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THE Upland GAZETTE

What's **Inside...**

The Decline of Bobwhite Quail in the South

Big Problems Don't Come with Easy Answers

By Mark D. Jones, Supervising Wildlife Biologist, NCWRC

PART 2

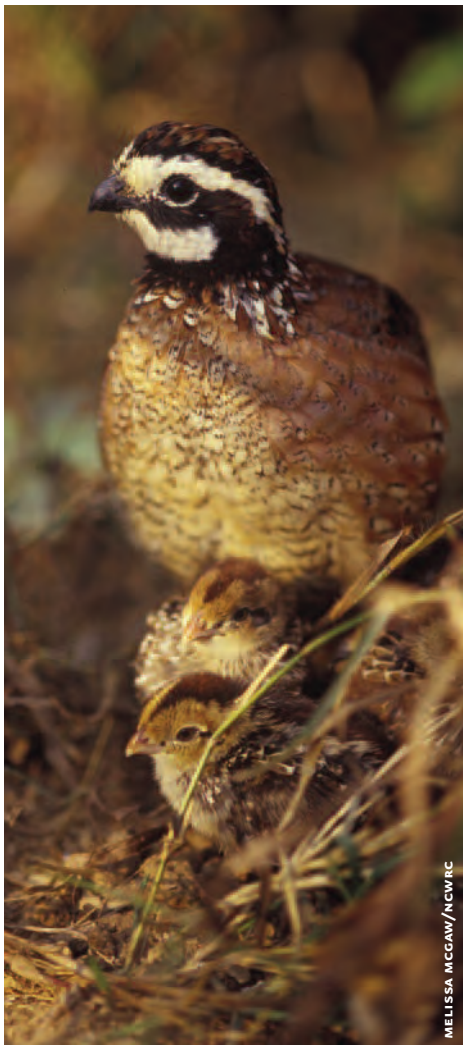
In the Fall issue, we discussed factors behind the decline of the Northern bobwhite quail. It is well established that the problem is widespread throughout the range of bobwhites and does not come with easy solutions. In fact, the required habitat changes are expensive, time consuming, and difficult for the average hunter or even state wildlife agency to influence because of the need to impact huge acreages of mostly privately owned lands. The difficulty of impacting enough habitat to make a difference leads hunters to propose a variety of other solutions to the quail decline. Let's discuss a few one by one.

Many of our state's hunters suggest we stock quail, similar to the traditions for fish such as trout. While this could provide a reliable supply of huntable birds for a short period each season, in my opinion it would be a poor substitute for wild birds. Anyone who has ever witnessed a covey of wild bobwhite quail explode in front of a bird dog will understand this sentiment. I'll let others debate the merits of stocking birds for providing short-term hunting opportunities, but if folks think stocking will help our wild quail situation, dozens of experiences from around the country tell a different tale. This is hard for hunters to accept, because they often assume quail can be stocked just like wild turkeys, but the circumstances around the decline of the two species are much different. Understanding the differences is critical to allowing hunters and agencies to make informed decisions.

Turkeys began declining over 100 years ago because their habitat was drastically degraded and because of excessive mortality as humans over-exploited them for food. However, turkey habitat began improving over much of the second half of the 1900s as forests recovered and the creation of state wildlife management agencies in the early and middle 1900s brought wise regulation of hunting seasons. A perfect storm of improving habitat and regulatory management allowed the highly adaptable turkey to be restored to improving but unoccupied habitats across the United States.

The three keys to this successful turkey story were the recovery of habitats occurring in the late 1900s, an ability to manage mortality levels through regulatory measures by state wildlife agencies, and the adaptable nature of the turkey itself. Under this scenario, it made perfect sense to move turkeys into quality habitats without birds.

The quail story does not qualify on any of these key points. Today, quail habitats continue to decline in both quality and quantity over most of the bird's range, with no sign of recovery. Bobwhites experience



MELISSA MCGAW/NCWRC

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very high natural mortality, making them difficult to impact with regulatory measures like hunting seasons, and quail are specialists (unlike wild turkeys), requiring specific habitats in order to reproduce and live out their daily lives.

Quail stocking has been attempted by many state agencies and private individuals with almost no success at establishing breeding populations in marginal habitats. The vast majority of wildlife biologists agree that stocking programs are a waste of resources and that our efforts are better spent working to improve habitat for existing birds. Populations in these areas are often low simply because the amount of quality habitat is limited on our modern landscape.

Populations of quail are widespread across the Coastal Plain and found in scattered habitats of the Piedmont. Mountain quail populations are even more disjunct due to limited quality habitats. Without improving habitat conditions, there is little hope for stocking birds into any of these regions. Quail are a species capable of reproducing quickly when their habitat needs are met, but moving birds into inhospitable landscapes would be like dumping fish that need fast-moving, cold, clear water into a coastal swamp and expecting them to live in a sluggish, warm and muddy stream. Our best bet is to manage habitats and allow existing birds to inhabit quality habitat areas.

An example from a neighboring state illustrates this point. Wild quail were thought to be locally extinct in a county far on the periphery of this state's known modern-day quail range. In recent years, major changes to cattle grazing practices occurred in this county as aging farmers reduced herd sizes due to multiple market forces. Then along came *Miscanthus* (Japanese silver grass), an aggressive species of non-native, introduced grass. This grass forced the next major land management change—the use of prescribed fire and flash grazing to control the spread of this invasive plant. All of a sudden, wild bobwhites were found in the areas formerly thought completely devoid of quail. Our neighbors report that it has been remarkable to watch quail populations increase in some of these areas when habitat improvements occurred. No quail were stocked; existing birds simply responded to newly available habitat.

Another suggested solution we commonly hear is that we need to kill predators. The

JODY DUGGINES/NCWRC

decline of the U.S. fur market, and subsequent decline in trapper numbers and interest, has played a role in increased populations of mammalian predators such as raccoons, opossums and foxes in recent decades. The ban on DDT, coupled with laws to protect hawks and owls, has increased populations of these birds of prey. There is no doubt that there may be more predators today than in decades past when quail were more abundant.

Because of legal status, we have to treat mammals and hawks separately when addressing any impact they may have on other wildlife. State wildlife agencies have full legal authority over resident mammal species and can pass laws and regulations to increase harvest or allow removal. Before this is allowed, it is important to know if mammalian predators can be linked directly to the quail decline.

