

TALL TIMBERS RESEARCH STATION



Quail Call



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Millennium hatch: Season prospects

We monitored survival and nesting of 400 radio-tagged quail this Spring on four plantations between Tallahassee and Thomasville. Despite the continuing drought, quail production was solid this year. For instance, on Tall Timbers (TTRS), reproductive success was much improved. The number of nests incubated by hens this year was up from 0.6 to 0.9 nests per hen.

This summer, the dry weather was not severe enough to cause major lapses in nesting, disrupt hatching of eggs, or reduce growth of chicks. However, in some areas, the drought continues to hamper growth of cover in the woods. Quail on areas with poorer than normal cover may have had lower than normal summer survival and likely will have lower over-winter survival.

Therefore, we predict similar to improved fall populations from last year. Plantations that noticed population declines following the severe heat and drought of 1998 should continue to see increased quail numbers this hunting season. Good Luck!

Identifying nest predators

Study Expands

The nest predator identification research was intensified in 2000 by increasing the number of micro-video cameras (Furhman Diversified,



This bobcat, which ate quail eggs on an Albany, Georgia study site, along with a fox squirrel, and barred owl are examples of incidental quail egg predators.

Austin, TX) from six to nineteen. This was made possible by cooperation between the Game Bird Program at TTRS, researchers at the University of Georgia, and the Albany Area Quail Project at Pinelands Plantation. To date, this study has recorded more than 80 depredations of quail nests at our four primary study sites: Tall Timbers, Pebble Hill Plantation, Pinelands Plantation, and a private farm.

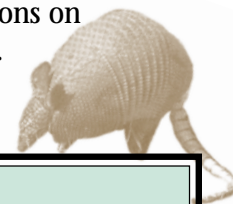
Results for 1999-2000

Similar to last year's preliminary results,

most of the predators identified eating quail eggs were certain common snakes (44%), raccoons (22%), nine-banded armadillos (20%), fire ants (8%) and opossums (4%). Other incidental predators videoed eating quail eggs included a barred owl, a fox squirrel, and a bobcat!

Differences across study sites

There were interesting differences between Pinelands and Tall Timbers and Pebble Hill. Snakes were the number one egg predator on Tall Timbers and Pebble Hill. However, on Pinelands, snakes caused an equal proportion of depredations (31%) as did raccoons (31%). On Pinelands, the primary snake predators were king snakes, rather than gray rat snakes as on Tall Timbers. Armadillos were less abundant in the Albany area, but were still responsible for 8% of nest depredations on Pinelands Plantation.



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Raccoons were the second most frequent nest predator after snakes. Although attempts to capture the incubating quail are made, no mammalian predator videoed has been successful. On two occasions, king snakes captured the quail on the nest, one released the bird the other did not. Interestingly, the snake left the quail, but ate the eggs.

Partial depredations by snakes

Over the years, we have noticed that clutch size often declines in nests during incubation. Our cameras on Tall Timbers have revealed two causes. In 20% of depredations, relatively small snakes remove from one to more than half the eggs, with or without the nesting bird fighting to protect the eggs. Often, the incubating bird hatches the partial clutch. The number of partial depredations by snakes nearly equals the number of depredations by raccoons, opossums and armadillos combined. A second, more rare cause of egg loss is nest maintenance. In one case, a male is seen rolling an egg out of the nest, pecking a small hole in the egg, then grabbing the egg in his bill and flying from the nest. The reason for this is somewhat of a mystery, but perhaps the egg was cracked and invaded with ants.

While most of the snake depredations were caused by two common species of snakes, all non-poisonous

snakes are protected in Florida and Georgia. Populations of many harmless snakes, such as the toad-eating, Southern hognose snake, are in serious decline (see www.uga/srelherp/ to read about snakes, their habitats and conservation status).

The lowly opossum?

The proportion of nests eaten by opossums was low relative to the apparent population on our study areas. Opossums are our number one visitor to predator surveys stations at Pebble Hill and are tied with raccoons on Tall Timbers. Despite this apparent abundance of opossums, they accounted for only 4% of quail nest depredations. It appears that opossums are either out-competed to quail nests by other predators or are simply an inefficient quail nest predator.

What does this mean for quail management?

