Upland restoration project closes in on 100,000-acre target in Florida

The Upland Ecosystem Restoration Project (UERP) added two new sites over the past six months: Withlacoochee State Forest and St. Sebastian River Preserve State Park for a total of 72,000 acres on eight sites in Florida this year. The goal of the project is to restore pine savanna habitats on public lands to sustain grassland birds, including bobwhite quail. The UERP model of management increases fire frequency, encourages necessary mechanical treatments of ground cover, and supports modest timber thinning to 40-60 ft²/acre of basal area. This is the fifth year of the project and bobwhite populations have begun to respond as much as doubling on some sites. Our goal is to sustain huntable populations on all of the UERP properties by 2015. Improving recreational opportunities for bird hunters and bird watchers!
Translocation of wild quail

The Tall Timbers Game Bird Program has been studying the effects of trans-locating wild quail for several years now. The earliest studies showed that wild birds that had been captured in the spring and moved into good habitat stayed where they were put and then survived and reproduced at a normal rate. This led to additional studies aimed at establishing new centers of wild quail populations in newly created habitat areas across the Southeast, where they did not exist or were at very low numbers. Huntable populations of good density have been established using this technique on three properties in Georgia and one in South Carolina. In each of these cases intensive habitat modifications were required of the recipient property to get ready for these birds and the donor sites were long established high density populations. All the states involved have a permitting process required to make sure this resource is not wasted. Establishing these new population centers is not only aiding in the recovery of the species and encouraging development of new quail properties but is an economic boost to local rural communities as well.

We have just been permitted for our next translocation project, which is significant in a couple of ways. First, it involves two southeastern wildlife agencies cooperating with each other in this interstate effort and secondly; it involves one of the original recipient sites now becoming a donor of wild quail. This is a real conservation success story, in which the wildlife departments and private landowners involved should be commended for their efforts in helping the recovery of what is a troubled species in many areas.

Releasing a covey translocated from a donor site to recipient site.

Tall Timbers develops database for wild quail in the Southeast

Starting this past year, we decided to measure the amount of acres private landowners manage for wild bobwhite populations and hopefully collect information on quail densities, hunting success, management practices and more, such that we can develop a more comprehensive understanding of the landscape level factors that influence the success of quail management on private lands. For instance, the Game Bird Program works with landowners in six states and has been involved with establishing over 50,000 acres of new wild quail programs on private lands. In many cases, we are helping to develop a new quail property outside the Albany and/or Thomasville-Tallahassee plantation area; wild quail management is new to these areas and often the property is isolated from other quail lands. Common question we receive in planning new properties include how large of an area do I need to manage and what kind of quail population can I expect to develop? What is the influence of a neighboring development? What effect do nearby river or creek drainages have on the quail populations? What about a neighbor that releases pen-reared quail? What management practices are most important? Developing a more formal database of quail lands across the Southeast will help us tease out answers to questions and help encourage others to engage in this great lifestyle. On the flip side, determining how fragmenting of our existing quail regions would influence the success of quail management can be explored. This is extremely important research, as our knowledge of how landscape patterns affect quail management on private lands is only beginning to be investigated, but has real ramifications for new property owners and those that wish to protect their landscape.

Another reason why it is important to document the amount of effort private individuals put toward quail management is to make sure that the good work that is being done to conserve bobwhite and other species on private lands is recognized by planners. Threats to successful private land management from development, fire restrictions/smoke management, public projects, and possible restrictions on management practices are easier to stop and/or influence if you have ready access to the consequences of bad policy or development. The recent threat of coal power plants in Georgia and their influence on smoke is an example.
RESEARCH REPORTS

Evaluation of Surrogator® released pen-raised quail in Alabama

By Tyson Crouch, Director Alabama Quail Project

In response to significant population declines of wild quail across parts of the country, many private landowners have relied on the use of pen-raised quail as an immediate means for hunting, while hoping for the added benefit of re-stocking a sustainable wild quail population. Results from the more traditional practices of releasing pen-raised birds may yield higher hunting success, but they have not resulted in sustainable quail populations, often the result of very poor survival and low genetic quality. In response to these poor results, several new release bird techniques have been developed over the years in hopes of restoring wild quail numbers. The Surrogate Propagation™ system, as designed by Wildlife Management Technologies (www.wildlifemanagementtechnologies.com), is a fairly recent addition to this list of commercialized quail re-stocking techniques. This product is basically an outdoor quail brooder that provides warmth, food, and water with minimal human contact to 150 quail chicks from two days old, until they are released en masse at five weeks of age. The website claims to help establish huntable quail populations by improving quail survival and imprinting the chicks to a location. During the spring of 2008, one of our cooperating private landowners in east-central Alabama purchased two Surrogator® units in hopes of not only providing better hunting quality with released quail, but also as a potential source for restoring wild quail to his property. This provided us with the opportunity to test the effectiveness of the Surrogator® at restoring local quail populations. During the summers of 2008 and 2009, we wing tagged and monitored band returns through hunter harvest of 1,366 quail, raised and released from the Surrogate Propagation System.

