird}$$

where, no harvest rate has occurred yet and natural bobwhite survival is 1 or (100%), with no natural mortality at the start of the interval. This would be the cost to produce a wild quail in November, just prior to hunting season. Compare this to the average management cost of a harvested bird, or one removed from the population during the hunting season on a property with a fall density of 1.5 birds per acre:

$$MC_{\text{harvested bird}} = \left( \frac{\$93.96}{1.5 \text{ bpa} \times 0.15} \right) = \$417.60 \text{ per bird}$$

## GRID-BLOCKING CONTINUED –

Mowing hunt paths too close together when cover is “light” may result in covey displacement and reduce localized (within hunt course) density, potentially increasing covey mortality. A general rule of thumb is to mow with the denseness of cover in mind, such that one can see the next lane from the cab of a tractor, but not see a soccer ball in that hunt path. If you can see the soccer ball, then the hunt path is likely too close for normal covey fidelity and survival. We find that an average of about 40 ft. is ideal in most conditions; this distance between hunt paths will seem too far apart in October and November, but about perfect in January and February, after the frosts have melted the cover away. 

Intuitively then, as the harvest rate goes down, the management cost per harvested bird goes up. The cost to carry a bird to March (post-hunting season), would then include both harvest and natural attrition (i.e., adult mortality in addition to direct harvest) as:

$$MC_{\text{Harvested Bird in March}} = \left( \frac{\$93.96}{1.5 \text{ bpa} \times 0.15 \times 0.76} \right) = \$549.47 \text{ per bird}$$

where 0.76 is the average survival rate from 1 November to 1 March.

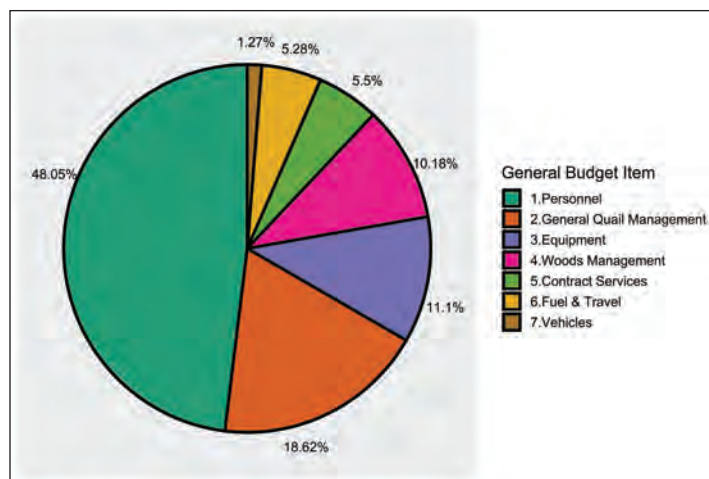


Figure 1. Average proportional cost at \$93.96 per acre for typical northern bobwhite land management activities in the southeastern United States. Personnel costs include land managers and woods crew staff only; general quail management includes expenses associated with prescribed fire, fallow field creation and maintenance, supplemental feeding, predator control, mowing/chopping, and etc.; equipment covers expenses incurred associated with tractors, woods and farm machinery (such as tree-cutters, roll-choppers and etc.), ATVs, lease agreements for tractors, loaders, and excavators; woods management covers expenses associated with land clearing (such as snag cleanup, hardwood cleanup, pile management, in-house herbicide application); contract services covers expenses incurred through contract burning, and chemical purchase and application; fuel and travel cover fuel for all equipment and trucks; and, vehicles cover works trucks.

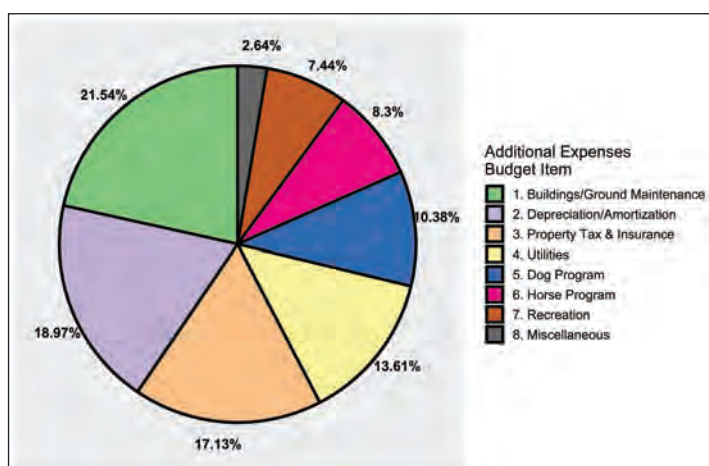


Figure 2. Additional operating expenses common for Red Hills and Albany area plantations. These expenses are not directly related to the creation and maintenance of bobwhite habitat.