In order to shed light on this issue, the N.C. Wildlife Resources Commission worked with researchers from N.C. State University and the Virginia Department of Game and Inland Fisheries on a comprehensive, long-term research project in the 1990s to test the removal of nest predators, including gray and red foxes, opossums, raccoons and skunks (all species that eat eggs and kill chicks). The results from this four-year effort told us that the control of these predators will not increase quail populations without the addition of significant acreages of improved quail habitat.

It is also important to understand that we were able to implement a level of predator removal that would be difficult, if not impossible, for the average landowner to achieve, because we used full-time, paid trappers outside the normal trapping season. Most landowners will never implement such a full-scale effort at removing predators because of time and financial constraints. The take-home message from this work is that the control of mammalian predators alone will not improve quail populations, and I expect the level of mammalian predator control possible for the average landowner will have little effect on predator populations.

The situation regarding hawks is much different from that of mammals. Hawks, owls and other raptors are protected by federal law that has its foundation in the Migratory Bird Treaty Act (an international treaty and the highest form of law in the United States). Let's suppose for a minute the federal government would grant an exemption for killing raptors in special circumstances to increase quail populations.

Upland game enthusiasts and state wildlife agencies have worked for decades to build partnerships with habitat-oriented and bird conservation groups often made up of a mix of hunters and non-hunters. After all, habitat for quail and other game species is also habitat for high priority non-game wildlife species requiring the same conditions. Many members of these groups do not hunt but support the role of hunting in wildlife management and share common interests with hunters in terms of managing quality wildlife habitats.

If we implemented programs designed to kill raptors in order to increase quail numbers, our agency and our hunters would immediately lose the support of many of these groups

who have been good partners in our wildlife habitat enhancement efforts over recent years. The loss of partners and support from the general bird-loving public would far outweigh any minor benefits that quail might receive from fewer hawks. All this would occur without the existence of solid data showing that such control of birds of prey would even make a difference for bobwhites. And remember, this debate jumps over the huge hurdle of getting an exemption to the federal Migratory Bird Treaty Act to allow this control in the first place.

I sometimes wonder if the predator debate is not a serious waste of resources that could be better spent on habitat discussions and efforts. This is colored by my direct experiences hunting in the Great Plains over the last couple of decades where there are some of the densest populations of hawks, foxes, and raccoons I have ever seen. These areas also had quail populations that would make a North Carolina hunter feel like a kid at Christmas. What sets those areas apart is that they contain large expanses of year-round bobwhite quail habitat. Also, finding a place to hunt in those states is much easier because of the greater quantity of habitat. Any North Carolina hunter who is not convinced habitat is the key ingredient needs to travel to these states and see for himself.

Year-round habitat must address a quail's needs in winter (food and cover for the leanest season), spring (courting and pre-nesting habitats), summer (nesting and chick-raising habitats), and fall (food and cover). There are few places left on the North Carolina landscape that provide all these components, but we do have examples of excellent quail habitat in the state with very high bird populations. Biologists know how to produce quail given enough resources, acreages, and commitment from the landowner. Most of these areas are on intensively managed private lands such as our Corporate CURE (Cooperative Upland Restoration and habitat Enhancement) farms or on private quail hunting areas in eastern North Carolina. This management is expensive and requires a commitment from the landowner and/or farmer that simply does not exist in most areas and cannot be easily paid for with the amount of public funds likely to be available anytime in the foreseeable future.

Historically high quail populations resulted from agricultural and forestry practices common in the late 1800s and early 1900s. Southerners at that time were working hard to clear and farm a mostly forested landscape. This work was done by hand and with work animals and created millions of acres of openings and near perfect "messy" edge habitat preferred by bobwhites. Row crop farming, grazing, and forestry of these times were not dominated by technology or machinery and not particularly manicured, efficient or clean. The resulting landscape of native grasses, briars, weeds, forbs and shrubs was very favorable for quail.

Things began to change in the years after the Great Depression and World War II when technology came onto the scene. Agricultural and forestry practices became more and more technologically advanced. It became "normal" practice to do things that manicured or "cleaned" the landscape in an unfavorable manner for quail, and quail numbers have simply followed these changes through time in the last half century. Because these land use changes occurred for economic reasons, it will take new and economically sensible practices, implemented over huge areas, to increase bobwhite numbers.

Biologists know how to produce quail given enough resources, acreages, and commitment from the landowner.

Another neighboring state gives us an example of the importance of economics in the bobwhite equation. This state's overall quail population has declined just as much, if not more, than ours. First, through coinci - dence, one county in this southern state's Coastal Plain experienced an unusually high amount of timber harvest (thinning and clearcuts) in local pine timberlands due to timber market forces beyond anyone's control.

This timber harvest was followed by the use of an unusual combination of herbicides to control competition with replanted trees. These mixes were less lethal than normal for quail-friendly legumes and grasses. Secondly, two very large acreage landowners in the county implemented prescribed burning on several thousand acres. And thirdly, many local landowners implemented conservation practices, cost-shared by USDA Farm Bill funds, on croplands.

All of these changes came together at the same time for pure economic reasons in a perfect storm for bobwhite quail. Bobwhites temporarily responded to the unusual amount of new, quality habitats. One hunter reportedly found over 125 coveys and killed 225 quail in these areas last season. All of this occurred in an area very similar to our Coastal Plain landscape, which has millions of acres of row crop land and forest land managed for timber production. If this type of change to standard land management regimes was implemented over entire regions of Southern states, imagine the impact to quail populations!

There are two bobwhite worlds that exist today. In one world, intensive habitat management produces bobwhites given adequate landowner commitment, finances, and acres. Scores of these areas exist throughout the South, and we have many right here in North Carolina. The average hunter will not set foot on these, and if you have access to such areas count yourself among the fortunate few. What we should learn from these areas is that there is no mystery about how to produce quail—the challenge is paying for it over larger areas.

That leads us to world number two: "The Real World". This covers the vast majority of quail range where common land use practices are driven by economics that determine the fate of quail. Lands are managed here by farmers, ranchers, and forest owners in ways they believe are economically sound. Whether biologists, hunters, and wildlife enthusiasts agree with this management does not matter. Putting food on the table, sending children to college, and paying the loan on the tractor, truck, and seed comes first. I say this with no disrespect because I think most Americans would do the same.

