

the Upland GAZETTE



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North Carolina Small Game Notes

Disappearing Acts

Slow Habitat Changes are Hard to See

Seeing slow changes over time is not easy—particularly when those changes involve wildlife habitat. Our failure to perceive change is magnified when our immediate surroundings change slowly or on a larger scale. For example, if you plant a tree by your back door and pass by the tree each day when you come home from work, the tree always looks about the same as it did the day before. But if you move to a different house and happen to return 10 years later, it's amazing how much the tree has grown.

Think back to when you were young and watched the minute hand of the clock on the classroom wall. Every day you waited during the last 15 minutes of class for the bell to ring so you could go home and play. You never took your eyes off that minute hand, and you knew it was a quarter till three when you started watching it—but you could never see it move. Suddenly the bell rang, everyone rushed out the door and those last 15 minutes were forgotten.

Several years ago, conversations with three of my elderly Wilkes County



Excellent small game habitat was once a by-product of normal land-management activities, but today's landscape has changed dramatically. (Photo courtesy of North Carolina Collection, UNC-CH)

neighbors made me vividly aware of our limited ability to notice and acknowledge slow, long-term changes in wildlife habitat. These gentlemen have since passed away, but I can still remember and share those conversations.

Let's start with Paul, a retiree from the U.S. Postal Service. Paul lived across the road in a nice brick house on the farm where he was raised. The chimneys of his old home place are still standing in the back pasture of the

property. Paul and I occasionally spent an evening sitting on his porch talking, mostly about the weather, people who had recently died, or new folks that had moved into the area. He would always get around to asking me about the deer and what I had been working on at my place. Then one day he asked me about quail.

"What happened to all the quail?" he asked.

I looked from the porch across the landscape at the forest stands and fescue pastures and gave him as honest an answer as I could, "There's just no place left for a quail to be." Then I proceeded to give my standard sermon on quail habitat.

Paul looked at me with a vacant stare, glanced around at the same scenery and quickly informed me that there was once lots of quail, and rabbits too. As far as he could see nothing had changed. "Everything still looks pretty much the same as it always has."

"So all these green pastures have always been here?" I asked. "There were never any grown up fields or areas covered in broom straw and

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Those of us who comprehend the impact of these slow, long-term changes are well aware of the final consequences.

blackberries, back before the chicken houses and cattle business showed up?"

He thought a minute and then stretched out his hand and waved it across the horizon as he told me that I wouldn't believe all the blackberries that used to be there. "I remember so many blackberries that every year a man would come up from Wilkesboro with a big truck, and he loaded it down with 55-gallon drums full of blackberries to take back to town to make jelly."

I waited a few minutes then looked at Paul and asked, "It really hasn't always looked like this has it?" He studied the view from the porch again and said, "No, I reckon not."

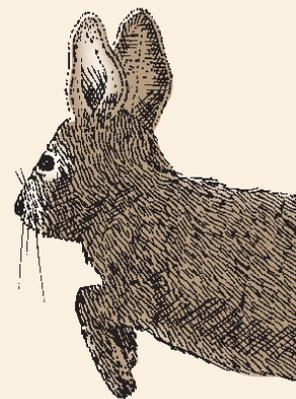
Paul lived on that farm his entire life but never really took notice of the major changes in the landscape as they occurred around him; likely because the changes were so gradual that when he came home from work each day everything looked about the same as it did the day before.

Then there was Paul's brother, Irvin. Irvin lived in a mobile home on my side of the road. Unlike Paul, he moved up north to find work and returned home after he retired. As with Paul, I sat on Irvin's porch every now and then, talking with him while he chain-smoked cigarettes. Irvin's stare always seemed fixed on the chimneys standing alone in the distant pasture across the road—the chimneys of the house where he and Paul had grown up. I always wondered what he was thinking about, but I never asked. While Paul had always asked me about deer, Irvin was most concerned about rabbits. "What happened to all the rabbits?" he would ask. "They used to come out in my yard and run around and play while I was sittin' out here on the porch." I would give Irvin my standard sermon on rabbit habitat, but as with his brother Paul, I couldn't convince him. One day I realized that the answer to Irvin's question was linked to a much more recent point in time than his brother's question about quail. The answer was right there the whole time, and it was the same answer. Irvin hadn't noticed things slowly changing, and he couldn't know and wouldn't believe that those slow changes were the reason his rabbits had disappeared.

