THE Upland GAZETTE

WILDLIFE CONSERVATION AND HABITAT MANAGEMENT

A Note from the Editor

REBECCA JONES

As I write this in July, it occurs to me that *Upland Gazette* readers will see these words just as fall hunting seasons begin in September. By then, North Carolina hunting will just be starting as the dog days of summer will be replaced by the frosts of my favorite season. Many of our readers will be preparing to hunt deer, ducks, small game, migratory birds and other species. Unfortunately, small game species like cottontail rabbits and bobwhite quail will not be pursued as often, with as much success, or by as many hunters this year as in past decades.

We know this because the steady decline of small game and small game hunters is something as certain as the setting sun. Sure, we have local examples of intensively managed areas where small game thrives, but their downward trend is widespread in at least 25 states. The decline is symptomatic of landscape changes that have impacted not only small game but a host of wildlife species, including some amphibians, reptiles, mammals and dozens of once common songbirds. In fact, species that require quality early successional habitats (grasses, forbs, weeds and early stages of plant succession needing disturbance) are among the most imperiled in the United States.

All of the stories in this issue address, directly or indirectly, the relationship between wildlife management and good habitat management. We highlight an Agency program devoted to the philosophy of keeping common species common and preventing species from becoming endangered. We also explore issues related to white-tailed deer and elk in the western part of the state, to Bachman's sparrows and bobwhite quail farther east, and cover a landowner's love of beagles in southeastern North Carolina.

Our stories feature many ways agencies and landowners are working to address these habitat issues, and this gives us hope of better days ahead. There is something in this issue for all of our readers, and I hope you get out and enjoy the great North Carolina outdoors this fall.

Marie D. Jones

Supervising Wildlife Biologist
Private Lands Wildlife Habitat Group

This wide field border, containing diverse native vegetation, demonstrates the type of early successional habitat so critical for bobwhites in agricultural landscapes.

ANDY RICHARDSON

The Quest to Return Bobwhites to Agricultural Landscapes

By Andy Richardson, graduate research assistant, and Chris Moorman, professor, Fisheries, Wildlife and Conservation Biology Program, North Carolina State University

It is no secret that Northern bobwhite quail populations have been declining for many years, likely as far back as the 1950s. The North American Breeding Bird Survey, a spring count of bird species taking place annually since 1966, reports bobwhite observations have declined by 85 percent since their first official count. The decline isn't just a problem in North Carolina, but across most of their range in the eastern United States.

There is no doubt that there are many issues affecting the decline of bobwhites, but the single largest contributor is habitat loss due to changes in land use. The grasslands and shrublands required by bobwhites for food and cover are created through disturbances to the landscape. Agricultural practices prior to the 1950s provided substantial bobwhite habitat, but habitat quality in these same landscapes declined drastically as management intensity increased.

The larger size of farm machinery allowed field sizes to grow ever larger and reduced the number of fencerows. Better fertilizers allowed poorer quality land to produce profitable crop yields instead of sitting fallow with weeds that bobwhites loved. Herbicides replaced cultivators to remove quail-friendly weedy fields. Additionally, suppression of fires allowed early successional plant communities to change from grasslands to shrublands to young forests, and now to closed-canopy mature forests.

These changes have greatly reduced the amount of grasses and forbs available for nesting and brood-rearing cover as well as the food those plants provide in the form of fruits, seeds and insect prey. To address these issues, North Carolina State University has collaborated with the North Carolina Wildlife Resources Commission (NCWRC) on numerous bobwhite studies over the years. The latest study attempted to determine how private working farms could be better managed to aid the conservation and recovery of bobwhites.

Landscape Matters

Our research took place on three private farms in Bladen and Duplin counties in North Carolina's southeastern Coastal Plain. One farm had participated in NCWRC's Corporate Cooperative Upland habitat Restoration and Enhancement (CURE) Program since 2008. This program allows NCWRC biologists to work with landowners to improve bobwhite habitat through the management of grassland patches, field borders and adjacent forests.

Field borders are strips (often 30 feet wide) of fallow vegetation along the edges of fields and drainage ditches and are managed for bobwhite cover. Two other farms, which had little summer bobwhite cover, served as representatives of the typical farm in the southeastern Coastal Plain and allowed us to make comparisons to CURE areas with intensive bobwhite habitat management. Over two years, we captured 241 wild bobwhites on the three farms and placed specially-designed radio transmitters on them, allowing us to track their movement, survival and nest success.

ANDY RICHARDSON

In poor quality habitats, quail are sometimes forced to nest in inhospitable cover such as under these fallen corn stalks. Nests in such poor cover are often subject to extreme heat and weather, destroyed by predators, and/or abandoned by adult quail.

Northern bobwhites rely on different vegetative communities during very distinct periods of the year. During winter, coveys of quail move into dense patches of shrubs and brambles. We observed individual quail using patches of gallberry, maleberry, chokeberry and blackberry for cover from predators and harsh weather. Conversely, during summer, bobwhites use field borders and patches of vegetation comprised of grasses (like bluestem and wiregrass) and forbs (like dogfennel and goldenrod) for nesting cover and protection from predators. The field borders also assisted bobwhites in safe movement across the landscape. We observed individuals traveling up to 2 ½ miles away from the location where they were captured within one summer, which likely aided in increasing populations surrounding the farm.