First, our research suggests that even with mid-sized mammalian removal, other predators, certainly snakes, may limit nesting success of quail. This is one reason why nesting success of quail is rarely greater than 60%, even with predator management. The good news is that this level of nesting success can produce increasing quail populations, assuming reasonable survival of adults and chicks. Our research also indicates that in this region, raccoons and armadillos are our most important mammalian nest predator. Therefore, focusing management efforts on these species is advised. Many trapping techniques capture a disproportionate number of opossums, which may be less important as nest predators. Finally, recent experience suggests that hardwood removal, opening intermittent drains to promote management with fire, and opening upland pine forests to promote vigorous ground cover growth indirectly reduce predator abundance on quail lands. For instance, following hardwood removal on Tall Timbers, the number of fledged Cooper's hawks has declined from 1-2 per nest per year to zero over the last two years.

We will continue our cooperative research to determine the best ways to identify when and what predator populations reach levels that depress quail nesting and hatching of nests, and ultimately quail populations. Further we will continue to research on how certain types of predators may be best managed through habitat manipula-

Visit the Tall Timbers web site (www.talltimbers.org) for more information on quail nest predators and to view interesting video clips of predators at quail nests, and of other quail behavior.

tion and which require predator removal. Only with a continued research effort will we be able to prescribe effective predator management for individual plantations.

Brood habitat update

Managing habitat to produce high survival of quail chicks is an important component of increasing quail populations. Significant research on plantations in Albany, GA clearly found quail where broods used fields, especially ragweed fields, extensively. Therefore, we were surprised when our research results indicated that use of fields by broods and adults was lower than expected. In fact, less than 20% of brood locations on Tall Timbers and Horseshoe Plantation were in fields, even though large fallow fields were available to them; broods spent most of their time in the burned uplands. What could be learned about brood habitat management from this apparent contradiction?

Over the past three years we have monitored brood habitat use on nine plantations and captured nearly 200 broods at ten days of age to measure their growth and survival. We found that growth of chicks was not greatly affected by habitat use. That is, chicks that used fields, upland pinewoods, or burned wiregrass areas, grew at the same rate. Surprisingly, survival of chicks was somewhat better (although not statistically) when chicks did not use ragweed fields! While we are still working through this information with graduate student Adam Hammond and Dr. Wes Burger, at Mississippi State University, the data suggest a reasonable explanation to this puzzle.

It appeared that broods selected areas with good overhead cover and all these habitats in our area pro-

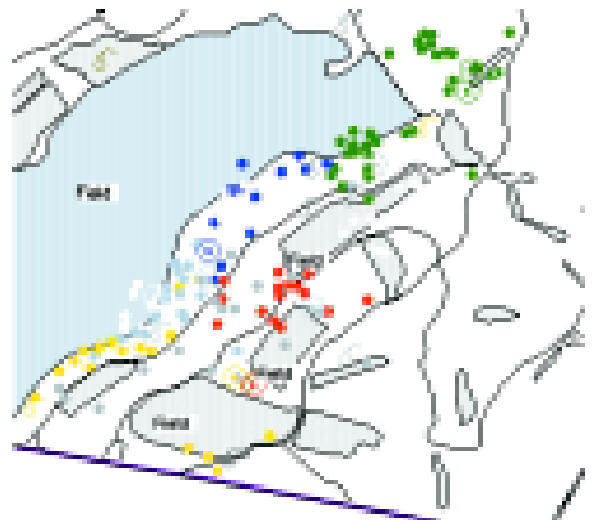


One of 140 quail chicks banded on Tall Timbers during 2000. Capturing broods allows us to measure growth of chicks, banding will allow us to measure their survival.

vided adequate insects for their growth. So, chicks used fields rather than burned pine stands only when cover provided in the surrounding upland forests was too sparse. This is typically the case on plantations with "light" soils, such as in the Albany area where research has demonstrated the value of fields as brood habitat. On our study areas, when cover in the woods surrounding fields was good, broods (and adults) used fields much less in favor of more floristically-diverse, burned pine stands. The lower survival rates we observed for broods relying on ragweed fields may have resulted from predation that occurred when chicks were forced to use the surrounding pine stands with poor cover. This may happen when fields are too small to "hold" the chicks daily movement patterns.

This research provides a new twist to what quail brood habitat is. After sorting and counting hundreds of thousands of insects

collected from brood home ranges across a dozen plantations, it appears that chicks in our habitats are not suffering from a lack of insects (even during droughts). What appears to be driving chick survival is the availability of large expanses of cover provided by weedy habitat. This type of habitat is created during winter, by harrowing fields or open woods or by burning open pinewoods during spring.



Colored dots indicate locations of quail broods on a Florida plantation. Notice how broods were generally located outside of fields. Our studies indicate that quail choose to use fields primarily when overhead cover is insufficient in the surrounding upland woods.