## VALUE PER BIRD ESTIMATE (VB)

The *value* per bird, on the other hand, takes into account other factors related to supply and demand, as well as natural attrition (adult mortality), to determine the value of a bird at different times of the year. These factors are often less concrete and more difficult to enumerate. For instance, the opportunity cost—the amount of money someone would pay for the opportunity to have or take (i.e., harvest) an individual—can drive up the overall value of a bird, while the cost to produce stays the same.

In Texas, for example, during years of plenty, aka the boom periods, bird density can be very high (in excess of 3 birds per acre at times on some ranches), and therefore the opportunity cost would decrease during those times and so does the relative value of a quail bird. But, on the same piece of ground during drought years, aka the “bust” years, the opportunity to harvest birds diminishes, given that there are substantially fewer quail, which drives the relative cost of management per bird up, along with the opportunity cost.

We estimated the value per bobwhite as the management cost (MC) plus the opportunity cost (OC) as follows:

$$OC = \left( \frac{\text{Cost of a Wild Bobwhite Hunt in the SE}}{\text{Daily Bag Limit}} \right) - MC$$

where the average cost per day for a wild bird hunt was \$7000, the daily bag limit was 24 for 2 hunters. The MC per bird was \$62.24 at 1.5 birds per acre. Therefore, at 1.5 birds per acre, the opportunity cost during the hunting season is:

$$OC = \left( \frac{\$7,000}{24} \right) - \$62.64 = \$229.03$$

Therefore, the value of a bobwhite (VB) at 1.5 birds per acre in November is:

$$\begin{aligned} VB_{\text{hunting season}} &= MC_{\text{harvested}} + OC \\ &= \$417.60 + 229.03 \\ &= \$646.63 \end{aligned}$$

The value of that bird in March, assuming it survived, using our example of 1.5 birds/acre and a 15% harvest, and factoring in natural attrition (adult mortality), as indicated in formula would be:

$$\begin{aligned} VB_{\text{March}} &= MC_{\text{March}} + OC \\ &= \$549.47 + 229.03 \\ &= \$778.50 \end{aligned}$$

Therefore, the \$570/bird figure used in the previous *Quail Call* was calculated in the same manner as above, but using the actual data averaged ( $MC = \$398.63 \pm 181.33$  and  $OC = \$170.92 \pm 107.48$ ), across all 17 properties surveyed, indicating that the average bobwhite density on properties surveyed was close to 2. This (\$570/bird) would be the



## QUAIL-NOMICS CONTINUED -



average value of a harvested quail or one removed from the population in March for translocation.

Managing a property intensively may result in higher input costs but will most likely result in lower cost per bird. For example, removing intensive management actions, such as regular woods management like chopping and mowing, herbicide application, fallow field management, supplemental feeding, and predator control, can reduce the average cost per acre to \$40–45 or less. The bird density will decline dramatically, yet the cost per bird will

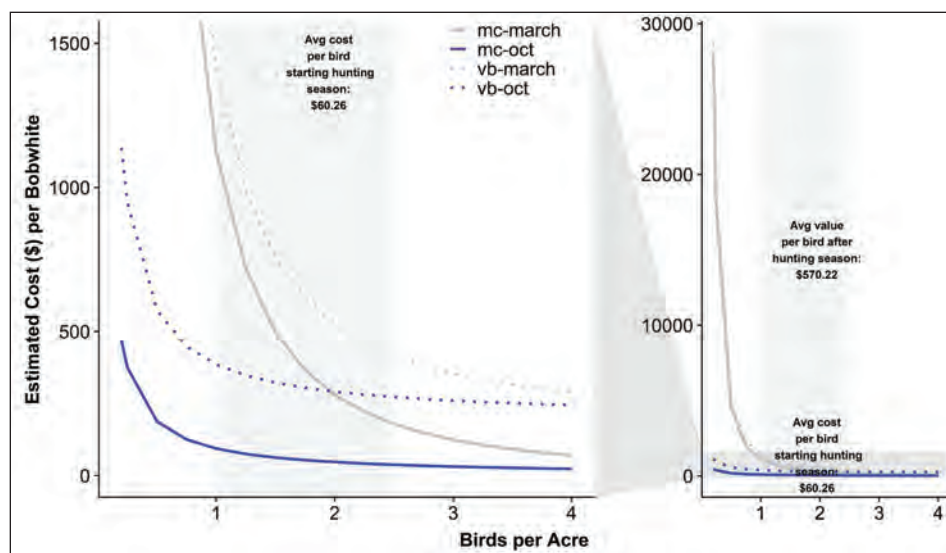


Figure 3. Estimated cost and value per bobwhite for plantations in the Red Hills region and Albany area.

go up substantially — as much as 85%. That said, when maximizing yield (i.e., bird density) through intensive management, the actual cost and value per bird decreases (see Figure 3).