Predators are a common scapegoat when any game species begins to decline, and the case is no different for bobwhites. However, it is often overlooked that the bobwhite has adapted to being on the menu of so many predators. The Northern bobwhite is a short-lived species that can survive up to several years in the wild, but their average lifespan is only six to eight months even in healthy populations.

During our study, we observed over 80 percent mortality each year with no noticeable decline in total quail numbers the following year. We typically observed two peaks in mortalities between February and September. The first peak, which occurred during March, coincided with the height of spring migration for birds of prey. The second peak occurred during the height of nesting season in July and was likely due to several reasons, including the fact that adults with young, flightless broods are less capable of escaping predators.

Outside of those two peaks, we typically lost birds to mortality at a rate of three to five individuals per week. Bobwhites have adapted to deal with the constant onslaught from predators by replacing themselves quickly. They reach maturity the summer following hatching and, under the right conditions, are capable of nesting up to three times from May until the end of September. The nests in our study averaged 13 eggs per nest with 23 eggs being the greatest number found in one nest. Of the 71 nests we located, 31 were successful, producing 335 young.

Room to Grow

Field borders played a major role in increasing nesting opportunity and nest success during our research. The CURE program converted roughly 11 percent of farm property to bobwhite habitat on the improved farm, but 73 percent of nests were found in or adjacent to these improved areas, proving how valuable this limited habitat is to quail. Meanwhile, bobwhites on the two farms without CURE management rarely even attempted to construct nests because of a lack of proper cover. This was so extreme we even witnessed one desperate hen incubating a nest on the bare ground of a cornfield with only a corn leaf for cover. This lack of nesting cover resulted in nests hatching at a rate nearly half that of the farm with quality bobwhite habitat management. Although overall mortality rates were lower on the farms without CURE management, the low reproductive output greatly restricted the population from growing.

During our work with bobwhites, we have proved that good quality habitat can support healthy quail populations in spite of many other impediments, but we realize that we have to purposefully create habitat that once occurred as a result of normal land use. Fortunately, land conservation doesn't require setting aside large tracts. There are roughly 489 million acres of cropland in the eastern United States, and much of this could be used for both agriculture and habitat conservation through the creation of field borders.

Some of the greatest results in bobwhite recovery in North Carolina have occurred using field borders to provide habitat on working farms. With guidance from NCWRC technical assistance biologists, there are a number of ways the average landowner can help restore bobwhites to the landscape once again, and many of these changes will benefit other wildlife species as well.

If you own or manage land in North Carolina and wish to explore options for improving habitat management, please visit the Wildlife Commission's website ncwildlife.org/CURE.

Conserving Private Lands Aids Recovery of a North Carolina Native

By Justin McVey, regional wildlife biologist, North Carolina Wildlife Resources Commission

If you would have told me when I was in college that I would be a North Carolina elk biologist I would have laughed at you, and when I tell folks that part of my job is being the elk biologist for North Carolina, they don't believe me.

Western North Carolina is now home to about 150 elk, and part of my responsibility with the North Carolina Wildlife Resources Commission (NCWRC) involves working to manage these elk. North Carolina was once home to the Eastern elk subspecies *(Cervus elaphus canadensis)*, but by the late 1700s, unregulated hunting and habitat loss resulted in elk being absent from the state. This changed in 2001 when the National Park Service released 52 elk of the Manitoban subspecies *(Cervus elaphus manitobensis)* in Great Smoky Mountain National Park. Now, the NCWRC is responsible for elk management on public and private lands outside of the park with a management goal of maintaining a sustainable and huntable elk herd. While there are numerous hurdles to overcome, perhaps the largest and most important challenge is providing quality elk habitat that is accessible to the public and not in conflict with private landowners' desired use of their property.

Western North Carolina is home to more than 1 million acres of U.S. Forest Service lands. However, less than 1 percent of these public lands provides the early successional habitat that elk require. Early successional habitat is simply land that has few trees and is comprised of grasses, legumes, wildflowers, vines and saplings. While pastures, hay fields and agriculture lands are considered early successional, these types of land aren't considered quality wildlife habitat. Furthermore, elk are intermediate feeders, meaning they graze on grasses, forbs and shrubs. Any of these three types of plants can make up a significant proportion of an elk's diet depending on the season, but quality early successional habitat provides all of these dietary components year-round.

JUSTIN MCVEY/NCWRC

Commission biologists have placed radio-collars on elk in western North Carolina in order to learn about the animals' movements between the Great Smoky Mountains National Park and adjacent private lands.

Lining the mountain valleys, private lands provide a great deal of early successional lands mostly in the forms pastures, hay fields and clear cuts. There is food here, and where there is food, there are elk! About half of the 150 elk in western North Carolina reside permanently or part-time on these private lands. For the wildlife enthusiast, elk on the landscape is a wonderful thing. However, not everyone shares this opinion. Elk sometimes venture to places where they are not wanted and have been known to eat corn, yard flowers and an entire backyard garden. So, that dynamic raises a question: Can we achieve the goal of having a sustainable, huntable population of elk while minimizing negative human-elk interactions? Hopefully the answer is yes and can be accomplished with land and habitat management and conservation.