To address quail in this "Real World", we

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ILLUSTRATION BY DAVID WILLIAMS

Success Restoring Quail and Songbirds with Habitat Management

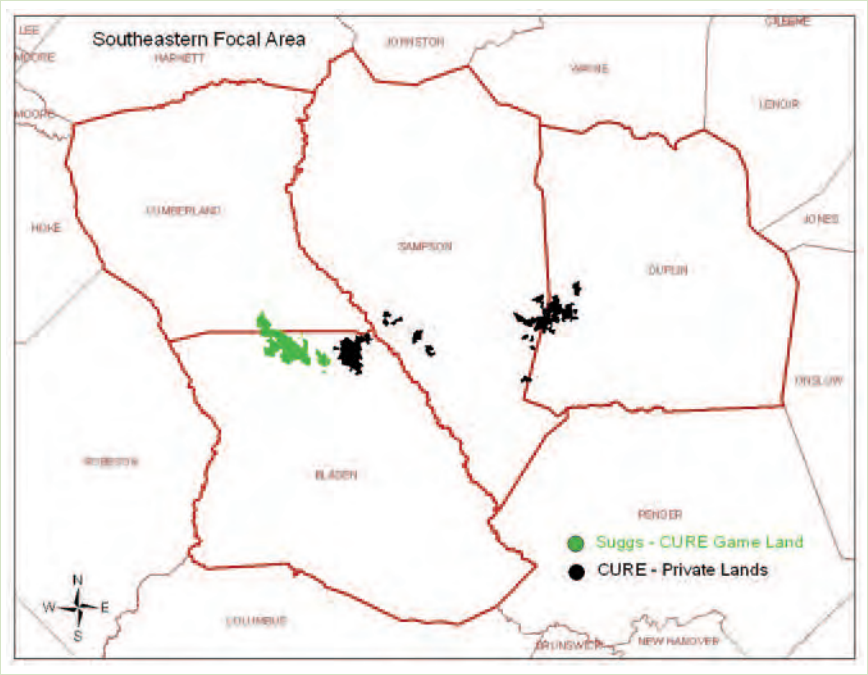
By Benjy Strope, Southeastern Focal Area Technical Assistance Biologist, NCWRC
Mark D. Jones, Supervising Wildlife Biologist, Private Lands Program, NCWRC

As promised in the last issue of the Upland Gazette, we wanted to provide information about the response of wildlife species to management efforts under CURE (Cooperative Upland habitat Restoration and Enhancement) in the Southeastern Focal Area (SEFA). This has become the Wildlife Commission's premier area for quail and associated species and proves that habitat management can work for these species if undertaken with enough land, money, and time.

To monitor this effort, we take note of anything rare or unusual, and we perform surveys of common species at various times throughout the year. These types of counts can usually be done by one or two people, do not require a lot of equipment, and are a fairly simple way to monitor the results of habitat manipulations.

Other than our winter bird surveys, which are line transect counts, all other surveys are point counts. Point counts involve being at a certain place or point for a limited amount of time at about the same time every year. Points are at least a quarter mile apart and care is taken to not double-count birds. While not a true population estimate, point counts do give an index to whatever species you are monitoring when the counts have been conducted several years in a row. Line transects involve observers walking a set distance and counting birds in a determined width. Line transects do give an actual population density of the species being counted.

Areas like NCWRC's SEFA demonstrate that quail populations can be improved with proper habitat management given enough acreages and financial commitment from landowners.



Information presented here comes from the Murphy-Brown Ammon Complex, which was the original Corporate CURE farm, and has multiple years of data associated with it. New farms in SEFA have limited data due to the short time since enrollment and manpower constraints.

Bird data collection started in 2003, but habitat work did not begin until 2006 on the Ammon Complex owned by Murphy Brown Farms. Therefore, management practices had little effect until recent years. Habitat work began by marking fallow vegetation field borders and habitat areas around row crops and planting native grasses. In 2009, we began timber stand improvements with clear cuts, thinning, and burning. There are no supplemental feeding, predator control, or quail release programs at this location.

- Fall bobwhite covey counts are based on 12 points and conducted in mid-October every year. These counts start 45 minutes before sunrise and last one hour. Since 2003, we have counted 367 coveys on those 12 points. Because more quail calling will stimulate more quail to call, and weather influences covey calling rates, we use a formula based on quail research projects to adjust call rates. Last October, our adjusted call rates per point were the highest they have been at 5.5 coveys per point. That is a very high number of calling coveys anywhere within the range of the bird!
- In late May or early June, we conduct a spring bird count. While quail are included in the count, this survey is also designed to determine which songbirds are utilizing the area. These point counts are conducted for five minutes on 21 different points. This count starts at sunrise and lasts for a few hours. Results from this survey are giving us much needed insight into grassland and/or early successional habitat species such as Eastern meadowlarks, Eastern kingbirds, loggerhead shrikes, indigo buntings, and blue grosbeaks.
- Summer quail routes are conducted three times the last two weeks of June on the same 21 points where the spring bird count is conducted. This is when bobwhites are at the peak of their calling. Counts are only three minutes long, and whistling male bobwhites are counted at each stop. Over the past three years, we have been averaging around four calling male bobwhites per point.
- Winter songbird counts are conducted in February by line transects, and these are heavily influenced by weather. While we

won't go into transect count details here, we have found that savannah sparrows love the field borders in the winter. Songbird densities on these counts are always highest in the fallow areas and field borders versus pastures, crop fields, or woodlands. Other species that use the farm in the winter include American kestrels, Northern harriers, swamp sparrows, song sparrows, and loggerhead shrikes.

Other uncommon or rare species that have been noted around the focal area from time to time include bobolinks, sandhill cranes, short-eared owls, barn owls, bald eagles, Eurasian collared doves, palm warblers, dickcissels, and a yellow-headed blackbird.

When one considers the abundance of bobwhite quail, and the observations of dozens of other birds utilizing our habitat areas, it is clear that the land management activities in the SEFA make it one of North Carolina's premier areas for early-successional wildlife habitat. Few places in North Carolina, or anywhere in the South for that matter, have quail counts of 5.5 coveys per survey point. The response of quail and songbirds to habitat management in SEFA demonstrates that there is hope for declining farmland wildlife and that proven techniques for managing these species do work. Hopefully, as we move forward, we can continue to enroll additional farms in SEFA and provide information to inform other early-successional habitat efforts throughout North Carolina.