In the Red Hills and Albany regions, most properties intensively managing for bobwhite sustain bird densities in the 1 to 2.5 birds per acre range, with an average estimated bobwhite density of 1.4 birds per acre throughout the Red Hills; this, in turn, would result in

an average management cost per bird at the end of hunting season about \$570 ( $\pm$  \$170; see Figure 3), compared to a cost of \$60.26 ( $\pm$  \$9.80) per bobwhite, at the start of hunting season.

The take home message is that despite a relatively high input cost of about \$94/acre, managing with this intensity and consistency can produce more birds, making it a relatively economical proposition. 🐦

## Thank You Game Bird Event Sponsors



Boykin Tree Farm | Mr. & Mrs. Chas H. Cannon | John M. Carlton, Jr. | Central States Enterprises | Continental Deutsch-Kurzhaar Association  
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## BEYOND THE RED HILLS

### Carolina Regional Quail Project

#### PARTNERING FOR "PARTRIDGES" IN THE PALMETTO STATE THE SOUTH CAROLINA BOBWHITE FUNDING PARTNERSHIP


By Paul Grimes, Carolina Regional Gamebird Biologist

There is a strong, increasing interest among folks in South Carolina to restore high densities of wild bobwhite. Individuals across the state are teaming together to make a difference and restore an important part of South Carolina's hunting heritage. Tall Timbers' commitment to restoring fire dependent systems for bobwhites and associated species in the Carolinas was forged in their 10-year Strategic Plan. It takes partnerships to impact a culture and to geographically expand fire across the Carolina landscape. By partnering with biologists, landowners, managers, and other quail enthusiasts across the South Carolina, the overall impact and likelihood for restoration success increases drastically.

Recently, an agreement was signed between the South Carolina Department of Natural Resources and Tall Timbers, which launched a new funding vehicle to aid in restoring wild quail in South Carolina. This funding vehicle, the South Carolina Bobwhite Funding Partnership (SCBFP), formalizes an existing partnership. It gives quail enthusiasts throughout the state an opportunity to support restoration on both private and public lands in South Carolina.

Funds raised through the SCBFP equally support Tall Timbers' Carolina Regional Quail Project efforts focused in South Carolina, and the South Carolina Bobwhite Initiative, to more efficiently focus efforts on landscape-scale restoration for bobwhites. Fund raising initiative held across the state create opportunities for those passionate about restoring wild bobwhites to get involved in this boots-on-the-ground effort.

Thanks to volunteers and donor support, more than \$36,000 over the first year was generated! These dollars have already been put to work in the form of hosting and participating in quail-centric workshops across the state. As a result, new localized partnerships are in the process of being formed, where Tall Timbers is able to deliver research-based, cutting-edge science to promote focused restoration and expansion of fire dependent systems for bobwhite and other associated species. Of course, local property-scale impacts are realized by refinement of habitat management through technical assistance provided via Tall Timbers. Collectively, these efforts are intended to make landscape level change through the focused expansion of fire-dependent systems and increase in bobwhite populations.

If Tall Timbers' Carolina Regional Quail Project can assist you, or for more information on the South Carolina Bobwhite Funding Partnership please contact Tall Timbers' Regional Gamebird Biologist, Paul Grimes at 706-825-0451 or [DPGrimes@talltimbers.org](mailto:DPGrimes@talltimbers.org) 



**SAVE THE DATE**  
*October 24, 2019*

**South Carolina  
Bobwhite Fundraising Partnership  
Event and Auction**

...

**The Millstone at Adams Pond  
Columbia, South Carolina**

*The proceeds from this event help to fund the South Carolina Bobwhite Initiative, as well as Tall Timbers' Carolina Regional Quail Project's efforts in South Carolina.*

At left, Paul Grimes with his Deutsch-Kurzhaar hunting dog, Belvedere.



## Central Florida Rangeland Bobwhite Initiative



About 18 months ago, we launched a new initiative in Central Florida geared toward the establishment of a long-term research program studying northern bobwhite ecology and management focused on both private and public ranchlands. Our overarching goal for this initiative is through long-term adaptive management and research, determine best management practices for sustaining high densities of northern bobwhite, while promoting ecological diversity, and improving the long-term sustainability of ranching on private lands.