More Room for Elk to Roam

As part of a strategy to address the habitat needs of elk, the NCWRC has partnered with the Rocky Mountain Elk Foundation and The Conservation Fund to acquire 2,408 acres of land adjoining Great Smoky Mountain National Park. The goal is for this property to be transferred to the NCWRC's Game Lands Program and then be actively managed to benefit elk, small game, wild turkey and other species that benefit from early successional habitat. Not only will this land acquisition provide quality elk habitat, but it will also serve to improve water quality for the Jonathan Creek watershed and the headwaters of the Pigeon and French Broad rivers.

In concert with the acquisition of state-owned lands, NCWRC and the U.S. Forest Service are also cooperating on several projects to provide early successional habitat on federally owned land within the 220,000 acres designated as elk range. Management of the new lands and projects within U.S. Forest Service boundaries will include an array of habitat and forest management techniques. To enhance forage conditions, the agencies will use prescribed burning rotations across the landscape to improve the amount of forage and its dietary quality.

In addition, well-designed timber harvests will reduce the forest overstory canopy to increase sunlight on the ground and the subsequent understory forage production to ensure a properly managed forest for western North Carolina. Providing a mosaic of habitats from early successional, to old growth, to oak savannahs will not only greatly increase the quality of elk habitat but will also provide the type of habitat diversity that is beneficial for a wide range of species from ruffed grouse to golden-winged warblers.

The elk story in western North Carolina is a long way from completion. However, through careful planning and cooperation with landowners and agencies, we are hopeful elk are destined to be a part of western North Carolina's landscape for a long time to come. Having large tracts of state-owned land where appropriate management can be accomplished coupled with enhanced management efforts on U.S. Forest Service lands will ensure that the hills of western North Carolina. will echo with the bugle of the bull elk for centuries to come.

MELISSA McGAW/NCWRC

Elk require extensive areas of early successional habitat which are lacking in most areas of western North Carolina. The excellent habitat on the hillside above has been managed by a private landowner using prescribed fire and herbicides to control woody competition. The field below contains a mix of native grasses, forbs and wildflowers that are critical for elk and many other species in our state.

MELISSA McGAW/NCWRC

Sparrows in Peril: Conserving the Bachman's Sparrow at a Landscape-scale

By Jay Winiarski, graduate student, and Chris Moorman, professor, Fisheries, Wildlife, and Conservation Biology Program, North Carolina State University

John Carpenter, wildlife biologist, North Carolina Wildlife Resources Commission

As the sun rises over the horizon on an early April morning, rays of light pass through the open canopy in a longleaf pine forest in southeastern North Carolina, illuminating one of the most species-rich plant communities outside of the Tropics. Perched on a branch above this diverse groundcover layer is a drab brown bird singing a beautiful, clear whistle followed by a short trill. It then takes a short flight down to the ground, where it remains hidden for most of the day. By late April, this male and its mate will be tending to a camouflaged ground nest that few people have ever seen.

This is the Bachman's sparrow, one of the most uncommon birds in North Carolina. A small and elusive bird, Bachman's sparrows spend most of their time running on the ground rather than flying. It is in this groundcover layer that Bachman's sparrows thrive, but only when conditions are just right: open forest overstory canopy, dense groundcover of grasses and forbs, and low shrubs. These vegetation characteristics occur primarily in longleaf pine woodlands that are maintained by frequent, low-intensity fires. Therefore, Bachman's sparrows are considered to be important indicators of the health of this very diverse ecosystem and the organisms residing within it.

Like most longleaf pine-dependent species, Bachman's sparrows have declined substantially throughout their range over the last several decades, and loss and degradation of longleaf pine forests appear to be contributing factors. Longleaf pine woodlands are one of the most highly imperiled ecosystems in the United States, and less than 5 percent of the original 60 to 90 million acres remains. These stands are often found in small and isolated forest patches. Consequently, the Bachman's sparrow population has declined by more than 3 percent per year across its range since the 1960s, and it has been listed as a species of conservation concern in every state in which it breeds.

Details on Bachman's sparrow ecology and life history are lacking because of its enigmatic nature. While some information exists from the core of the sparrow's range (such as Georgia and Florida), little is known for populations at the northern periphery of the range, including North Carolina. This is particularly troubling given that some of the steepest declines are occurring at the northern range limits.

Once common in Virginia, Bachman's sparrows are now extirpated from that state, putting North Carolina as the current northern range limit along the East Coast. In addition, surprisingly few studies have looked directly at the effects of habitat fragmentation on Bachman's sparrows. Recent research from North Carolina State University (NCSU) showed that Bachman's sparrows in North Carolina are unlikely to occur in landscapes with less than 10 percent quality habitat in the surrounding landscape. However, the reasons for the low occurrence in the highly fragmented landscapes are not known. Is habitat fragmentation negatively impacting the ability of Bachman's sparrows to attract a mate and fledge offspring? In 2014, NCSU and the North Carolina Wildlife Resources Commission initiated a two-year study to answer this question.

Study Design and Data Collection

We focused our work at eight sites across the southeastern Coastal Plain that varied in the degree of habitat fragmentation in the surrounding landscape. We lured adult male Bachman's sparrows into fine mesh nets by playing recorded Bachman's sparrow vocalizations that trick a male into thinking that an intruder has infringed upon its territory. Upon capture, we took a series of measurements and fitted individuals with a combination of three colored leg bands and a

JAY WINIARSKI

uniquely numbered aluminum band. These leg band combinations allowed us to visually identify individual sparrows from afar using binoculars without impacting a bird's routine activities.