Finally, don't forget to check out the NCWRC's Special Hunts booklet for opportunities to apply for permit quail and rabbit hunts on these areas. These are, without a doubt, some of the best opportunities offered to sportsmen in the state. Information can be found for 2012–2013 hunts later this summer at ncwildlife.org/Licensing/PermitHuntingOpportunities.aspx.

Hunting of wild bobwhite quail is a cherished Southern tradition threatened by declining habitat conditions.

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are left with two options. One is to directly pay landowners for quail-friendly habitat. That has been done to varying degrees in many states, but it is expensive and rarely sustainable over the long-term. Some experts believe this is the future of quail management and the only chance for the species. Time will tell if they are right, and at least we have this option.

I still have hope of another promising option. If adopted, it would be more sustainable over time and benefit more acres, people, and other wildlife species. It involves finding economically sensible alternatives to current land management practices. No-till planting, filter strips on cropland, conversion of sod-forming fescue and Bermuda grass to native bunch grasses, and thinning and burning of woodlands are examples. These practices benefit not just quail but a host of declining species.

Unfortunately, these and other practices are not common on a high percentage of our landscape. Perhaps we have not identified the right practices or presented the right economic arguments. Clearly, we have a long way to go in terms of reaching out to landowners and developing reasons for them to change standard practices. We must continue to search for more information about economically smart land management alternatives and hope for a little luck along the way.

For quail and associated species to ever recover, government agencies, quail hunters, songbird enthusiasts, and landowners must all work together to find economically sensible reasons for private landowners to do things differently. Changes must address practices on crops, fields, pastures, and forested lands. It will take a combination of persistence, hard work, and planning for bobwhites to once again return to prominence in North Carolina and throughout their range in the South.

Wild Turkey Time Bomb?

By Evin Stanford, Deer, Turkey, and Feral Swine Biologist, NCWRC

North Carolina has been blessed with thriving wild turkey populations in recent years. However, there is cause for concern about declining productivity.

Undoubtedly these times are the heyday of turkey hunting in North Carolina. In 1948, one year after the North Carolina Wildlife Resources Commission (NCWRC) was formed, only 10,000 estimated wild turkeys called the Tar Heel state home. That number consistently dwindled over time due to overharvesting, habitat destruction, and other factors until the population bottomed out at approximately 2,000 birds statewide around 1970. At that time, the possibility of turkey populations rebounding to the levels that we enjoy today was unthinkable.

As most hunters are aware, our state's wild turkey restoration program is responsible for the recovery of turkey populations across the state. The heroes of wild turkey restoration include numerous past and present NCWRC staff members that trapped and relocated birds, cooperating landowners and sportsmen that assisted with the establishment of restoration areas, and the National Wild Turkey Federation that provided financial assistance and logistical support to help make it all happen. The fruits of those efforts are evident today as wild turkeys are now found throughout the state and number approximately 260,000.

This tremendous wildlife management success story is also reflected in the reported harvests of our spring turkey hunters, which have set back-to-back-to-back record harvests each of the last three seasons. Yes, indeed, it appears this is the best time ever to be a turkey hunter in North Carolina, and expectations are high that it will only get better.

But what if I told you that may not be the case? There may be a time bomb waiting to go off in our state's wild turkey populations. What if I told you this time bomb has already gone off in several southeastern states, and currently nobody knows how to diffuse it to keep it from happening elsewhere? Let me introduce you to a phenomenon known as the Southeast Wild Turkey Decline.

The Southeast Wild Turkey Decline is a general term wild turkey biologists use to describe long-term decreases in wild turkey productivity, population levels, and/or annual harvests that have been observed in many Southeastern states. Almost all state wildlife agencies in the Southeast have documented notable decreases in wild turkey productivity over the long-term based on poult per hen ratios observed during summer wild turkey observation surveys. Many of the states that have observed these declining productivity trends have also experienced a decrease in population levels and harvest. For those states that have experienced a decline in productivity but not yet a decrease in population levels or harvest, the message appears to be clear. Be patient. The time bomb is waiting to go off.

> There may be a time bomb waiting to go off in our state's wild turkey populations.

Just how bad can it be? In Arkansas, the wild turkey population has decreased by 100,000 birds since the early 2000's which correlates to a 50 percent decrease in the statewide population. In some parts of northwestern Arkansas, turkey populations have declined more than 75 percent since 2000. In Mississippi, the statewide turkey population peaked in 1987 when just over 59,000 turkeys were harvested. Since that time, population levels and harvest have decreased by about 60 percent. In South Carolina, the spring turkey harvest peaked in 2002 and has since decreased more than 36%. It is believed these harvest trends in South Carolina are reflecting actual population changes over the same time period. This same scenario of decreasing wild turkey productivity followed by a substantial drop in population levels and harvest has played out in several other Southeastern states as well. Some states not experiencing this phenomenon statewide are beginning to see it within localized areas.

What does this mean for North Carolina's turkey populations? Let's look south of the border for a comparison. As you can see in the graph, both South Carolina's and Georgia's wild turkey poult per hen recruitment indices have decreased remarkably since 1982. Poult per hen ratios that used to range between 3 and 4 now consistently range between 1 and 2. The trend in North Carolina has likewise decreased over time since surveys were incorporated into our state's turkey management program in 1988. This decreasing trend in wild turkey productivity is mirrored by almost all Southeastern states that conduct summer wild turkey observation surveys.

Georgia's and North Carolina's overall wild turkey populations are still doing well despite the drop in productivity. However, as mentioned before, South Carolina's population

has dramatically decreased with dropping productivity. What is the primary difference between states that have observed both decreasing productivity and population trends and those states that have observed only decreasing productivity? It seems to simply be time. As I've been told by turkey biologists from Southeastern states that have experienced both decreasing trends in productivity and population levels, all we need is patience. Give it time and the time bomb is likely to go off here too.

I imagine it would be embarrassing to be a turkey biologist that comes on board with a state wildlife agency after a success story like the restoration of wild turkey populations only to see part of that success crumble away without explanation. No one knows why turkey productivity is decreasing across almost the entire Southeast, and no one knows why some states have seen a corresponding decrease in population levels and harvest. Following the restoration of turkeys to suitable but unoccupied habitats, did birds simply not have to compete with other members of the same species? Maybe it's possible this lack of competition created a scenario where recruitment and population growth levels were artificially high for some period of time and are now readjusting to a new reality. However, it's hard for a wildlife biologist to imagine that scenario resulting in population levels dropping as much as they have in Arkansas, Mississippi, and elsewhere.