The take home message is to produce good overhead cover for broods. This may require creating large fields if good cover is not reliably produced in the woods. (See - *Managing wiregrass areas for quail.*) However, if soils are heavy and capable of producing a lush weed community after fire, then fields may do little to improve chick survival.

What about wiregrass and broods?

It seems that chick survival and growth are excellent when good ground cover is managed across the brood range. This ground cover can be old-field or native ground cover, like wiregrass, without apparent differences in chick survival.

While we did notice slightly lower growth rates of chicks in stands of wiregrass in 1998 during the 100-year drought, there were no differences in growth of chicks in 1999, regardless of habitat use. That is, broods with home ranges greater than 66% wiregrass, grew similarly to chicks using greater than 66% ragweed fields. More importantly, survival of chicks in 1998 was somewhat higher, though not statistically, for chicks in wiregrass than in old-field lands. This seems odd that slower growing chicks in 1998 actually had higher survival! Part of the answer is that during the severe drought of 1998 experienced by the Tallahassee/Thomasville plantations, old-field ground cover, dominated by annual plants like ragweed, grew slowly, while perennial native plants, like wiregrass created cover more quickly after spring burning. Again, the take home message is that good cover is probably more important to chick survival than insect abundance in the natural habitats of the Red Hills!

Managing wiregrass areas for quail

Adult quail and broods in areas with wiregrass used unburned wiregrass less even when it was available, meaning they tended to avoid it. Those same broods, however, readily used wiregrass that was burned the previous April. Importantly, adult quail readily nested in unburned wiregrass early, then nested in both burned and unburned wiregrass after green-up. All quail completely avoided



This is an example of quail brood habitat in an area where the wiregrass has been burned.

wiregrass areas in its third growing season since the last fire. The reason is likely because of a tremendous buildup of plant residue (both plants and pine needles) on the ground.

Harrowing native ground cover tends to destroy the plants that provide the greatest overhead cover. What returns after harrowing (if not planted to a cover crop) tends to be poorer habitat than the intact wiregrass cover. We suggest that a series of permanent firebreaks, be used to burn five to ten-acre patches of native ground cover. These firebreaks usually exist on quail plantations from previous soil disturbance. We recommend burning wiregrass areas at the scale of five to ten-acre patches, every other year, when quail management is a priority. Leave few or no areas unburned for two or more years in a row - unless you don't want quail.

Of course all other quail management activities apply to wiregrass areas, including opening the over story canopy to allow for good ground cover growth. Wiregrass areas often remain on "light" soils so having too many trees may severely reduce cover. Finally, year-round supplemental feeding appeared to significantly increase reproduction of quail on areas dominated by longleaf pine and wiregrass plant communities. With a good supplemental feeding program, quail on areas with longleaf pine and wiregrass communities were just as productive as the best old-field plantations. In short - feed them!

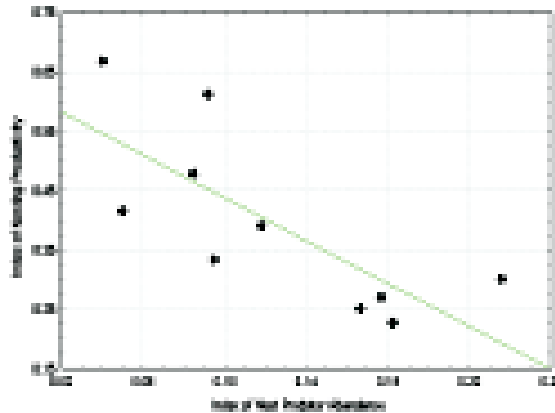


More on nest predators: The Cooperative Quail Unlimited/Southeast Quail Study Group Research Project

With support from Quail Unlimited and Southeast Quail Study Group, research members from Tall Timbers, Auburn University, Mississippi State University, and Hobart C. Ames Plantation are measuring predator abundance where we have active quail habitat studies. The reason for this study is to determine if mammalian nest predator abundance is related to survival and reproduction of quail on areas with good to excellent habitat management programs. Our primary goals are to determine if this relationship exists and if so, is it possible to create a technique for quail managers to use to determine if predator management is a necessary expense.