This study took place on an approximately 3,000 acre privately owned plantation in Russell and Barbour County, Alabama. Quail hunting is the main objective on this property and it is managed intensively as such. Habitat composition is mainly that of low-density pine forests with an understory of early successional plant species such as broomsedge, blackberry briars, partridge peas, and other plant species commonly associated with the area. The main aspects of the intensive management includes prescribed burning (2-year rotation), maintenance of ragweed fields for quail broods, drum chopping, predator control, and year-round supplemental feeding on established feed lines. Following the recommended Surrogator® protocol, we wing-tagged and released a total of 1,366 five-week old chicks during July (507), August (443), and October (416) in 2008 and 2009. The release units were placed near the best available brood cover and located at least 500 meters apart from each other. Throughout the respective quail seasons, the property was hunted two to four half-days a week, and all winged tagged birds were recorded following each hunt. During the 2008/2009 and 2009/2010 quail seasons, only six of the 1,366 wing-tagged birds were ever recovered in the harvest. This comes out to a band return of .004 or less than half of one percent.

Based on the hunter harvest returns, and what was observed during the respective quail seasons, the
It’s no secret that hawks kill bobwhites. In fact, predation from avian predators over eons is what helped make bobwhites the outstanding game bird they are today. The two are so closely tied, in fact, that there is a very strong correlation between high populations of one and low populations of the other. When continental hawk and owl populations were at their lowest in the 1960s and early 1970s, bobwhite populations were peaking across their range, and now the opposite is true. Sure, a lot of other things have changed during this time period. Habitat changes at a landscape level have been profound; this has no doubt been the basis for the decline. But add to that the dramatic recovery of the adult quail’s number one predator during the same time period, and it’s no wonder quail are in trouble over much of their range. Same can be said of the abundant quail populations of the 1950s and 1960s when habitat conditions were much more favorable. There probably would have been a lot of quail regardless, but my bet is they were being helped by very low levels of avian predation as well.

The staff of the Tall Timbers Game Bird Program has been interested in this relationship between hawks and quail for a long time. We have been reminded almost daily of the profound impact avian predation has on the species since we first put a transmitter on a quail back in 1984. Over 25 years and 20,000 transmitters later the following is what we think we know.

Of the avian predators that kill quail, the Cooper’s hawk is generally regarded as the most deadly – and rightly so. The early telemetry studies at Tall Timbers revealed them to be a major predator of adult birds. When the Albany Quail Project was started in 1992, it came as somewhat of a surprise that this was not the case on the plantations in this part of Georgia, and apparently had not been for some time. One of our original study areas had also served as a study site for a previous quail study conducted by well known quail biologist Ron Simpson with the Georgia Department Natural Resources. While radio-telemetry technology for quail was not available yet, they did collect survival rate information from banding and recapturing/recovering large numbers of quail from 1967-1971. The most relevant piece of information they published was their over-winter survival rate. The average over-winter quail survival on Albany area plantations at this time in history was 85 percent! In fact, Ron’s summary of the mortality during this time period was that “the majority of the mortality during the winter period was due to hunting, with natural causes contributing a lesser amount”. It’s no wonder their estimated quail density for the 1971 season was over three quail per acre! Our radio-telemetry quail study in the area began...
in 1993. Our over-winter survival then was pretty good when compared to what was going on across the general landscape of the southeast, but it was still only about 60 percent, with most of that loss being to avian predation. There was still very little loss to Cooper’s hawks in the area at this time; we all felt fortunate that we were somehow dodging that bullet. In a paper we published in 1998, we referred to “the relatively low local densities of accipiter’s diminishing the effect of these predators relative to other populations in the Southeast.” This period of high survival and growing populations continued until the 2002 season, when record populations of over three birds per acre were again experienced. We were feeling pretty good about ourselves then and felt like we had a good handle on what it took to produce high density quail populations in the Deep South. Little did we know at the time that things were about to change.