Is it possible a predator—prey relationship is responsible? Perhaps predators did not initially know how to effectively target turkeys as a food source? Over time, as turkey populations became more abundant, it's possible the predator community developed effective strategies to take advantage of this resource. This could result in a lower threshold for sustainable turkey population levels. Are we overharvesting turkeys in portions of the Southeast, or are biologists otherwise lacking an understanding of some fundamental aspect of turkey population dynamics?

Other potential contributing factors to the Southeast Wild Turkey Decline that have been discussed among wild turkey biologists include changes in habitats and land use patterns over time, the frequency and timing of recent drought events throughout the Southeast, direct and indirect effects of baiting and supplemental feeding, and unknown disease effects. These are just a few of the many ideas that have been tossed around as potential contributors to this alarming issue.

By now you are probably asking what we are doing to address this time bomb. In June 2010, the NCWRC hosted the annual meeting of the Southeast Wild Turkey Working Group, a committee of turkey biologists from all Southeastern state wildlife agencies. During that meeting, the working group began to develop a list of prioritized research topics to address the Southeast Wild Turkey Decline issue. After much discussion and coordination over a period of several months, the list was finalized in May 2011. Research priorities include: 1) analyses of population, habitat, and other trend data; 2) evaluation, validation, and standardization of population monitoring techniques; 3) evaluation of changes in habitat suitability for turkeys over time; and 4) development of population modeling techniques that incorporate turkey population dynamics and landscape habitat changes.

Although the list may seem short, addressing all of these research priorities is a tremendous undertaking that will involve multiple large-scale research projects, massive coordination efforts, and quite a bit of time. However, the working group has been quick to begin addressing the research priorities. Priority #1 is currently being addressed by researchers at the University of Georgia. This effort involves pooling and evaluating tremendous amounts of trend data from all Southeastern states. Data to be evaluated include turkey population and productivity trends, habitat changes over time, changes in hunting regulations, weather trends, and many other trends potentially associated with wild turkey population dynamics. The objective of this 2-year effort is to evaluate these data and determine if hypotheses for the Southeast Wild Turkey Decline phenomenon can be developed. The results from this initial research will guide the Southeast Wild Turkey Working Group

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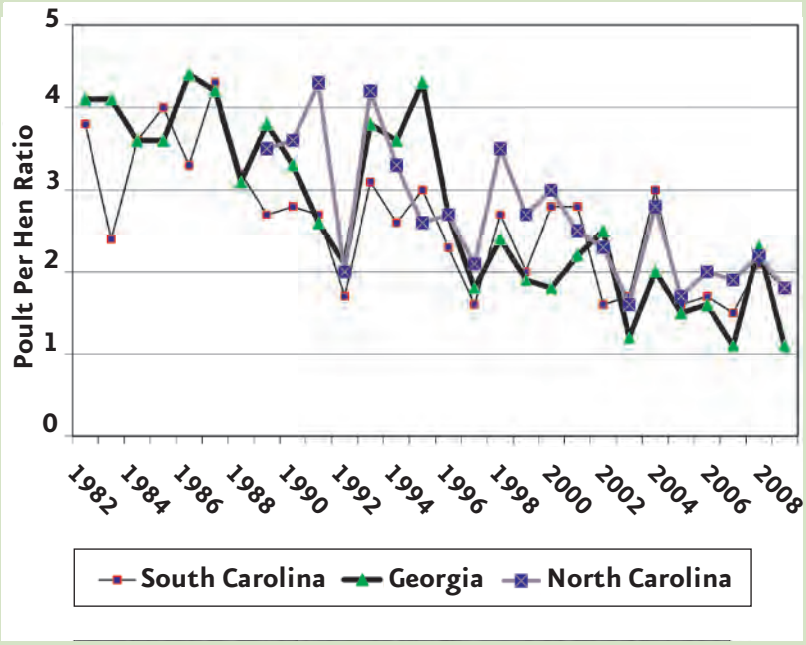
SUMMER WILD TURKEY POULT PER HEN RATIOS IN GA & SC 1982-2009 & NC 1989-2009



Productivity, or the replacement of adult turkeys by young, has dropped significantly in North Carolina and neighboring states in recent decades.

Wildlife Habitat Conservation Success Story

John Peeler, Piedmont Region, Davie County, North Carolina

By Johnny Riley, Technical Assistance Biologist, NCWRC

During the winter of 2006, I was looking for someone to do contract prescribed burning in my work area, and I was having a very difficult time finding someone willing to help. Then a local forestry consultant suggested that I call John Peeler. John is a land management consultant who specializes in wildlife habitat projects. After contacting John and telling him more about our CURE (Cooperative Upland habitat Restoration and Enhancement) program, he was not only willing to help with prescribed burning, but he also wanted to know more about implementing CURE practices on his own property.

John owns a small farm south of Mocksville in Davie County. While John doesn't need large amounts of hay each year, he was still interested in establishing native warm season grasses on his property for the benefit of his livestock and wildlife. During the spring of 2007, John converted 14 acres of his hay land into big bluestem and indiangrass. After having success with this initial planting, John decided to plant an additional 13 acres in 2008. In the years since these first plantings, John has continued to manage his native warm season grass fields with wildlife in mind.

The timing of spring hay mowing is crucial for wildlife in grassland habitats. Native grasses allow John to mow later in the spring than with most conventional grasses. Also, when he can, he leaves as much cover as possible throughout the winter by either only cutting once (since the yield is higher than fescue) or by timing his second cutting no later than early August.

John's property is a unique mix of well-managed timber and open ground, and his fields are primarily used for hay and grazing for an assortment of livestock. Thanks to John's forestry background, his timber is also providing quality habitat. John majored in Forestry at North Carolina State University, and he manages his timber in such a way as to provide both quality wildlife habitat and timber revenue. This means his timber stands are being thinned and burned on a regular basis to the benefit of plant and wildlife species dependent on such practices.

John's benefit to wildlife has reached beyond his property because he has referred other property owners to our CURE program, and in most cases we were able to complete wildlife habitat projects on those properties. Furthermore, some of John's fields are located along a heavily-travelled road and are providing much needed exposure for native grasses. There is tremendous value in providing a showpiece for the public that demonstrates common timber and agriculture practices that compliment wildlife management. John Peeler is doing good things for wildlife in and around Davie County, and the benefits extend to the public at large.