The development of this rangeland initiative aligns perfectly with Tall Timbers' mission and will heighten our knowledge of bobwhite ecology as a whole. Tall Timbers strategic plan recently called for the expansion of research in northern bobwhite and prescribed fire across the southeastern coastal plain. This is because, in contrast to the Red Hills and Albany regions, most areas of the eastern U.S. have lost, or nearly lost, wild bobwhite populations and other species associated within their habitats. In central Florida, specifically, over two million acres of potential habitat for bobwhite exists on private and public rangelands. However, few research efforts have been conducted on best management practices and basic ecology of bobwhites in central Florida rangelands. As a result, much of the landscape holds great potential for bobwhite, but remains an untapped resource. The most recent research efforts in this region were led by Tall Timbers studying the effect of burn size on bobwhite demographics. Therefore, long-term research is needed to develop management strategies for landowners interested in managing for

wild bobwhite populations, while sustaining natural diversity and other compatible land use practices on rangelands and ranchlands. We currently have two research sites in central Florida: Escape Ranch and Rollins Ranch.

Escape Ranch is where our primary research headquarters is located and is an ideal location to conduct this investigation. It is comprised of a mix of improved pasture and mesic longleaf pine and central Florida slash pine flatwoods. The intact well-managed flatwood communities harbor many rare plants and animals such as the Bachman's sparrow (*Aimophila aestivalis*), red-cockaded woodpecker (*Picoides borealis*), sandhill crane (*Grus Canadensis*), and Sherman's fox squirrel (*Sciurus niger shermani*). Like bobwhite, these species depend on habitats created by the application of prescribed fire at relatively high frequency and appropriate scale. In addition to having high biodiversity, Escape Ranch is managed for northern bobwhites. While the ranch is operated largely for wild bobwhite, other game species are important to the diversity on the ranch.

More recently, we added Yeehaw Plantation at Rollins Ranch as our second study site in central Florida. The habitat context is very similar to Escape Ranch, which provides a replicate site for experimental research. It also poses some unique challenges and has a larger focus on cattle production and management. The combination of managing for cattle and wildlife resources is common for many properties in central Florida and, as such, information gained on these ranches will be portable to other landowners in rangeland country of central and south Florida. 🐾



A common characteristic of bobwhite in central and south Florida is the dark, black hue of the feather plumage resembling the phenotype of the *C.v. floridanus* subspecies of bobwhite.

## Bobwhite Translocation Gets “Plane” Crazy

The Game Bird Team successfully completed yet another epic translocation season. In March, 838 bobwhites were captured, banded and translocated to multiple sites in 7 different states. This year was different than past years as we had several translocation firsts this year including (a) the first ever translocation to the State of Delaware; (b) the first ever bobwhite translocation by way of a private plane; and, (c) the first ever translocation of wild bobwhites from private to public lands. We continue to radio-tag translocated birds on some sites in an experimental research framework to better understand the limitations of translocation as well as to help refine translocation science.

### 6,000<sup>TH</sup> BOBWHITE TRANSLOCATED IN 2019

The completion of this year’s translocation brings the total number of birds translocated by Tall Timbers to 6,002 over the last 16 years! Private properties in the Red Hills and Albany region continue to generously donate birds to the bobwhite population recovery efforts, which are now approaching 80,000 acres of restored wild bobwhite lands



PHOTO BY DALE SPARTAS

along the east Coast. An Alabama property also donated birds this year making it the second property to become a donor of birds that was previously a recipient of translocation birds — a true translocation success story! To all those properties, managers and landowners, we thank you for your support and generous contribution of wild birds! 🐔

## Broadcast Supplemental Feeding Proves Beneficial to Bobwhite Survival in Texas

Project Collaborators: John McLaughlin, Brad Dabbert and Theron Terhune

In southwest Georgia and northwest Florida, broadcast supplemental feeding is as common as the air we breathe. A recent survey of land managers in the Red Hills and Albany region indicated that nearly 100% of properties managing for quail implemented broadcast feeding. In fact, the practice dates as far back as the 1960s and ‘70s on some properties. In other parts of the country, however, broadcast supplemental feeding is not only an uncommon practice, but it is often frowned upon and viewed as unnatural and unwarranted. Despite research findings in the Southeast clearly demonstrating the benefits of supplemental feeding, some bobwhite-centric organizations like the National Bobwhite Conservation Initiative do not readily accept broadcast feeding as a tenable management practice for bobwhite.