To determine each male's reproductive success over the course of a breeding season, we visited its territory for one hour each week from mid-April to the end of July. During these territory visits, we recorded behaviors that indicated whether a male was paired (a female in close proximity to a male, mate-guarding or copulation), had a nest in its territory (parents carrying nest material or food to feed nestlings) or fledged young (direct observation of fledglings).

Bachman's sparrows can produce as many as three broods per season, so we also recorded the number of broods that were raised. When actual nests were located, they were checked every few days to determine whether or not they were successful or had been depredated or lost to weather or fire. At the end of each season, we were able to determine if it fledged young. We tested if several variables, including habitat amount in the surrounding landscape, affected reproductive success for Bachman's sparrows.

What Did We Learn?

We monitored 96 male sparrow territories during 2014 and 2015. Overall, approximately 70 percent of males were paired, and 76 percent of these paired males successfully fledged offspring. The amount of habitat within the 3 kilometers surrounding the territory was most influential on a male's ability to attract a mate as males residing in highly isolated longleaf pine patches were less likely to pair than males in landscapes with more continuous habitat. In contrast, there was no relationship between landscape characteristics and a male's success fledging young or the total number of broods that were raised.

Although Bachman's sparrow nests are notoriously difficult to find, we managed to locate 47 nests; one of the largest samples yet collected for this species. Nests had a 35 percent overall probability of surviving during the incubation and nestling periods.

JAY WINIARSKI

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Predation was the main source of nest failures, with 15 nests destroyed. Prescribed fire destroyed only 4 percent of nests. Nest survival rates were not affected by the amount of habitat in the surrounding landscape.

What Does It Mean?

Low pairing success (ability to attract a mate) is limiting the reproductive success of males in highly fragmented landscapes and likely is partly responsible for Bachman's sparrow population declines. This pattern has been shown for a number of other bird species, and two explanations have been proposed. First, females may avoid isolated habitat because they recognize these areas as being lower quality, therefore containing lower quality males. Second, females, which are more likely to disperse than male sparrows, may be unable to find mates because movement between patches is impeded in highly fragmented landscapes.

Our study accounted for measures of both habitat and male quality in our analyses, but we found no effect for these factors. This suggests that the females may simply be unable to find male mates (the second hypothesis above), but more research is needed to understand Bachman's sparrow dispersal patterns.

The most effective strategy to reverse the impact of habitat fragmentation would be to increase the amount and quality of habitat near large longleaf pine patches that now mainly occur on public lands, like Holly Shelter Game Land. Much of this habitat management will benefit a host of species, including other high-priority songbirds, amphibians and even game species like bobwhite quail.

The participation of private landowners next to public lands will be critical for the recovery of Bachman's sparrows and other wildlife. While many of this species' secrets remain unknown and warrant further research, our work is an important step forward in the conservation of this important but overlooked bird and many other species that share its realm.

Natural Partnership: Several Agencies Come Together to Boost Deer Population in Western North Carolina

By Dr. Maria Palamar, wildlife veterinarian, North Carolina Wildlife Resources Commission

Deer have been part of North Carolina and important to its people since before Europeans arrived here in the 16th century. The Cherokee, like many other Native American groups in North America, lived with deer for thousands of years and depended on them for food and shelter. Deer were part of the Cherokee culture, and like other native species, were regarded with respect and appreciation.

Colonization, and with it an increase in human population size, took a toll on deer numbers in our state and added to habitat fragmentation, over hunting, and habitat degradation. Eventually, deer became scarce in North Carolina. In fact, many North Carolinians over 50 years old can remember never seeing deer as children. Some can even remember the "first deer track" on the family farm, as deer numbers started to rebound following the repopulation efforts and protective harvest regulations implemented by the North Carolina Wildlife Resources Commission (NCWRC).

For some of us who see deer every day on our way to work, imagining a North Carolina without deer is impossible. Yet there are still parts of the state where deer numbers have not recovered. The most western part of our state, home to the Eastern Band of the Cherokee Indians (EBCI), is one of those areas. However, a successful collaboration is trying to bring deer back to western North Carolina and to the people who live there.

United for a Cause

In 2013, EBCI biologists, NCWRC, and North Carolina State Parks staff started evaluating options for increasing the number of deer in the most western part of North Carolina. National Park Service biologists joined the group because of their experience with animal relocation and because of the close proximity of tribal lands to Smoky Mountain National Park. After adding North Carolina Department of Agriculture staff, a diverse team composed of five different agencies embarked on an adventure that would lead to close partnerships, exploring ideas, breaching differences and ultimately creating long-lasting friendships.

EBCI biologists knew they needed two things to increase the number of deer in western North Carolina: better deer habitat and more deer. They had started improving their deer habitat before this relocation and they continued to do so for the duration of the project. This habitat transformation was critical to making the relocation of deer successful, simply because it would not have made sense to place deer in poor quality habitats.