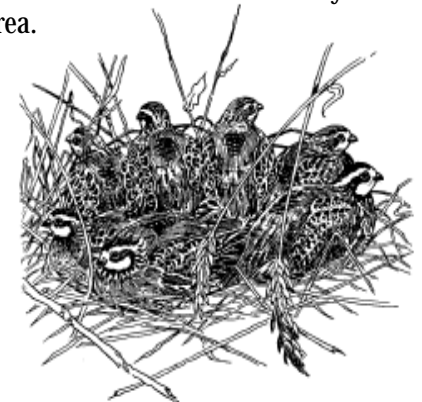
Our first year results are in for ten areas and clearly suggest that as predator abundance increases, chick production, of the quail population, survival, nesting, and nesting success, declines. (See graph below.) After this year, we will add an additional 10-15 sites. Stay tuned for updates and see detailed articles on this project and more in Quail Unlimited's magazine this winter.

Ratio of the hatched nests per hen in relation to abundance of nest predators on ten sites throughout the Southeast. This graph suggests that as mammalian nest predator abundance increases, production of chicks per hen declines.



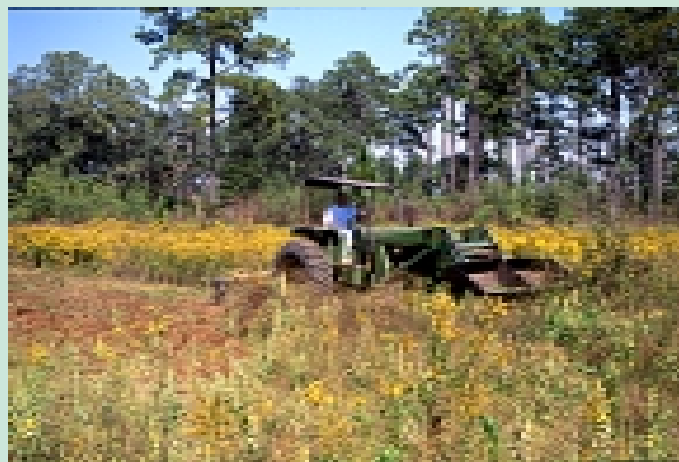
Census quail using covey calling

The covey call is a loud, clear whistle given during predawn hours. This call is given on a regular basis while coveys are still forming and establishing their winter ranges. To estimate the number of coveys in an area, arrive at a point you want to sample about 40 minutes before sunrise. Our studies of 600 covey calls, from 130 coveys found calling, were concentrated around 25 minutes before sunrise. In moderate to high populations of quail, 70-85% of coveys call. In our area, the best time to listen is the last two weeks of October and the first week of November. The best mornings to listen are clear, still mornings. Low or high-pressure systems moving in tend to depress calling of coveys, so avoid these mornings to census quail. Space listeners in areas of interest to cover more ground on good mornings. You can hear coveys over 500 meters away on clear mornings, so it is best to space individuals well apart. If you are hearing more than three coveys at a point, you can assume you heard 70% of the coveys. So to estimate the number of coveys in an area, divide the number heard by 0.7. If you are only hearing one to two coveys per point, then divide this number by 0.5 to more accurately estimate the number of coveys in an area.



Field Size: Bigger is better may have merit

Even on areas where adults and broods tend to select for fields, relatively small fields were used only occasionally by quail with broods. If fields were between one-tenth an acre to two acres, quail were nearly five times farther from fields, than if fields were greater than two acres. Quail with broods move throughout the day, therefore if fields are relatively small, like patches in the woods, they will not "hold" much of the birds' daily activities.



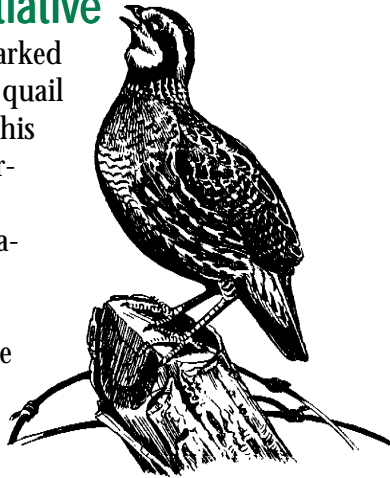
If you are depending on fallow fields to provide brood habitat, then larger fields will likely benefit quail more than small fields. We recommend field sizes between two and five acres.

Support Quail Research!

Quail Research Initiative

In 1994, Tall Timbers embarked on an ambitious three-year quail research initiative (QRI). This program demonstrated overwhelming results that warranted a three year continuation of this research.

Our fundraising goal is \$250,000 per year. We hope you will consider a gift. Remember, no gift is too small and is exclusively for quail research. If you love these birds as much as we do, please fill out the enclosed envelope and mail today!!



Thank you for supporting quail research at Tall Timbers.

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