The first indication of this change was that after several decades of hardly seeing any Cooper’s hawks in the area; we started seeing a few and heard reports of others seeing them. We also started finding a few transmitters in “feather puddles” which is a classic sign of a Cooper’s hawk kill, familiar to the guys tracking quail in Thomasville. In fact, prior to 2002, we did not distinguish on our data sheets whether a bird was killed by a Cooper’s hawk, but just called it all avian mortality. But by 2002, we were seeing enough Cooper’s hawks to start classifying them separately. By then monitoring of continental populations of Cooper’s hawks was indicating a rapid recovery of the species nationwide, which continues today. Below is a graph of the relative contribution of our radio-tagged quail mortality from Cooper’s hawks since that time, which clearly shows their increasing importance as a mortality factor. It seems clear at this point that we have not dodged the Cooper’s hawk bullet, as they have obviously spread into our area as the continental populations increased.

We are fortunate as well to have on one of our long-term study areas a continuous sample of radio-tagged quail dating back to March 1992. By closely monitoring the demographics of the quail population during this period, we have been able to see what impact these changing predator dynamics are having on quail survival. Below is a graph showing winter, summer, and annual survival of radio-tagged quail on this area for the last 18 years. As the graph clearly shows, after having averaged nearly 50 percent summer survival for the first 10 years of the study, this started to change in 2003, which coincides with the time that Cooper’s hawk mortality started increasing.

Before you feel too sorry for us, know this, we still have lots of quail. By intensifying management efforts to maintain high winter survival (i.e., good cover, supplemental feeding) and reproductive output (nesting cover, brood habitat, feeding, trapping mammals) populations in the area have been maintained at well over one quail per acre. But you should know this as well, we do not have as many as we did back in the late 1990s to about 2002, when populations were up well over two and even around three birds acre.

In an effort to gain an even better understanding the relationship between quail and Cooper’s hawks, we added a couple of aspects to our monitoring efforts over the last several years. The first of these is a bi-monthly hawk count that we have been doing now for three full years. To conduct this count, we simply established a 20-mile driving route throughout the property that two observers drive every two weeks early in the morning and count by species all the hawks and owls we see. Since we have...
radio-tagged birds on this property, as well, we can see how these counts correlate to quail mortality. Below are the graphs showing this relationship broken out by winter and summer seasons. What these graphs show is that there is generally a relationship between hawk numbers and quail mortality; this comes as no surprise. What is not evident by the graphs is that our hawk counts are not very good at monitoring Cooper’s Hawk numbers as they are much less visible than their larger relatives, such as red-tails and owls. Beginning with the winter months, you can see our peak avian numbers occur during mid to late November and on into early December; this is the peak of the hawk migration. This peak coincides with a spike in quail mortality during that time. It then levels out some until spring when we have another peak in hawk numbers in late May and early June, and then levels off again through the summer. What these graphs also show is that we have a good number of hawks year round. A couple of things stand out on the summer graph, most notably the peaks of quail mortality in April-May and then again in August. This is at least partly explained by increased vulnerability of quail during these periods, due to covey break-up and reproductive activity. Mammals and snakes become more efficient predators at this time also. The spring peak in mortality is also attributed to high losses to Cooper’s hawks; this is a heavy feeding time for them as they are feeding young in the nest.

The other aspect we added to our monitoring efforts a few years ago was a census of small mammals, primarily cotton rats. Evidence from Tall Timbers and elsewhere indicates these animals can be an important buffer species to predation on quail. These counts have been conducted over the last five years in Albany and are depicted in the next graph which correlates rat numbers to quail survival. As this graph indicates, their does seem to be a relationship between rat numbers and quail survival in the Albany area. While we do not have data going back before 2006, we observed that during the period of high quail survival prior to 2003, we had very high rat numbers during that time period.

So what does this all mean? Obviously quail can coexist with this increasing predation pressure on properties in the Albany area. There’s no doubt that being located in a landscape of 300,000 acres of intensively managed habitat with low mammal nest predator numbers and supplemental feed contributes to this. This may not be the case in less hospitable environments. Clearly our demographics (primarily summer quail survival) have changed over time, but is this a result of increasing Cooper’s hawk numbers, lower cotton rat numbers, or some combination of the two? We may not know for sure until the cotton rat populations recover. We are now working on ways to increase these numbers, to see if we get a demographic response from the quail population. Further evidence that this may be the case is the fact that radio-tagged birds at Tall Timbers are not experiencing these same demographic issues as cotton rat numbers have been high there for the last few years. It is unclear at this point exactly why that is, but it may

Hawk index in relation to quail mortality.

Relationship between cotton rat abundance and quail survival. Longer-term research will provide more information on how to manage for increased cotton rats and what affect that will have on quail demographics.
be related to soil conditions, which promote more rapid cover re-growth, better nutrient levels, or some other factors yet undetermined.