In the last issue of the *Quail Call*, we reported on the winter effects and snow impacts on bobwhite in northern periphery states. In that study, pejorative impacts of snow accumulation — particularly for extended periods of time (>7 days) — proved to be crippling on over-winter survival of bobwhite, and dramatically impacted population abundance. At that time, we proposed that provisioning of supplemental food during harsh winter events might alleviate the impacts on adult survival.

As part of a larger research effort being conducted through the Quail Tech Alliance at Texas Tech University, John McLaughlin recently completed his master’s degree studying the impacts of supplemental feeding on bobwhite demographics in the Rolling Plains ecoregion of Texas. The timing of this project provided a perfect complement to the studies we conducted in Maryland and Ohio and recently had published.



PHOTO BY PHILIP COPPOLA

– SUPPLEMENTAL FEEDING CONTINUED ON PAGE 34



## SUPPLEMENTAL FEEDING CONTINUED –

We are hopeful that this research, which was published in *The Journal of Wildlife Management*, will help to change the mindset about supplemental feeding at large, as this study clearly shows that the practice is not just applicable to properties in the Southeast. While feeding is generally accepted and broadly applied in Texas for white-tailed deer, turkey, quail and other wildlife, feeders or feed stations are commonly used as opposed to broadcast distribution of feed into quality cover.

The results from the Texas Tech study provide unequivocal evidence that broadcast supplemental feeding benefits bobwhite over-winter survival. And, these effects potentially prevented devastating population declines associated with adverse winter weather events and snow accumulation.

Bobwhite survival in this study was 25–46% better on fed sites compared to unfed sites during winter. An interesting finding, however, is that while feeding had obvious advantages during winter months (Dec through Mar), the benefits on survival during other seasons (spring, summer, and fall) were not evident (see Figure 1). With that said, we suspect that cumulative effects of continuous, year-round feeding likely benefit body condition of birds heading into winter, but future research is needed to explicitly test this belief.

Exposure to freezing temperatures, combined with the inability to access feed during snow events, may increase metabolic demands as much as 2.5

times that of a bobwhite's basal metabolic rate.

As such, during times of extended snow cover, bobwhites must tap into and rely on fat reserves for fuel; these reserves are accumulated through time and require ample food availability leading up to winter events. In this study, birds succumbing to winter effects in the control (unfed) areas experienced severe muscle atrophy and as much as 42% loss in total body mass!

Previous studies on bobwhite have demonstrated that 100% of a bird's daily energy requirements are needed to maintain body mass for 6 days at near-freezing temperatures, whereas birds obtaining less than 60% of their energy needs may lose up to 25% of their body mass during the same period of time; at this point, bobwhites are at severe risk of mortality. Thus, a single winter weather event lasting 6 days or more can have dramatic impacts on over-winter survival and population abundance.

We observed this effect where during one year in this study 12.5 inches of snowfall dropped in 2 days, with maximum depths of up to 11 inches accumulated, and sustained depths greater than 4 inches for more than 6 days, and greater than 2 inches for more than 9 days. Survival differences between the fed and unfed sites were dramatic as a result of this weather event (see Figure 2a).

In year two of this study, another lower magnitude snow event also occurred (less snowfall and shorter duration of snow resulting in similar results

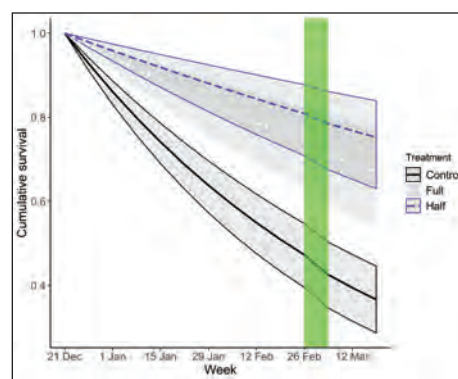


Figure 2b

to year one), but with a less dramatic effect on survival (Figure 2b), related directly to the snow event.

Taken collectively, broadcast supplemental feeding improved over-winter survival in Texas, especially during extended periods of snow cover. Even when snow events did not occur, the advantages of supplemental feeding and its ability to profit bobwhite survival were obvious.