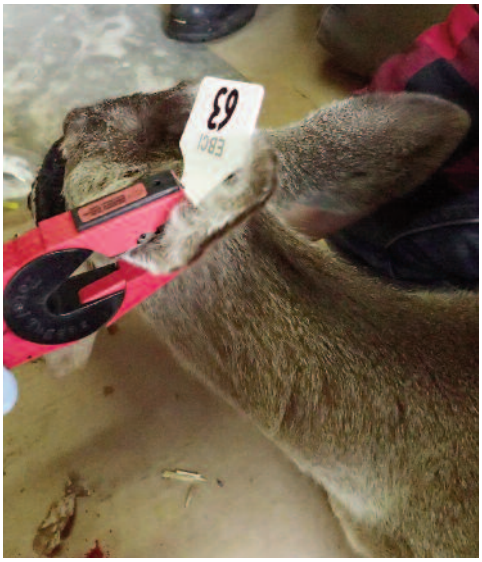
Translocating deer would require careful planning and strong partnerships. Long hours of research and communication were needed to decide where to obtain the animals, how many animals would be moved, how to capture and process them, what type of tests were to be performed and how to follow-up with the deer once they were released in their new habitat. There were many challenges, including institutional barriers due to the diverse policies of each of the agencies, equipment malfunctions and the inherent risks associated with moving wildlife.

Wildlife translocations can have low success rates because wild animals generally do not deal well with the stress of capture, processing and transport. We knew there would be some mortality associated with the project, so we extensively researched our options and kept detailed records in order to learn from our experience.

We decided to take deer from Morrow Mountain State Park in Stanly County. Deer there were causing problems due to overbrowsing and showing early signs of nutritional stress associated with high densities. Some of the animals were changing their behavior, showing lack of natural fear of humans and searching for food to eat close to campsites. We aimed to move 50 deer per year for three years, and the trapping was

done during the winter to reduce heat stress to animals and minimize risk to park visitors.

Deer were processed as quickly as possible, fitted with transmitter collars, sampled for diseases of importance, and transported in individual, custom-made boxes to a soft-release enclosure on EBCI lands. While in the enclosure, the deer were monitored for three to four weeks before being released into the wild. After release, the animals were monitored in an effort to better understand the behavior of translocated deer and the future challenges and opportunities associated with these type of efforts.



MARIA PALAMAR/NCWRC

Commission biologists mark deer with identifying ear tags and take blood samples to be used to determine the health of the animals.

Going West

During the winters of 2014, 2015 and 2016, biologists, veterinarians and rangers from the various agencies spent several weeks at Morrow Mountain State Park and captured and translocated 144 deer. During those days, we had to continuously recalibrate our methods in response to our field observations in an effort to make the process more efficient and successful. Those long days in the field allowed us to better understand the way each of our agencies work and put a name and a face to the people who care about our natural resources as much as we do.

These people often have different goals, opportunities and constraints when doing their job. We were able to see a part of the building blocks of each agency (the people who make them) that we would not have been able to see during a 45-minute meeting at the office. We all believed in doing things to the best of our ability, we voiced our opinions and respected others while still moving forward. We explored (and sometimes failed) novel ideas and methodologies. But we also had fun spending cold days outdoors, working with the animals that we got into this profession to conserve and connecting with other professionals who shared our passion and respect for the natural resources that we are tasked to protect.

After three capture seasons, the first part of the project is completed, and we are developing a comprehensive report of what we have done and learned. The EBCI biologists are still monitoring the deer released on their land and recording movement, behavior, reproductive output and mortality data. The deer at Morrow Mountain will be evaluated in a couple of years to assess nutritional and behavioral stress now that population numbers have been slightly reduced. So far, the behavior of the Morrow Mountain deer has changed dramatically with noticeably fewer deer approaching vehicles and campers in the park; a very positive change.

Due in part to the trust built during the project, we have embarked on new ventures with State and National Parks and the EBCI, allowing us to strengthen our collective impact on natural resources management with the common goal of conservation and protection.

It is with some nostalgia that I write about this project and the people who worked so hard to make it happen. I hold hope of finding myself collaborating with them or their staff again soon. It is important to remember that wildlife does not acknowledge our political boundaries and institutional missions, thus effective conservation is critically tied to agencies and the public working together to meet shared goals.

I can't wait to learn more, to share my knowledge and to continue to feel that I got into the right profession with the right people. Relationships are what make conservation happen. One person or agency cannot do it alone, and this project has been just another example of the power of passionate people with a common purpose working toward a common goal.

"Relationships are what make conservation happen."

CONSERVATION CHRONICLES

Native Son Raises Music Makers in Columbus County

By John Henry Harrelson, technical assistance biologist, North Carolina Wildlife Resources Commission

MELISSA McGAW/NCWRC

The harmony of sounds produced by a tuned-up, experienced pack of beagles running a hot rabbit track could easily be classified as one of the most beautiful sounds known to a small-game hunter. Nothing is more true to Joe Simmons, a Columbus County landowner, farmer, dog trainer and rabbit enthusiast.

Training dogs, especially beagles, has been a lifelong passion for Simmons. He was born and raised in the house that still stands on his family's 122-acre farm, grew tobacco with his dad and aunts on a minuscule tobacco allotment in small fields they cleared, and left home when he was 18 to chase a dream of becoming a professional stock car driver. By that time, Simmons had taken a single beagle puppy, given to him at age 9 by his neighbor Claude Hardy, and turned it into a pack of great rabbit dogs.