In the meantime, what can be done about it? All hawk and owl populations are protected by federal law so direct control is not legal. Managing your property to keep these losses as low as possible is what we recommend. Keeping pine timber properly thinned, and removing upland hardwoods to allow maximum ground-cover growth is an obvious first step. Careful prescribed burning that is spread out over the spring and does not remove too much cover at any one time can help offset spring losses. Supplemental feeding will certainly help by reducing quail movements, increasing buffer prey and thus their exposure to predation. Keeping nest predators that can be legally controlled at low numbers will allow the birds to reach more of their reproductive potential, and not over harvesting birds during the hunting season will bring more of them into the nesting season. Hopefully we can figure out how to bring cotton rat numbers back or maybe Mother Nature will do it for us. Until we understand more about this relationship managing your property to decrease or offset these losses would be a wise move.

**Quail daily and seasonal movements and supplemental feed**

Over the past years we have reported on the survival and reproductive benefits to bobwhites from supplemental feeding. In the last Quail Call we spelled out the details of a seven-year study that showed significant improvements in these demographics and as a result increased quail populations. To recap, breeding season and annual survival was generally greater on areas with year-round supplemental feed, which along with improved reproduction resulted in higher bobwhite densities. We currently recommend a feeding program that spreads approximately 2 bushels/acre/year on quail lands. This program entails about 1.8 miles of feed trail per hundred acres of quail land. By spreading about five bushels of sorghum per mile along the feed trail every two weeks, the math works out to 2.3 bushels/acre/year. Our next step was to figure out what mechanisms were behind this result. By better understanding the reasons why feeding helps our quail populations, we are more likely to make better management recommendations.

As we pointed out in the past, Tall Timbers has ample native food for the energy needs of bobwhites in most years (this may not be the case on all sites). In fact, we have seen very little difference in lipids between fed and unfed bobwhites on Tall Timbers. So, we come back to the idea that perhaps there is a predation angle as to why feeding helps?

We have always assumed that quail move less when they have high amounts of supplemental feed available and that less movement may influence their susceptibility to predators. To better assess this idea, we developed a project to determine how much coveys move in relation to how much food they had available. For the past two winters, Mississippi State University graduate student Ryan Miller, along with a bevy of dedicated research interns, tracked coveys from daybreak to roost while at the same time measuring the amount of supplemental feed remaining on the feed trail. Ahead of this study, our prediction was that with more feed available to them, coveys would move less over the course of a day. If they moved a lot less, this may partially explain why survival rates were greater on fed courses (if we assume that moving is a hazardous activity for a quail). On the flip side, we figured that as food declined, coveys would move more, and bird hunters would have greater success in finding them, just like predators.

For this study, we divided Tall Timbers into three areas, one was fed 2 bushels/acre/year (normal plantation rate) and one 0.5 bushels per year (light rate), and one area that was not fed at all. As it turns out, after 15 days at the 2 bushel rate, there is about the same amount of feed left that occurs at the start of the 0.5 bushel rate treatment. So, when spreading at the normal feed rate,

![Figure 1. This graph shows the rate of decline in sorghum seeds during February on Tall Timbers. Note that the normal spreading rate ends up about where the light feeding rate starts.](image)
we end up with an average of about 20 seeds/ft² that steadily decline in winter to about 4 seeds/ft² after 15 days (Figure 1). The light feed rate starts at 4 seeds/ft² and declines to 0 seeds/ft² after 15 days. This way we covered a whole range of food availability. To make sure there wasn’t an effect of the area of Tall Timbers chosen for each treatment on covey behavior, we rotated the feeding treatments to new areas each spring. Over the course of two years, the research team tracked the movements of 38 coveys on 107 days during February and March. We assessed how daily movements, distance to feed trail and diet varied with time since feeding for the light and normal rates.