## TAKE HOME MESSAGE

Feed, feed and feed!! Although we are fortunate in the Red Hills to not have to deal with extended periods of snowfall, the benefits of feeding are obvious and corroborate the practice as a management tool, far outweighing the cost. We view feeding much like an insurance plan such that regular installments are required to ensure consistent year-round coverage, and that food availability is high—so when the crash comes or adverse weather hits—it is there to bail the birds out of tough, stressful times. Broadcasting feed provides accessible energy to birds, affording them the opportunity to cope with harsh winter events, severely cold temperatures and prolonged snow cover. Broadcast feeding every other week at a rate of 1.5–3.0 bushels per acre per year won't save you 10% on your car insurance, but it just might save you 25–46% of your bird population! 🐾

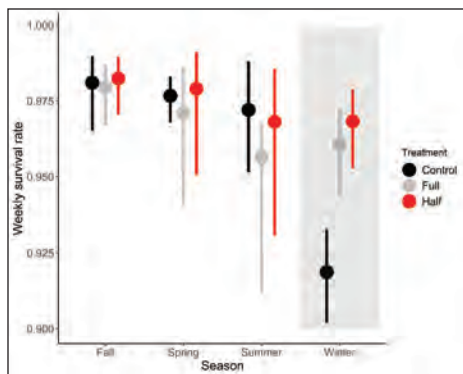


Figure 1

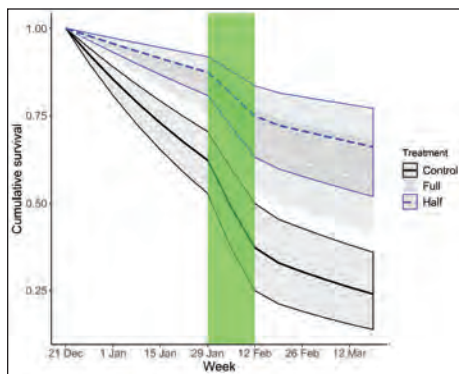


Figure 2a

## TOOLS & TECHNOLOGY

### Using Avenza's PDF Maps App for Everyday Land Management Tasks

Record keeping and data collection are important components of any Quail Management Program to evaluate the effectiveness of management practices, as well as to understand how factors such as weather contribute to vegetation response and fluctuations in quail abundance.

The advent of smartphones and tablets, along with an abundance of apps available for download, provide some neat opportunities to collect data in the field and streamline land management. There are several apps out there that provide mapping capabilities and digital maps for use in the field, but **Avenza's PDF Maps** app has surfaced over the years above the others due to its relative ease of use, flexibility to integrate customized PDF maps, and it does not require WiFi or internet connection to work in the field, or use GPS functionality, once a map is available in the app. There are scores of ways this app can facilitate management and assist with a variety of land management tasks such as mapping: feedlines, prescribed burns, and deer stand locations. It can also help with collecting data for post-burn assessment, timber cruising, noting lightning-strike trees, predator traps and predator control; and, wildlife surveys including spring and fall covey counts, predator index, hunting success, and brood counts.

Here is some more information about **Avenza's PDF Maps** and how to use the app:



**Avenza PDF Maps** is a free mobile application for both the Apple iOS and Google Android mobile devices.

To learn more about the app go to: <http://www.avenza.com/avenza-maps/>

Download from the Apple Store for iOS devices: <https://apps.apple.com/us/app/avenza-maps/id388424049>

or, Google Play for Android devices: [https://play.google.com/store/apps/details?id=com.Avenza&hl=en\\_US](https://play.google.com/store/apps/details?id=com.Avenza&hl=en_US)



The **Southern Fire Exchange (SFE)** has put together a nice instructional guide on how to generate custom maps, and how to use basic operational tools, such as loading maps, dropping pins, collecting GPS tracks, and exporting data. You can download SFE's instructional guide at:

[http://www.southernfireexchange.org/SFE\\_Publications/factsheets/2014-3.pdf](http://www.southernfireexchange.org/SFE_Publications/factsheets/2014-3.pdf)



The **Game Bird Program** also uses PDF Maps for numerous field applications. One particular feature we like is the ability to create customized forms using drop-down menu items to facilitate data collection while in the field.

As an example, follow these instructions on **How-To** install and use our custom-made form for collecting predator removal data: <http://www.gamebird.trrs.org/WebDocs/gbdownloads/gbp-predatorcollection.pdf>

### Tall Timbers' Bobwhite Quail Management Handbook

EDITED BY WILLIAM E. PALMER AND D. CLAY SISSON

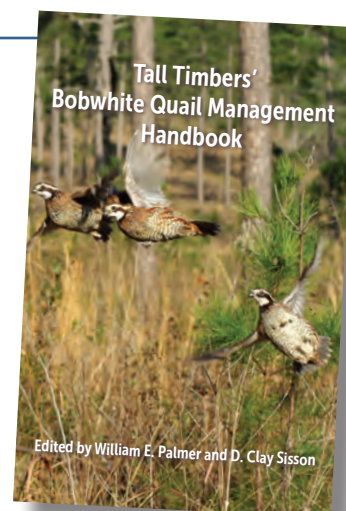
"The Tall Timbers' Bobwhite Quail Management Handbook is an essential tool for anyone wanting to understand the ecology and management of bobwhites in their eastern range. The authors have done an excellent job of distilling years of scientific investigation, involving thousands of bobwhites, into an easy to understand, but comprehensive guide of best practices for bobwhite management. ... Novices and seasoned managers will both benefit from reading this handbook and find themselves referring back to it as they make management decisions throughout the year."