However, as we all know, life happens, and we have to adjust and alter course. Simmons' childhood farm was sold, children were born and raised, stock car races were won and lost, but his love for raising beagles and chasing rabbits never faded. Simmons was finally able to reacquire the 122-acre farm in 1987, and he set out to make the best habitat possible for rabbits.

Similar to landowners throughout the South, Simmons had seen a decline of bobwhite quail and rabbits on the farm since his childhood days. Long gone were hedgerows with multiple quail coveys and a plethora of rabbits along with fallow fields and great days of hunting. Instead, the fallow fields had grown over into thick unmanaged pine stands. No sunlight reaching the ground meant no understory cover, resulting in low food availability as well as no cover. And those hedgerows had long ago been cleared, eliminating travel corridors, escape cover and food resources.

A Rabbit Sanctuary Takes Shape

Slowly but surely, Simmons has turned his piece of ground back into great habitat for rabbits. He enrolled seven of his nine farm fields into the Conservation Reserve Program (CRP) through the Farm Service Agency (FSA) in 1999. He installed 90- to 120-foot habitat buffers around his small field edges, giving him 12 acres of native fallow vegetation from 22 acres of fields. These buffers provide great early successional habitat for rabbits, as well as songbirds, quail, small mammals, turkeys and deer.

The remaining portions of the fields have been planted with corn or soybeans, or allowed to go fallow through the years. In addition, Simmons began building a 10.5-acre rabbit pen that same year. Through permission from the FSA, Simmons was able to fence in a portion of the new CRP habitat buffers along with a portion of woods and older fallow fields that were not in CRP.

Simmons followed his management plan by disking one-third of his borders every year and spot spraying with herbicide occasionally.

John Henry Harrelson discusses management options for Joe Simmons to implement on his Columbus County Farm.

MELISSA McGAW/NCWRC

MELISSA McGAW/NCWRC

However, as most habitat managers know, two or three passes with the disk every three years is not enough to keep sweetgums, red maples and loblolly pines in control. These light-seeded species tend to colonize fresh ground rather quickly and provide little food and cover for wildlife while shading-out and out-competing other beneficial species. Simmons decided to be a little more aggressive with his disking, so he moved his rotation up to half of the buffers every year. He still has a never-ending battle with unwanted and undesirable species in all borders, but regular disturbance has kept them in check.

Simmons just recently signed up for a new CRP contract, reenrolling all his buffers into CP33 (habitat buffers for upland game birds). The habitat is exceptional in these buffers and in other similarly managed areas. Large patches of blackberries and thick stands of little bluestem and broomstraw make up the majority of the taller species in the buffers, with partridge pea, ragweed, pokeweed, mare's tail, dog fennel and other forbs and native grasses making regular appearances in the buffers as well. Regular disturbance through disking and yearly maintenance has paid off for Simmons, his habitat, the beagles and wildlife.

Management is now planned for beyond the fields as well. The small woodlots between fields and along multiple streams have long been neglected. Most of these consist of overstocked loblolly pine stands which are now scheduled to be thinned in the near future. In addition, Simmons plans to reintroduce prescribed fire into all his woodlots including the bottomland hardwoods that are scattered across the property. These added management practices can only help increase the amount of cover, food, travel corridors, nest sites, and bugging areas.

Multiple coveys of quail now call the farm home, along with an extraordinary amount of rabbits in and outside the pen. Simmons doesn't harvest rabbits anymore because he really just likes to hear his dogs work the track and sing their songs. He likes to see his puppies progress and become champions, and Simmons has been rather successful using habitat management to reach these goals.

Over the first 15-year contract of CRP, and the first 15 years of the rabbit pen, Simmons has raised countless litters of beagle puppies. He has lost track of the number of field trial champions that have been raised and started training in his rabbit pen. He has also lost track of the number of hours of enjoyment, comradery and fellowship his farm has given him. Now, his granddaughter has taken an interest in the farm, in beagles and in rabbit hunting. Hopefully, she will enjoy the beagle music for as long as Simmons has on this special place.

Wildlife Diversity Program Continues Mission To Keep Species Off of Endangered Lists

By Kendrick Weeks, western wildlife diversity coordinator, North Carolina Wildlife Resources Commission

The Wildlife Diversity Program functions to keep common species common and prevent species from becoming endangered by monitoring and managing Species of Greatest Conservation Need (SGCN) and their habitats. North Carolina's State Wildlife Action Plan provides the direction for this work and was recently revised with the most up-to-date information regarding mammals, birds, reptiles, amphibians, fish, mussels and snails (ncwildlife.org/Plan).

SGCN was determined through an objective process, with input from experts who evaluated each species occurring in the state using criteria such as population size, population trends, distribution and threats to the species and its habitat. The process identified the best existing science available to assist in making sound management and policy decisions. It also pinpointed additional scientific information needed to improve management.

The Wildlife Diversity Program has grown from the early days of just a couple of Commission employees to now include 25 permanent biologists and a dozen temporary technicians across two divisions of the agency: Wildlife Management and Inland Fisheries. Each biologist coordinates and conducts surveys, monitoring, research, management and outreach on a subset of the over 1,000 non-game species that call North Carolina home. A critical component of these activities is collaborating with internal and external partners to multiply the effect of conservation actions, whether it be technical guidance for landowners, management of public lands, surveys, monitoring or research.