**Time coveys spend associated with feed trail**

Over all days of monitoring, about 15 percent of covey locations were associated with the feed trail. However, the amount of time coveys spent associated with the feed trail changed as food availability changed. Immediately after feeding and for the first 4-5 days, only about 10 percent of their locations were on the feed trail, translating into association with the feed trail for about a half hour per day. (Figure 2) shows a graph that plots the proportion of time each covey spent along the feed trail in relation to food availability. Ryan and his crew monitored 25 covey-days when food was highly available. As you can see, when sorghum was greater than 12 seeds/ft² (which corresponds to the first 5 days after feeding), 21 of the coveys monitored used the feed trail below expectation, while only 4 coveys we monitored used the feed trail more than expected (average being 15% of their locations as indicated by the horizontal line). During this period when food was prevalent, our diet study showed that not only was their diet almost entirely sorghum, but the amount of food in their crop weights was greatest during this period. Coveys tended to gorge on the sorghum soon after spreading feed, then the amount in their crops was slightly reduced over time. During the second week, following feeding at the normal rate, and as the availability of sorghum began to decline to between 12 to 6 seeds/ft², coveys began to spend more time associated with the feed trail, about half of the coveys spending more time than expected on the feed trail, and half, less than expected. At this time, sorghum was still the prevalent diet item (about 50% of diet by proportion) but it was taking longer for them to fill their crops. When seed density was less than about 4 seeds/ft², only about 20 percent of their diet was sorghum. To put this into management perspective, it appears that when we feed at two-plus bushels/acre/year, every two weeks, sorghum seed never gets low enough for coveys to switch over to native feed, and most coveys spent little time associated with the feed trail throughout the two-week feed cycle.

During the first week following feeding at a normal rate, coveys spend less than average time along the
feed trail (about 10 percent of their day), and during the second week, coveys spend a bit more than average associated with the feed trail (about 20 percent of their day, Figure 3).

**Daily movements**

So, we know that coveys feed quickly, and spend only a small percentage of their day associated with the feed trail, unless sorghum is very sparse. But, what do they do after they feed, set up and loaf all day? Our assumption that quail will move less over the course of a day when supplemental feed is more abundant to them was basically incorrect. Covey movement did not vary with food availability, so coveys on the light rate sites moved on average 1,707 feet per day which was about identical to coveys on the normal feed rate (1,654 feet per day). As food declined, the time a covey spent foraging likely increased because food items like partridge pea and other seeds would require more foraging time. This could translate into differences in survival rate, especially on poorer sites. However, coveys that had filled up quickly at the feed trail moved regardless, perhaps for other purposes, such as thermal protection and for avoiding predators or hunting parties (Figure 4). Basically, total daily movements of coveys were independent of the amount of feed on the ground in our managed piney woods. But there were subtle differences.

**How far are coveys from feed trail?**

We also determined if coveys were more likely to be close or far from the feed trail as food abundance declined. Over all days, coveys used space randomly across all of the feeding treatments; that is, they were no closer to the feed trail than randomly-placed points. Coveys were on average 45 yards from the feed trail. About 58 percent of their locations were within 45 yards of the feed trail, and 42 percent were farther than 45 yards, as much as 200 yards away. Coveys were not found to be closer than random to the feed trail, because while coveys may use the feed trail, it is a very brief period of time (especially when feed was heavy), then they continue to move elsewhere, as in Figure 5. Also, about a third of the coveys never visited the feed trail over the course of the day. This supports earlier research that found that supplemental feeding as practiced in the Red Hills and Albany Area did not increase the likelihood of finding a covey while hunting.

Just as how the time coveys spent along the feed trail changed with changing food availability, so did the relationship between distance from the feed trail change as food availability declined. Just after feeding at the heavy feeding rate, coveys were no closer on average to the feed trail than random. As before, they simply gorged quickly and left the feed trail. As feed declined however, they spent more time associated with the feed trail and were actually closer to it than random over the course of the day. This occurred the second week following feeding at normal rates. However, when feed declined to less than 4 seeds/ft², they were again no closer than random because they had switched to other food resources. Again, less than 4 seeds/ft² would occur about 15 to 17 days after feeding at normal rates.
Lipid Content of Quail

Lipid stores (fat) provide an energy safety net for quail. They typically have 3-4 days of lipids they can use if they needed to forgo feeding. This is especially important in areas with snow and ice. We also know that quail in good condition are more likely to nest earlier. Therefore, we were interested in checking the lipid content (fat content) of the birds on the control, light and normal fed areas. Also, we wondered if just adding some high quality food to the system would allow bobwhites to have similar lipid storage as heavy feeding since natural foods were prevalent. What we found was the birds had the greatest fat content on the normally-fed areas, but the lowest lipid content was not on the control, but on the lightly-fed area. This suggests that feeding too little supplemental feed causes the birds to shift between supplemental feed and native seeds and in doing so they are less efficient foragers.

What about Reproduction?

This study was designed to also consider the potential effects of a lighter feed rate on chick production. Ultimately, that is the demographic of most interest to managers. Tweaking feeding to influence hunting success is worth considering, but not if there is an impact on fall populations because of lower productivity. What we found was that in 2008, there were no differences between chick production and feeding treatments. However, this was the first year after a major timber thinning on Tall Timbers and quail here were likely benefiting from the “new ground effect.” In 2009 and 2010, there again began to be separation in chick production among the treatments. In both years, chick production was greater on the site with normal feeding rate, and lower on the lighter feeding rate (Figure 6). In 2010, the difference was double the number of hatched nests per hen on the normal feeding rate than the light. This is a significant difference in production in relation to feeding rate.