My property was directly behind Irvin's trailer and was clear-cut in the mid to late 1970s. For at least 10 years after the timber harvest, there was 60 acres of early successional habitat within 20 yards of Irvin's back door. Combined with the lush grass in his yard and the adjoining five-acre orchard grass hay field, Irvin had been surrounded by perfect rabbit habitat. But Irvin never saw the trees growing in the clearcut and never connected that slow almost unnoticeable change with the disappearance of his rabbits. When the school bell rang, Irvin had never seen the minute hand move and had completely forgotten the last 15 minutes.

Finally, there was Ralph. Ralph lived in the old log house on the farm immediately west of me. Ralph always wore overalls and dipped old timey dental snuff. He looked like the last real man who lived completely off the land; maybe he was. Like Paul, Ralph lived in this valley his whole life. When you went over to Ralph's, he was always working outside. He might be hoeing the garden, snapping beans, cracking walnuts, or splitting wood, but he was always doing something that connected his existence to the land. His wife cooked on a wood stove, and when they went to town for a few supplies they drove a 1950 Chevrolet pickup that Ralph had driven since he purchased it new. I got behind him on the road a couple of times and I'm confident the top speed of that vehicle was 35 mph.

One day I dropped by to see Ralph and he was hoeing in the garden. He mentioned that his son David was planting some places for the "partridges" (what many of the older folks around the mountains call quail). I asked Ralph if there were ever many quail around here. He said, "There were so many that every year two doctors would come all the way up here from Winston-Salem and hunt all day long around the same 15-acre field." He said, "The men would get up a covey but couldn't hunt the singles without bustin' another covey." He went on to say that, "There were so many partridges, I worried about my mule stepping on 'em 'cause they were always running out from under the mule's feet when I was plowin' fields." When I asked Ralph what was different about the farms back then, he said that all the fields were planted in either wheat or



lespedeza hay. He believed that was the change that had caused the quail to disappear.

Ralph was able to remember at least one of the changes that had occurred on these small foothills farms, partly because of his close ties to the land and partly because he had a specific point in time that he vividly remembers: the day he put his mule in the barn for the last time and began riding his brand new Farmall 100 tractor. By having a point of reference, Ralph was able to recall a slow change of the landscape over time. He had identified a specific point along the sweep of the minute hand and was able to remember something from the last 15 minutes of class.