SGCN can change over time, so wildlife diversity biologists are flexible and adapt to current needs. However, they often focus on a species or group of similar species for which they have the most expertise. Let's take a quick look at some of these animals, the biologists who work with them and some projects currently underway.

REPTILES AND AMPHIBIANS

(Jeff Hall, Dr. Jeff Humphries, Gabrielle Graeter and Lori Williams)

Jeff Hall coordinates the North Carolina Partners in Amphibian and Reptile Conservation (NCPARC), which is a collaboration of citizens from all walks of life (professionals and laymen alike) who work together to advance conservation. He collaborates with Dr. Jeff Humphries and others in the eastern half of the state on gopher frog surveys, monitoring, research and management.

The gopher frog now has a much greater potential for population increases because of the information gained, including radio-tracking individual frogs from their breeding ponds to their upland refugia, finding and restoring breeding ponds that have grown thick with shrubs and trees from lack of management, and augmenting populations with juveniles grown in captivity in cooperation with the Fort Fisher Aquarium. Hall also works with Gabrielle Graeter, who coordinates bog turtle conservation efforts in the western part of the state, to implement surveys, monitoring, research and habitat management. This species also requires extensive management of its wetland habitat so that trees and shrubs do not create too much shade or dry out its boggy habitat.

It is also important to protect habitats that provide water to the wetland. Important partners in this work include Project Bog Turtle, a group of bog turtle experts from across the state, and the Bog Learning Network, which includes other bog conservationists such as native plant conservationists. Lori Williams coordinates conservation efforts on amphibians in the western half of the state, especially in the Appalachian Mountains where more species of salamanders are found than anywhere in the world. Her collaborations with Warren Wilson College, The University of North Carolina Asheville and others have led to an understanding of green salamander ecology unparalleled in the species' range. For example, research has shown that dormant season prescribed fire has little effect on green salamander populations, and the Hickory Nut Gorge populations have been separated genetically from the Blue Ridge populations of green salamander for millions of years.

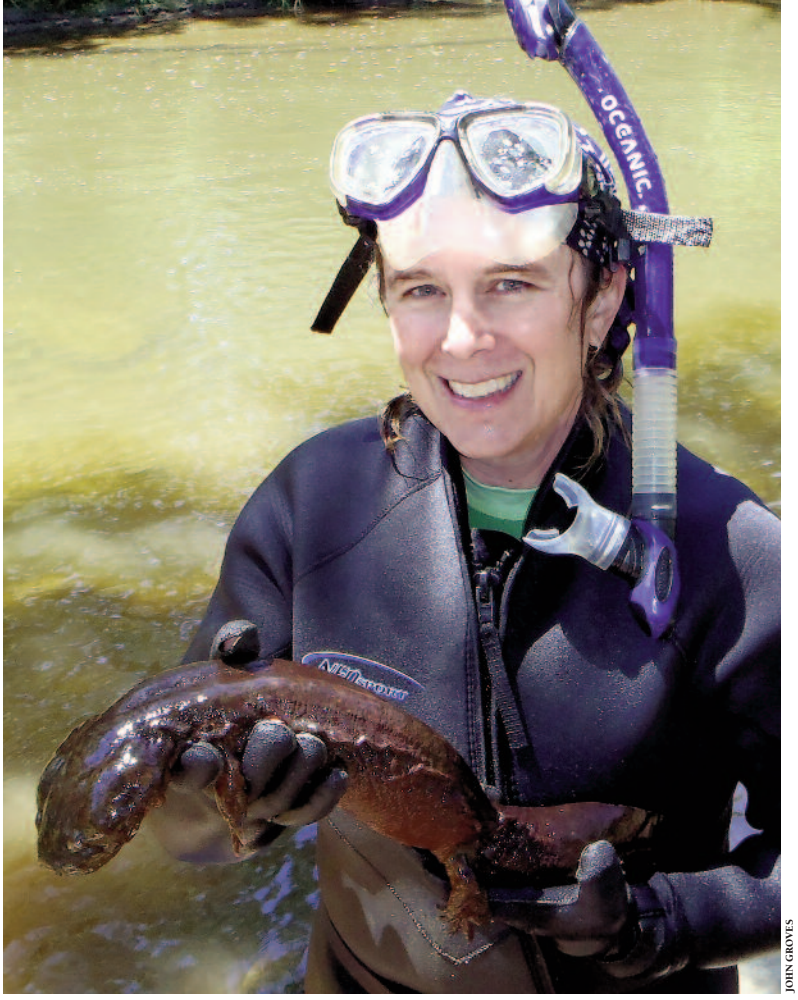
SEA TURTLES

(Dr. Matthew Godfrey and Sarah Finn)

Sea turtle biologists coordinate the North Carolina Stranding and Salvage Network, which responds to stranded sea turtles throughout the year, and the North Carolina Sea Turtle Monitoring and Protection Project, which collects data on incubating sea turtle eggs found on North Carolina beaches during the nesting and hatching season.