– C. Brad Dabbert, Ph.D., Burnett Foundation Endowed Professor of Quail Ecology,  
Department of Natural Resources Management, Texas Tech University



7x10; 168 pp  
\$30.00 + S/H

TO PURCHASE VISIT: <https://talltimbers.org/product/tall-timbers-bobwhite-quail-management-handbook/>





## OTHER NEWS

### 2019 Georgia-Florida Turkey Invitational has record attendance

A big shout out to our sponsors and host, Osceola Plantation, for making this year's Georgia-Florida Turkey Invitational, held on March 28 and 29, another huge success. Thank you!

The event marked the 14<sup>th</sup> annual invitational, with 225 people in attendance at the dinner to hear legendary fishing kingpin and avid turkey hunter, Flip Pallot, our guest speaker this year. Seventy-seven teams participated in the invitational—a new event record!



Left to right: Dr. Bill Palmer, Eddie Nickens, Chef Chris Hastings, and Flip Pallot

Flip was accompanied and introduced by the well-known and respected author and journalist Eddie Nickens, both of whom challenged those in attendance to leave a legacy and to involve youth in hunting, fishing and conservation activities. Flip said that the future of hunting and fishing lies in our young people, the next generations, and that many of them learn about wildlife and nature from technology and



Adult Winners: (L-R) Johnny Hester and Michael Ponder, Travis and Raegan Sherman, Shane Wellendorf and Chuck Williams

social media, rather than personal experience, so that we must invite them into nature to gain the experience and appreciation for the great outdoors.

On the morning of the hunt, the weather was superb throughout South Georgia and North Florida, but the gobbling activity was sporadic, making it difficult for hunters to locate and talk a gobbler into giving up. Despite a lower than usual number of gobblers bagged, only 19 birds turned in for weighing, this year some very nice birds were harvested. Congratulations to the 2019 winners!

As a result of the banner dinner attendance and record number of teams entered this year, the Turkey Invitational raised \$35,000 for the Game Bird Program. In total, the event has raised more than \$315,000 for game bird research since its inception. Thank you to all the participants, sponsors, invitational committee, Osceola Plantation and Tall Timbers' staff for supporting the Game Bird Program.

Be sure to check our website and social media outlets for 2020 event dates. We look forward to seeing you next year!



At right, Youth Winner Colin Crocker

1st Place: Raegan and Travis Sherman

2nd Place: Shane Wellendorf and Chuck Williams

3rd Place: Johnny Hester and Michael Ponder

PHOTOS BY GABRIEL HANWAY



## QUAIL RESEARCH NEEDS YOUR SUPPORT

Tall Timbers has a long and rich tradition of leadership in quail research. Beginning with Herbert Stoddard's study of quail life history over 80 years ago, Tall Timbers has led the charge to gain new knowledge that can be used to improve quail management.

Today, novel research is greatly needed to better understand bobwhites. The Game Bird Program continues to be an innovative leader in research and management of bobwhites, and serves as an important resource for those who value the future of sustainable populations of wild birds.

The Game Bird Program now encompasses the Tall Timbers Quail Management Research (QMR), which conducts research on Tall Timbers, Dixie Plantation and surrounding quail properties; the Albany Quail Project (AQP), which conducts research on quail lands around the Albany, Georgia area; the Carolina Regional Quail Project (CRQP) and the Central Florida Bobwhite Research Initiative (CFBRI).

We hope you will consider making a contribution to the Game Bird Program. Our fundraising goal is \$575,000 in 2019 to support all our projects. If you have supported these projects in the past, please continue to do so as we depend greatly on your annual donations. Please earmark your contributions for the appropriate project. You can make your donation online at our website here:

<https://talltimbers.org/support-tall-timbers-program-specific-giving/>.



Bobwhite chicks radio-tagged for chick ecology research. Photo by Diana McGraff.