Free advice on managing wildlife habitat is available from the North Carolina Wildlife Resources Commission (919-707-0050). NCWRC Biologists can also inform you of available federal conservation cost-share programs available from your local Natural Resources Conservation Service office (http://www.nc.nrcs.usda.gov/contact/directory/index.html).

Eight Conservation Groups Form Initiative to Promote Wildlife Habitat

Eight North Carolina conservation organizations, representing over 100,000 citizens, have joined forces in a new initiative to promote common goals for wildlife habitat across the Tarheel state. These groups, formed under the umbrella name of the North Carolina Wildlife Habitat Coalition (NCWHC), share a deep-rooted concern about the conservation and enjoyment of wildlife and fish and their habitat in North Carolina. Participating groups include Conservation Trust for North Carolina, National Wild Turkey Federation, North Carolina Wildlife Federation, Quail and Upland Wildlife Federation, Quality Deer Management Association, The Nature Conservancy NC Chapter, Ducks Unlimited, and NC Trout Unlimited.

NCWHC recognizes that the conservation programs of the U.S. Department of Agriculture's Farm Bill have significant impact on wildlife habitat on private lands, and that the USDA has as its primary goal the shaping and implementation of these programs. "The programs, funding, and authorities of the Farm Bill have never been more important than they are today," says North Carolina Wildlife Federation executive director Tim Gestwicki. "In fact, through its conservation programs, the Farm Bill impacts more acres of private land in the United States and in North Carolina than any other single program."

The voluntary conservation programs and conservation compliance provisions established in the Farm Bill have improved ecological integrity and provided assistance and advice to farmers over the last 25 years. Conservation benefits include increased farmland sustainability, a reduction of soil erosion, a decrease in net wetlands loss on farmland, the preservation and enhancement of critical habitat for high priority wildlife species, and substantial financial return for farmers and landowners. These gains have been hard-fought, but there is still a lot of work to do to improve programs and meet conservation needs. Specifically, NCWHC will target policy development and implementation of Farm Bill conservation programs by working at the federal, state, local, and landowner levels.

"The Farm Bill gives wildlife managers and landowners the tools to manage and improve critical and declining habitats such as native warm season grasses, filter strips of native vegetation, and fire-maintained southern pines—if constituents work with USDA agencies to match policies and programs to landowner needs and objectives," said Nick Prough, Chief Wildlife Biologist for the Quail and Upland Wildlife Federation.

NCWHC is an informal partnership open to all North Carolina sporting and habitat conservation groups and individuals wishing to improve Farm Bill programs. The Coalition will convene meetings and conference calls as necessary. Within the policy and resource constraints of each organization, member groups will work towards the shared objectives and action strategies developed by the group. The goal of the NCWHC is to continue and improve the incentive and assistance programs of the Farm Bill (impacting croplands, pastures, and forests), and to ensure favorable conditions for fish and wildlife while maintaining income productivity on private lands. Both objectives can be reached for the benefit of landowners and the general public.

For more information or to become involved, organizations and individuals interested in the promotion of improved wildlife habitat in North Carolina should contact Tim Gestwicki at tim@ncwf.org or 704-332-5696.

North Carolina Wildlife Habitat Coalition (NCWHC)

- Conservation Trust for North Carolina
- National Wild Turkey Federation
- North Carolina Wildlife Federation
- Quail and Upland Wildlife Federation
- Quality Deer Management Association
- The Nature Conservancy NC Chapter
- Ducks Unlimited
- NC Trout Unlimited

MARK D. JONES

Bobwhites and Songbirds Living on the Edge

By Jessica Piispanen and Jason Riddle, Wildlife Ecology Discipline, College of Natural Resources, University of Wisconsin-Stevens Point

For most wildlife species life can be a challenge. This is no different for those species whose habitat often includes early-successional vegetation and is often close to field edges. Early-successional habitat has been lost and degraded over the past several decades, jeopardizing many bird populations including the beloved bobwhite quail. Field borders have been promoted to aid in bringing back this type of habitat. A field border is a strip of volunteer or planted vegetation which is maintained around an agricultural field. Field borders can be adjacent to different edge types including woody patches, ditches, crop fields, or roads. This could pose a unique set of problems for many bird species as studies have shown that predators may use edges more heavily for travel lanes and for foraging.

Blue grosbeak chicks wait on an adult to bring food in a CURE field border in NCWRC's Southeastern Focal Area. A photo of an adult blue grosbeak is inserted.

One potential problem is the possibility for decreased nest success close to edges. Because field borders can be next to and within close proximity to a variety of edges, birds using field borders for nesting habitat may be at greater risk of nest failure. If nest success is low in field borders close to certain edge types, then landowners and land managers would benefit in knowing what kinds of edges to avoid when using field borders to benefit birds.

Our study attempted to accomplish just that by investigating how distances to different edge types affect three bird species' nest success on Cooperative Upland-habitat Restoration and Enhancement (CURE) field borders on farms in the Wildlife Commission's Southeastern Focal Area (SEFA). The three species included Northern bobwhite quail and two songbirds: indigo buntings and blue grosbeaks. We measured the closest distance from nests in field borders to four different edges: woody, ditch, crop field, and road. We also wanted to identify the predator community on these farms and determine the most frequent nest predator for each of our three focal birds.

Based on a previous study done on some of our farms, black rat snakes were thought to be a major nest predator of indigo buntings and blue grosbeaks. However, this could not be determined as cameras were not set up on the songbird nests to allow us to make definitive nest predator identifications.

In addition to having technicians from the University of Wisconsin-Stevens Point (UWSP), we collaborated with North Carolina State University (NCSU) and the North Carolina Wildlife Resources Commission (NCWRC). We conducted our study during the summers of 2010 and 2011 (see "The Quest for More Successful Nests: A Cooperative Effort with Bobwhites and Songbirds" Fall 2010 *Upland Gazette*). We worked on four farms in Bladen and Sampson Counties. Three of the farms were in a forest-dominated landscape, and the fourth farm was in an agriculture-dominated landscape. Between these farms, we used approximately 190 acres of field borders for our study. We searched each field border at least twice in 2010 and four times in 2011. When we found a nest, we monitored it every three

to four days until the outcome was known.