Our agency works closely with the U.S. Coast Guard, National Park Service, National Marine Fisheries Service, U.S. Fish and Wildlife Service, NCSU College of Veterinary Medicine, N.C. Aquariums and Sea Turtle Assistance and Rehabilitation Center, volunteers from the Northern Outer Banks Endangered Sea Turtle Network, the Karen Beasley Sea Turtle Rescue and Rehabilitation Center and many others. Due to the work of all these partners, mortality from mass strandings is significantly reduced and endangered

TRISH MILLER



JOHN GROVES

Above: Wildlife Diversity Biologist Chris Kelly prepares to release a golden eagle fitted with a GPS transmitter in Mitchell County. The transmitter will provide information about winter and migratory habitat use. Right: Wildlife Diversity Biologist Lori Williams holds the heaviest and second-longest Eastern hellbender (*Cryptobranchus alleganiensis*) on record for North Carolina (Alleghany County).

sea turtle nesting is increasing in North Carolina and all along the eastern seaboard.

FISH, MUSSELS AND SNAILS

(Steve Fraley, T.R. Russ, Dave Stagliano, Tyler Black, Tom Fox, Ryan Heise, Brenna Jones and Michael Perkins)

Aquatic biologists throughout four ecoregions—Coastal Plain, Piedmont, Foothills and Mountains—coordinate and conduct surveys, monitoring, and research throughout the state's river basins each year for fish, mussels and snails. They also implement augmentation or stocking projects to increase populations of rare fish and mussels.

The most recent augmentation projects include Carolina heelsplitters in Union County, Tar River spinymussels in the Tar River Basin, robust redhorse in the Pee Dee River and the Cape Fear shiner in the Rocky River. Collaboration with hatchery staff and other Inland Fisheries Division staff, universities like North Carolina State University, and other agencies and organizations is critical to successful augmentation projects. Follow-up monitoring is providing information to evaluate management efforts and identify challenges in order to adapt projects and ensure successful species recovery.

BIRDS

(Scott Anderson, Dr. Sara Schweitzer, John Carpenter, Allison Medford and Chris Kelly)

Scott Anderson coordinates North Carolina Partners in Flight and the North Carolina Birding Trail while also coordinating and conducting bird conservation activities statewide, such as the Riparian Breeding Bird Survey. Waterbirds are the most numerous group of birds in the SGCN category and include wading birds like ibis, egrets and herons, and shorebirds like terns, plovers and sandpipers.

Dr. Sara Schweitzer coordinates and conducts surveys, monitoring, research and management on these iconic species that nest on beaches and islands along the coast and other areas throughout the state. The threats to their populations are many, varied, and require extensive collaboration with other agencies and organizations to collect the information required for effective actions to conserve them. Land bird SGCN are also numerous and occupy a much larger portion of the state.

John Carpenter, Allison Medford and Chris Kelly focus their efforts in the Coastal Plain, Piedmont and Mountains, respectively. Current projects include color-banding golden-winged warblers to determine return rates, coordinating the Safe Harbor Program for private lands conservation of endangered red-cockaded woodpeckers, and surveying and monitoring SGCN such as peregrine falcon nests, loggerhead shrike, Northern saw-whet owl and bald eagle nests.

MAMMALS

(Brandon Sherrill, Katherine Caldwell, Allison Medford and Chris Kelly)

Brandon Sherrill has responsibilities for both small-sized nongame and game mammals. The non-game mammal group includes many of the state's species of insectivores (shrews and moles), bats and rodents (mice, voles and flying squirrels). Katherine Caldwell is the statewide mammologist that focuses primarily on coordinating and conducting surveys, monitoring, research and management on bats and their habitats.

With the threat of white-nose syndrome, a fungus deadly to certain hibernating bats, these activities have increased in importance since a decade ago when the first bat mortalities were documented in a cave in New York. The disease was first documented in North

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Carolina in 2011, and after significant declines in Northern long-eared, little brown and tri-colored bats, mortality appears to have leveled off and populations are approximately 5 to 10 percent of their levels five years ago. Some species are not affected as much and others not at all. Allison Medford focuses her work in the Piedmont to survey and monitor bird and mammal populations. Chris Kelly's expertise also spans birds and mammals, and she coordinates and conducts surveys, monitoring, research and management for the endangered Carolina Northern flying squirrel as well as some of the birds mentioned earlier.

COORDINATORS AND SUPERVISORS
(Allen Boynton, Todd Ewing, David Allen and Kendrick Weeks)

Allen Boynton and Todd Ewing are coordinators of the wildlife diversity program statewide for the Wildlife Management division and Inland Fiisheries division, respectively. Their work connects activities at the field level with the agency's commissioners and executive staff as well as conservation groups that are regional collaborators. David Allen and Kendrick Weeks manage the administrative work and provide overall support and direction for field activities in the eastern and western halves of the state, respectively.

As these profiles have shown, the Wildlife Diversity Program is quite varied and works to conserve hundreds of species across North Carolina. Their work is critical to ensuring the future of many rare and declining species for future generations to enjoy. You can learn more and keep up with wildlife diversity conservation by accessing quarterly activity reports at: ncwildlife.org/Conserving/.

Devoted *Upland Gazette* readers can still access each issue at

ncwildlife.org/UplandGazette

Issues from 1996 through spring 2016 have been posted on the site, and we plan to continue posting issues in the future. While visiting the website, be sure to sign up for e-mail notices to be sent to you each time a new issue is available.

THE Upland GAZETTE

The Upland Gazette is published twice a year by the N.C. Wildlife Resources Commission, Division of Wildlife Management.

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