# SAVE THE DATE

## **ECONOMIC TRADE-OFFS AND QUAIL MANAGEMENT FIELD WORKSHOP**

**FRIDAY, SEPTEMBER 27**

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# TALL TIMBERS

Carolina Regional Quail Project



## In Memory of Dr. Daniel W. Speake (1926-2019)

By Mark Sasser and D. Clay Sisson

Dr. Dan Speake, 92, noted wildlife researcher and retired Auburn University professor, passed quietly away in Huntsville, Alabama on May 7. Dan was known throughout the wildlife fraternity as an extraordinary naturalist and researcher. He was passionate about his work. His teaching and research spanned over 40 years, with major contributions on bobwhite quail, Eastern wild turkey and Eastern indigo snake.

Dan was born in Decatur, Alabama in 1926 where he grew up roaming the woods hunting and “catching snakes and turtles;” passions that were developed young and stayed with him throughout his life.

After a stint in the Navy during the WW II years, he went to Auburn on the GI bill, eventually earning a PhD working on bobwhite quail in the Alabama piedmont. Dan served as Assistant Leader and later, Unit Leader for the Alabama Cooperative Wildlife Research Unit at Auburn from 1955-1995. In Dan’s words, there was a “technology explosion” in the 1970s with the advent of radio telemetry. He was a pioneer in many ways, but certainly in the use of radio transmitters on wildlife. He and his students were among the first to put radio-transmitters on wild turkeys and quail, and were the first to document double brooding in quail in 1987, as well as second brood production by wild turkeys in 1991. His cutting-edge research allowed monitoring of wildlife populations as never before, leading to better management practices and resulting in the recovery of the wild turkey in Alabama, as well as other states.

His research with nongame and endangered species in the 1970s was at a time when very little research was supported for nongame wildlife. He established the first eastern indigo snake captive breeding program in the United States and continued this research into the 1980s with reintroductions throughout south Alabama and other states in efforts to re-establish a viable population of the endangered species. He developed and used one of the first cameras to be put down gopher tortoise burrows, revealing for the first time the long list of animals that were dependent on this environment. He was known far and wide for his collection of live snakes, most notably “Bubba,” who was a huge eastern diamondback he donated to the Montgomery Zoo when he retired. Those of us fortunate enough to have spent time with him roaming the woods of the South remember how he always travelled with a pillowcase in the event he needed a way to carry some “ready” species of snake back to Auburn.

Dan was the recipient of 19 wildlife awards, including the Special Recognition Service Award from The Wildlife Society for his leadership on wild turkey research. He received the coveted Henry S. Mosby Award in 1991, presented by the National Wild Turkey Federation, for his extraordinary accomplishments in wild turkey research. At the time of this award, he was only the fifth recipient to receive this special recognition.

Dr. Speake had a long relationship with Tall Timbers; he brought his upland wildlife management class here for many years. He served on the Board of Trustees of Tall Timbers from 1990–1993, and one of his last graduate students did their work here on an award-winning study of turkey poult mortality in coastal plain pine forests. In 1992, late in his career, he and Dr. Lee Stribling were co-founders of the Albany Quail Project, which brought him full circle to studying quail, as he had done as a graduate student in 1950s.

Dr. Speake was a colorful character who enjoyed his life and life’s work. When you were with him, it was impossible not to go along for the ride. He had many sayings, but some of the best remembered are that he, “knew a lot more about turkeys than he could prove,” and, “if you don’t know what your data means before you analyze it, it don’t mean nothing.”

The twinkle in his eye never faltered, and his wonderful sense of humor never left. His many wonderful stories will linger on, and he will be remembered fondly by the many students and wildlife workers that he trained for the wildlife profession. They truly broke the mold when they made Dr. Dan Speake.



L-R: Mark Sasser and Dan Speake

## 2018-2019 Game Bird Research Team

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John Michael McCormick, Assistant Land  
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Kaili Stevens, MS Student, University of  
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Andrew Ward, University of Georgia

*\* indicates student graduated and/or recently  
completed their thesis*

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Ashe Kelly

Aubrey Langston

Kellyanne MacCombie

Megan Martin

Luke Mitchell

Amanda Schmidt

Destinee Story

Shannon Summers

Chris Terrazas

Miles Thredgill

Trenton Voytko

Sarah Welch

Seth Williams

### Volunteers

Cliff Preston

Will Rogers

### Upland Ecosystem Restoration Project (UERP)

Greg Hagan, Florida Fish and Wildlife  
Conservation Commission

Sarah Brown, Public Lands Monitoring  
Coordinator



PhD candidate Katie Hooker with a cotton rat, an alternate prey species she captured for her research. She is studying the fluctuation in cotton rat abundance and quail chick survival.





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**RED HILLS  
FALL FIELD DAY**

Friday, October 18



**FOUR OAKS**



**TALL TIMBERS**