Take Home Messages

There is some debate as to whether it is best to hunt right after fresh feed, or waiting until the food availability is lower. Our analysis of plantation hunting records indicates that, by and large, you see the same number of coveys regardless of food availability, although there may be some improvement in shooting covey rises when birds are hunted soon after feeding, even though they don’t use the feed trail much. Coveys tend to be more wary and flush wild when feeding versus when not actively feeding. If coveys are jumpy when feeding, then you see a lot of birds, but point and shoot fewer classic rises. Most everyone has witnessed this during a hunt. In areas with dense wiregrass or other dense ground cover where scenting conditions may be more challenging for bird dogs, it may be worth experimenting with hunting areas toward the end of the feeding cycle in an attempt to find more birds when out feeding.

Clearly, feeding has important consequences on bobwhite recruitment and fall populations in Red Hills and Albany. Given increasing grain prices, we were hopeful that research on lower feeding rates may find less costly ways to benefit from supplemental feeding. However, based on our data at this time, feeding at normal rates appears to be a quail-wise management practice.
Rats and quail: another angle on why to feed

If quail moved substantially less when supplemental food was super abundant, this would have provided some indirect support for the idea that feeding reduced predation risk by modifying quail behavior. While this could be true at some level, our data on quail movements does not support the idea that this was a primary factor in why quail survive better when a supplemental feeding program was used, because covey behavior was not affected to a large enough degree to influence survival on our managed lands. Also, at least, on Tall Timbers, while there is some energetic benefit to supplemental feeding, our lipid studies show only minor differences in fat stores most years. Yet, we have measured higher survival on fed sites?

We continue to suspect that higher quail populations may be a function of reduced predation on bobwhite, because many other species of wildlife are also supported at higher densities when food is prevalent and these other menu items for predators may help to buffer quail from predation. Since 2002, we have measured rat abundance on Tall Timbers on eight 5-acre plots using mark-recapture grids. Grids within the normally-fed area have supported an average of 9.3 rats per acre over the past nine years versus half as many on unfed areas (4.3 rats per acre). What is most interesting is that the nesting rate of hens, nesting success, and hatches per hen, are all significantly correlated to rat abundance (Figure 7). It is ironic that nesting success would be positively correlated to rat density given that rats were once thought to be significant nest predators. But the question of why rats and nesting success are positively correlated is important. We suspect that predators, such as gray rat and corn snakes that eat cotton rats or other buffer prey species, are less likely to search and find quail nests, when rats in high numbers are served for dinner. Of course the situation is much more complex than just rats, but higher rat numbers likely correlate to other prey species as well.

On our study areas with light and normal feeding rates, cotton rat numbers were lowest on the not fed area, moderate on the lightly fed area, and highest on the normal fed area. Cotton rats are known to produce large numbers of litters when they have access to supplemental feed. Given the correlation between quail demographic, like nesting success, and cotton rat numbers, we are hesitant to recommend lower feeding rates at this time. On the lighter feeding rates, we have seen lower chick production than on the normally fed sites. As shown previously (Figure 6), chick production on the lightly fed area was half the production than on the normally fed area. What the graph did not show was that the lightly fed area had chick production basically the same as the not fed area in 2010.

We believe this is a function of increased nest predation when rat numbers are low. Our research on feeding rates will continue, we are now including three levels of feeding, 0.5, 1 and 2 bushels per acre per year, because teasing out these relationships may still yield savings for some landowners. However, our current recommendation,
based on ten years of research still remains – to feed at 2 bushels/acre/year, or more.

**New ground effect and rats**

Anyone with enough management experience knows that the year of, but mostly the second year after a major timber operation, quail populations tend to increase on an area, and often quite dramatically. Of course this is mostly due to habitat improvements, but then 4-5 years later quail populations tend to decline on the same area, even though habitat remains when managed by frequent fire. We have long considered part of the new ground effect -- the disruption of the predator-prey relationship; a timber harvest is known to reduce nesting by Cooper’s hawks, temporarily displace mammal predators, and probably directly reduce (kill) some nest predators, such as snakes. At the same time, timber harvests significantly reduce the rodent population on an area. When quail return as the habitat comes back, their recruitment rates are well above average, given suitable weather conditions. A wonderful example of this was when a nearby plantation was created from timber company land. After the manager finished two years of timber harvest, to create quail habitat, their juvenile-adult ratio the following fall was 6.1 juveniles per adult, the highest we have measured and near the theoretical limit of 7 juveniles per adult! Their population also exploded, by the way. The juvenile-adult ratio on this area is now closer to 3.4 juveniles per adult, which is typical on established properties in the area.