Between the two field seasons, we found a total of 26 Northern bobwhite quail nests, 12 indigo bunting nests, and 29 blue grosbeak nests. We also set up small cameras on half of each of the focal species' nests in order to identify nest predators.

We found a variety of predators on camera impacting our three bird species. For Northern bobwhites, we recorded 4 snake and 2 Virginia opossum depredations. We recorded 3 snake depredations for indigo buntings. For blue grosbeaks, three nests failed due to snake depredations, 2 were taken by unknown mammalian predators, and 1 was lost to avian predation. We found that although snakes were the most frequent nest predators for each of our focal species, this was only statistically significant for indigo buntings.

Most importantly, we discovered that none of the distances to the four edge types appeared to influence nest success for any of the three species. In other words, no matter what the distance was from the nests to any of the edge types, nests for each species had the same chance of being successful. Although our sample size was relatively small, we saw similar trends in both indigo bunting and blue grosbeaks, which nest off the ground in shrubs or herbaceous plants, and bobwhites, which are ground nesters.

So what does this mean for landowners and farm managers who want to plant field borders on their farms but also want to increase nest success for these bird species? This means landowners and managers have flexibility in where they can place field borders in relation to the four edge types studied. All Northern bobwhite and most songbird nests were found in field borders in an agriculture-dominated landscape. This could be because birds preferred this landscape or simply because most of our field borders were in an agriculture-dominated landscape. As such, our recommendation may be more applicable to farms in agriculture-dominated landscapes than in forest-dominated landscapes. As always, we learned more about one piece of the puzzle and are now more curious about the remaining pieces.

KEN TAYLOR

Farmland Field Borders—The Relationships between Beneficial Insects and Wildlife

By Charlie Plush, Chris Moorman, David Orr, and Chris Reberg-Horton, North Carolina State University

The practice of establishing vegetation along cropland field margins (known as field borders) is a well-known strategy for providing wildlife habitat on North Carolina farmlands. Over the past 20 years, federal and state agencies have developed numerous programs (USDA Farm Bill, Georgia's Bobwhite Quail Initiative, and North Carolina's CURE) that promote field border establishment on private agricultural lands, resulting in thousands of useable habitat acres for Northern bobwhite, grassland and shrubland songbirds, and small mammals. In many agriculturally-dominated areas, field borders often are the only habitat available for wildlife dependent on early-successional conditions for feeding, nesting, and loafing.

Traditionally, field borders have consisted of natural vegetation that emerges after cultivation has stopped. While the mix of fallow vegetation attracts songbirds and quail, it may not be suitable for beneficial insects such as pollinators and predatory wasps and parasitoids that destroy harmful insects. In the Fall 2008 issue of *The Upland Gazette,* Dr. David Orr described this problem and explained that fallow borders typically lack the nectar-producing vegetation needed to sustain many beneficial insect communities. Orr suggested planting borders with flowering plants that attract and feed beneficial insects.

High commodity prices, increased food demand, and a struggling economy have lessened the amount of funding available for many conservation programs, so field border management strategies should yield the greatest amount of economic and ecological benefit at the least cost to the landowner. To learn what types of field borders (e.g., fallow, planted, mowed) provide the greatest ecological services at the lowest cost, we conducted a collaborative research project from 2009-2011 at the Center for Environmental Farming Systems (CEFS) in Goldsboro, North Carolina.

One goal of the project was to examine the wildlife use of field borders planted as beneficial insect habitat. At CEFS, four different field border treatments were established around nine crop fields. The four field border treatments were: 1) planted native-warm season grasses (NWSG) and native prairie flowers (hereafter NWSG/Flowers); 2) planted native prairie flowers only; 3) traditional border of fallow vegetation (hereafter Fallow); 4) borders mowed 2-3

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By simply staying off the bush hog, landowners can greatly increase the amount of wildlife on their cultivated lands.

times per month. The NWSG species planted were indiangrass and little bluestem. The planted native prairie flower species were lance- leaved coreopsis, purple coneflower, black-eyed susan, butterfly milkweed, common milkweed, swamp sunflower, heath aster, and showy goldenrod. All field borders were approximately 10 x 100 meters in size, and seed mixes we used in planted field border treatments had demonstrated value to beneficial insects in prior studies.

We assessed response by three different wildlife groups to the treatments. First, we determined the quality of each field border type as brooding habitat for Northern bobwhite quail. To do this, we used 10-12 day old, human-imprinted bobwhite chicks to conduct foraging trials in each of the borders from June-August in 2009 and 2010. In each field border, a trial was performed by allowing 6 chicks to forage freely in a field border for exactly 30 minutes. Because we had "trained" the chicks since birth, the chicks foraged naturally alongside us in the border and would respond to our whistle call.

At the end of each trial, chicks were taken to a lab where the contents of their digestive organs were extracted. Using a dissecting microscope, we identified and measured whole arthropods and "diagnostic fragments" (i.e. wings, legs, mandibles, etc.) of arthropods consumed by each chick. The measurements for each arthropod consumed were analyzed to estimate the arthropod's live weight. By adding up the estimated live weight for each arthropod consumed, we derived a foraging rate (grams of arthropods consumed/ chick/ 30 minutes) for each chick. Bobwhite chicks must consume large amounts of arthropods to maintain proper growth rates, and the amount of time spent foraging is often inversely proportional to bobwhite chick survival rates. Therefore, we used the mean foraging rate for each border treatment as the measure for brood-habitat suitability.

In conjunction with the foraging trials, we also measured arthropod abundance in each field border treatment. Using a modified blower-vacuum, we were able to sample arthropods from the ground and low-level vegetation strata where young bobwhite chicks feed. Back in the lab, we counted and identified arthropods collected in each sample and calculated a mean abundance of arthropods and a diversity index for each border treatment.

We also compared overwintering sparrow use of the border treatments. By late-fall, most agricultural fields have been harvested or tilled, and for many landowners, this is the season to "clean up" those unsightly ditches and field corners. Consequently, many migratory sparrow species arrive in North Carolina in late fall to find little cover for feeding, loafing, and protection from weather and predators. To determine sparrow abundance in each field border treatment, we conducted 9 bird counts in each field border. Although we identified individual sparrow species when possible, we chose to count the abundance of sparrows collectively because wintering sparrows often travel in large flocks and share similar markings.

Finally, we determined rodent density in each type of field border. Although not the usual animals for promoting the benefits of field border establishment, rodents play an important role in agricultural ecosystems. Mice and rats are a major food source for many larger mammal species and raptors, they act as important seed dispersal agents, and their presence can have a significant influence on the composition of plant communities. We trapped in each field border for 6 days in October 2009 to estimate densities.

We learned that planted beneficial insect habitats provide quality wildlife habitat comparable to traditional fallow field borders. Bobwhite chick foraging rate was similar among all field border treatments in both 2009 and 2010. Additionally, the arthropod sampling data suggested that arthropod prey availability was similar among all field border treatments in both years. In a nutshell, there

Flowers provide important habitat for beneficial insects including those that prey on harmful insects and those that serve as food for the chicks of many species of birds including bobwhite quail.

were a lot of insects for chicks to eat in all field borders, and overall, they were fairly efficient in capturing and consuming arthropod prey.

Although chicks consumed large amounts of arthropod prey in mowed borders, by no means does this suggest that mowed areas provide quality brood habitat. In a natural setting, chicks foraging in mowed habitats would be highly susceptible to predation or would likely succumb to heat stress. Our results emphasize that arthropod abundance is probably not the issue for quail young using field margins; rather there is a lack of suitable vegetation structure (cover) and microclimate that facilitates efficient and safe foraging.

In both 2009 and 2010, overwintering sparrows used planted beneficial insect habitats and fallow borders equally. However, sparrow densities were between 5-10 times lower in mowed borders in both years. A majority of the sparrows observed were savannah sparrows and song sparrows, but we did observe less common species such as grasshopper sparrows and white-crowned sparrows using the borders. It appeared that the vegetation in both planted and fallow borders provided an abundant seed source for foraging sparrows as well as suitable escape cover for individuals feeding in adjacent crop fields. We observed a weak trend of increased sparrow use in borders with taller vegetation and in borders with a modest amount of woody plant encroachment. Both taller vegetation and the presence of woody vegetation likely increased the availability of perching locations and provided better overhead canopy protection from predators while foraging on the ground.

Over the three-week trapping period in 2009, we captured 512 individual rodents, all of which were either cotton rats or house mice. Although species diversity was low, small mammal densities were extremely high in both the planted and fallow field borders, ranging from 13–57 cotton rats per acre and 67–87 house mice per acre, respectively. Cotton rat densities were nearly 5 times higher in NWSG/Flowers borders compared to fallow borders, likely because the presence of NWSGs provided a preferred food source and more suitable microhabitat conditions. Rodents were virtually absent from mowed borders.

We failed to capture a single cotton rat in the mowed borders, and house mice densities were approximately 8 times lower in mowed borders than in planted and fallow borders.

Borders planted in wildflowers for beneficial insects appear to be a viable option for maximizing the biodiversity potential of uncultivated field margins by providing habitat for both vertebrate and invertebrate wildlife. Additionally, the planted borders were brilliant with color in mid-June when all the flowers were in bloom. Given the beneficial insect habitats were aesthetically pleasing, they may be more acceptable to those producers who are leery of the traditional "weedy" field borders. However, beneficial insect habitats are expensive, and require additional time and input costs to ensure successful establishment. So, fallow borders may be a more cost-effective option for landowners for whom cost is a major concern.

Mowing eliminated habitat year round and reduced wintering sparrow and rodent abundance. By simply staying off the bush hog, landowners can greatly increase the amount of wildlife on their cultivated lands. Regardless of vegetation composition, landowners and managers should manage borders to maximize vegetation structure and diversity, and increase the amount of bare ground with low overhead cover to facillitate movements by birds such as bobwhite quail and sparrows.

BOMB-SNIFFING SQUIRRELS?

By John Wooding, Freelance Wildlife Biologist

We all know that beagles have good noses. So do bird dogs. And don't write-off a Lab because some have excellent noses—good enough to make a blood hound howl with jealousy.

What about squirrels? Do they have good sniffers? It turns out; squirrels are as tuned-into smells as the best dogs. Smells are a big part of a squirrel's world. You've seen squirrels search for buried acorns. They hop, sniff, hop, sniff; then they start digging with bulls eye precision for the buried acorn. They find it by smell. This is why you often see squirrels digging after a rain—wet dirt and moist air carries smells better than when conditions are dry.

Have you ever watched a squirrel chasing a mate? The first male may follow the female by sight, but the other males often trail the female using their noses. They run the limbs with their nose to the bark following her scent trail. They run full speed ahead without looking up. I've seen the males lose the trail at a fork in the branches, realize their error, return to the fork, and follow the right path after re-finding the trail.

Squirrels mark trees as a way of establishing their territories. The marks are chewed spots at the junction of the trunk and a limb (on the underside of the junction, and thus sheltered from rain). The squirrels chew the outer bark off the tree—maybe an area the size of a cell phone—and wipe their cheeks on the bare spot. Squirrel cheeks are loaded with scent glands. Some squirrels urinate on the bare spot. When other squirrels smell the marked spot, they know the territory is claimed, and just by the smell they probably know the individual squirrel that marked the spot.

I did a study on fox squirrels using radio transmitters, and males sometimes traveled over a mile to a female in breeding condition. I asked myself; "how did the males know?" I think they knew from smells carried by the wind. Nature is amazing.

You've probably seen squirrels wiping their cheeks on a branch and chasing each other with their noses to the trunk. Squirrels perceive the world as much with their noses as with their eyes and ears—maybe more so.

I don't know if you've thought about it, but a pack of squirrels would be a lot cheaper to feed than a pack of beagles. Could you train squirrels to chase rabbits? And would the rabbit run or just laugh? How about bomb sniffing squirrels? They would work for peanuts. That's something to think about.

TERRY SHANKLE/NCWRC

Squirrels are highly sensitive to smells and use their noses for communication and in many ways biologists don't fully understand.

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and other researchers as more focused research projects are designed and conducted to directly address other aspects of the decline.

Wild turkey biologists across the Southeast consider the Southeast Wild Turkey Decline a very serious issue. We have identified a potential time bomb with respect to management of turkey populations, and we want our constituents to know we are making great efforts to address the issue. However, research takes time, and patience is once again necessary. Luckily, our state's population of wild turkeys has not yet experienced the declining population and harvest trends observed in many other Southeastern states. With any luck, we can diffuse the time bomb before it goes off in North Carolina.

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