If there was a time when the rat-predator-quail relationship shown above should decouple and show different results, it would likely be during a new ground effect. This is because if nest and adult predators are lowered in abundance due to the disturbance of a timber cut and clean-up operations, quail should survive and reproduce well, regardless of rat abundance. The buffer prey concept is not necessary, if predator numbers are reduced. In fact, this is what we measured on Tall Timbers, when we conducted a major thinning operation in 2007. In 2008, the year following the timber cut and clean-up operations, nesting by hens was at the highest rate we have measured on Tall Timbers, and overall recruitment rates were at near highest ever, yet there was no relationship to rat numbers, which ranged from 0.9 to 5 rats per acre (Figure 8). The graph shows how our quail recruitment rates on four areas of Tall Timbers in 2008 were high, even though rat numbers were low. While the new ground effect is a round-about way to explore the influence of rats on quail, it does fit the “theory” of how predator-prey relations operate, thus strengthening our support for the importance of buffer prey species, and why supplemental feeding helps quail populations.

The take home message is that feeding and buffer prey species, such as rats, play a role in abundance of bobwhites. Once the new ground effect from a timber harvest wears off, and the predator community rebounds, having more rats and other prey species helps quail. In fact, our research shows that nesting, nesting success, and therefore, chick production increase with increasing rat numbers. For those that want to maximize quail following a new ground effect, feeding and keeping nest predators in check with a quality predation management program are prudent management decisions.
Turkeys and fire frequency in piney woods

Much of the turkey literature recommends fire frequencies of 2-5 years for turkey management. This data often comes from studies in planted pine stands, which through shading from 100 percent canopy closure limit understory growth. However, knowledge of fire frequencies and plant response in open piney woods indicates fire frequencies this long would create a mid-story of pines and hardwoods, which would out-compete grasses and forbs that produce both nesting cover, but also insect rich habitats turkeys need. Therefore we were interested in how our quail burning regimes in the Red Hills influenced turkey habitat use. James Martin, a PhD student at the time, and now a professor at Mississippi State University, modeled our turkey habitat use data we collected primarily at Pebble Hill, Willow Oak, and Springwood plantations. What he found was surprising. First, open piney woods were generally not preferred by turkey hens. That is they used them less than they were available. But this is only part of the story. Ground cover changes quickly in open piney woods, and turkeys’ selection for these stands change since the time burning took place. The results are summarized in the following graph (Figure 9) of habitat selection, which show a selection ratio (above 1, the radio-tagged turkeys show preference for, and below 1, they show avoidance of, piney woods). The graph shows that like bobwhites or Bachman’s sparrows, turkeys prefer piney woods that have been burned within two years and avoid piney woods that are burned less often. Our study showed that turkey hens readily nested in 2-year roughs, suggesting longer burning frequencies, once thought necessary for creating nesting habitat for turkeys, are redundant and unnecessary. This study is another example of how important frequent fire is to wildlife in the southeastern U.S. and specifically on Red Hills and Albany plantations!

Figure 9. Habitat selection of open pine savanna in the Red Hills in relation to the days since a stand was burned. This graph shows that turkey hens are very sensitive to time since burning and avoid pine stands not burned within two years.
Quail populations — what goes up, must come down

By Bill Palmer, PhD, Game Bird Program Director

Over the past 14 years we have witnessed three quail population “peaks” in the Red Hills, one in 1996-97, one in 2001-02 and most recently last year during the 2010-11 season. If the 2010-11 hunting season was the actual peak of populations remains unknown at this time.

However, in between these peaks there must be a valley! We witnessed a short period of increased avian predation during March, but survival has been relatively good since that time. Carry-over of birds from the previous season is good, leaving ample birds for breeding. At this point, indicators suggest that the 2011-2012 hunting season will be a good one, but the prediction of drought is of concern.

Our long-term research paints a clear picture that during post-peak years, and drought years, nest predation management and supplemental feeding are more important than during the increasing phases of the quail populations. In fact, during years with drought, or below average rainfall, supplemental feeding increases chick production by as much as double, which is what we saw in 1998 and 2007. So, maintaining a well-designed feeding program is a wise investment in your quail population this year.

The large drops in bobwhite populations in the Red Hills have primarily been a result of lower adult and chick survival, which is a function of many factors, such as buffer prey (songbirds, cotton rats, mice and other rodents), burning practices, and weather conditions. When survival rates of quail are normal or above normal, nesting success is not all that important a demographic variable (within reason); even if a nest fails, and most hens are still alive and able to re-nest, they can ultimately bring off a brood. When adult survival is lowered due to increased predation, for instance, each nest becomes more important to fall population density because, on average, hens may not survive long enough to re-nest. We are anticipating a decline in adult survival either this year or next and will continue to report on that in future E-News issues. However to be safe, spending some effort to reduce the number of nest predators is likely to be important this year. On Tall Timbers, where we have not trapped predators since 2006, our predator index was at an all time high, suggesting that regional populations of nest predators are on the upswing.

So, while timber management and burning frequency and pattern remain the most important aspects of bobwhite management, supplemental feeding and nest predator management help to increase populations over time. While they may not forestall a decline, they do help keep the ebbs in quail populations higher than they would be. Reducing the rate of decline not only maintains higher fall populations, but helps recover quail numbers more quickly on the upswings. If you would like us to review your feeding program or your nest predator management program, or any other management aspect please give us a call: 850.893.4153, x226.

Georgia–Florida Turkey Invitational a fundraising success

The annual Georgia–Florida Turkey Invitational has become a tremendous fundraiser for the Game Bird Program while at the same time creating a sporting and competitive environment for those who participate. This year’s event raised over $20,000 in support of the Game Bird Program at Tall Timbers – thank you competitors!

Fifty-five teams turned out to compete in this year’s event with the coveted perpetual trophy and bragging rights on the line. A youth division was created this year; much thanks to Beau Turner for sponsoring several youth teams! The rules dinner took place on the evening before the Invitational at beautiful Osceola Plantation. Expert call maker, turkey hunter, and raconteur Donny Richards, from Brunridge, Alabama, entertained the crowd.
with secret calling techniques guaranteed to bring in only the largest gobblers.

This year the team of Cliff Waldrep and Bobby Ryan of Mandalay Plantation brought home the winning bird. A whopper with 1 7/16 inch spurs and a 10 3/4 inch beard! No strangers to the winners circle, Cliff and Bobby took second place honors in 2010! Second place went to Osceola Plantation’s Christopher Watt and Tony Pope whose bird also won the youth hunting division! Christopher (age 11) bested a strong field of crusty veteran turkey hunters from throughout the Red Hills. Way to go Christopher! Third place went to the team of Tom Kirbo and David Halloran who made the trek all the way from Dooley County, GA. Kirbo and Halloran also won the Calcutta with the heaviest bird weighing 22 lbs. 4 ounces. Second place in the youth division went to Tyler Reardon, with the first turkey he had proudly harvested! Congrats Tyler and his guide Steve Shafer! We look forward to an expanded field of youth hunters in 2012!

We thank tournament coordinators, John Daniel and Tim Miles, for staging another great event. Thanks as well to the Williams and Parker families for hosting the dinner at Osceola and to the Rankin Smith family for allowing us to use Seminole Plantation for the weigh in luncheon. FWC biologists David Nicholson and Don Francis served as official and “impartial” judges for the event – no easy task given that 21 birds were weighed in that day. Thanks to all who participated in the event and for your support of the Game Bird Program at Tall Timbers. See you next year!
Quail Management Research needs your support

Tall Timbers has a long and rich tradition of leadership in quail research. Beginning with Herbert Stoddard’s first study of quail life history 80 years ago, Tall Timbers has led the charge to gain new knowledge that can be used to improve quail management. The Game Bird Program continues to be an innovative leader in the research and management of bobwhites, and serves as an important resource for those who value the future of sustainable populations of wild birds. Core long-term research is conducted on the 2,000-acre Kate Ireland Model Quail & Conservation Area here at Tall Timbers. Additional field research takes place on our regional sites at Pineland Plantation in the Albany, Georgia area; Mt. Pleasant Plantation in South Carolina and Sehoy Plantation in Alabama. Together, these study sites represent a wide variety management challenges and solutions for sustainable populations of wild Bobwhites.

We hope you will consider making a contribution to the Game Bird Program. Our 2011 fundraising goal for Quail Management Research (QMR) at Tall Timbers is $250,000. Additionally, we must raise dollars specifically for the Albany Quail Project ($200,000); the Alabama Quail Project ($85,000) and the South Carolina Quail Project ($135,000). If you have supported these programs in the past, please continue to do so as they depend greatly on your annual donations. Please earmark contributions for the appropriate program: (QMR, Albany, Alabama or SC Quail).

If you love these birds as much as we do, please take a moment to fill out the enclosed envelope and mail it today, or visit our website at www.talltimbers.org and make your gift online.

Thank you for your continued support of Tall Timbers and quail research!