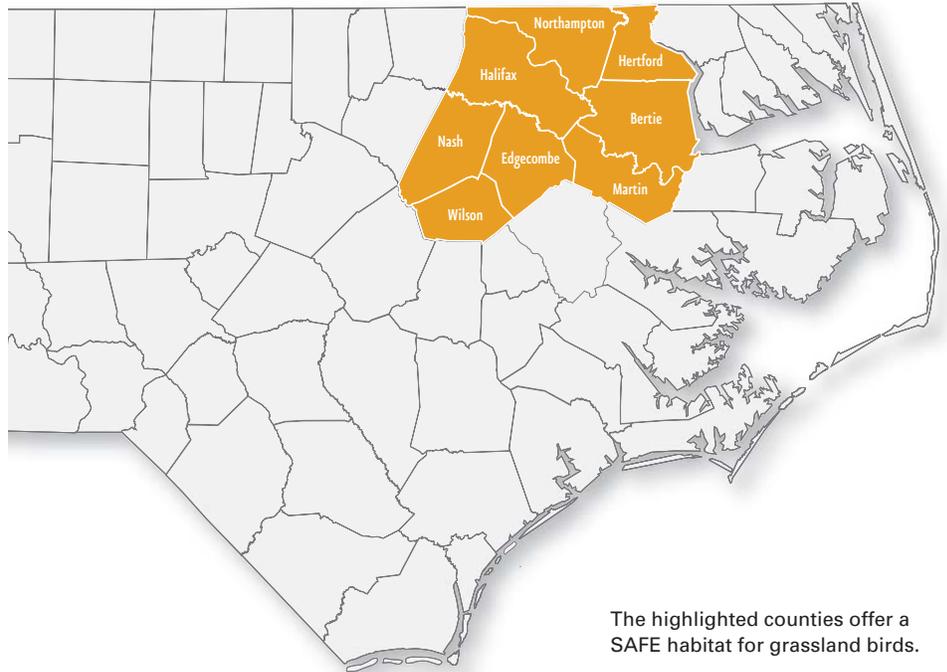
The minute hand on the landscape clock continues to tick. Everyday we convert pieces of wildlife habitat into something else. We lose a little bit here and a little bit there, and if our memories don't contain a vivid visual measurement from a previous point in time, we may fail to see or recognize that habitat is actually disappearing. Those of us who comprehend the impact of these slow, long-term changes are well aware of the final consequences. We are doing what we can to turn back the clock's hands. For those who don't think about these three men and remember that things have changed across North Carolina's landscape and will continue to change. If we fail to move the hands back to an earlier point on the clock's face, the bell will ring and there will be no quail when we all go out to play. 🌿

*David T. Sawyer,
NCWRC Surveys and Research Coordinator*



Enhancing High Priority Wildlife Habitat in North Carolina

SAFE Habitat Initiative CP38E Boosts Conservation Reserve Program



The highlighted counties offer a SAFE habitat for grassland birds.

High priority wildlife habitat in eastern North Carolina just received a much-needed boost. This January, the U.S. Department of Agriculture's Farm Service Agency (FSA) began offering a new program: the State Acres for Wildlife Enhancement (SAFE) Habitat Initiative. SAFE operates under a new continuous Conservation Reserve Program (CRP) practice offering cost share and a sign-up bonus. The program's goal is to develop 5,600 acres of native, early successional habitat to benefit grassland bird species identified by the state as a high priority conservation concern. These species include, but are not limited to, northern bobwhite, loggerhead shrike, grasshopper sparrow, eastern kingbird, eastern meadowlark, and field sparrow.

Plans call for restoring habitat in the northeastern portion of North Carolina's upper coastal plain. This area has been targeted by wildlife biologists as a focus area for grassland bird conservation efforts. To establish habitat, landowners will plant two species of native warm season grasses, two species of native forbs, and manage natural vegetation diversity on a rotational schedule. Required management activities include prescribed burning, light disking, and spot spraying on rotation to control woody vegetation.

If you are interested in this new CRP practice please contact your local FSA office. The following link will direct you to your local office.

<http://www.fsa.usda.gov/FSA/stateOffices?area=about&subject=landing&topic=sao-do-so> 🌿

*Don Barker,
NCWRC Coastal Technical Assistance Biologist*

Restoring Longleaf Pine Ecosystems

Newcomers to North Carolina may find it hard to believe that the longleaf pine ecosystem once covered 92 million acres in the southeastern Coastal Plain. But with progress, comes pain. And, over the years, this once thriving ecosystem—made up of vast longleaf pine forest—has been reduced to only a few remnant stands. As a result, populations of plant and animal species dependent upon this ecosystem have also declined.

Recently, these remnant longleaf stands and other areas of loblolly pine plantations (with mature residual longleaf) have become the focus of statewide habitat restoration efforts. While several species associated with this ecosystem require longleaf pines to thrive, for many others, the herbaceous ground cover associated with longleaf pine ecosystems is the most critical habitat characteristic. How can such habitat be recovered? According to biologists, prescribed burning is the

most important practice in developing and maintaining both a longleaf stand and herbaceous groundcover.

The Landowner Incentive Program

The North Carolina Wildlife Resources Commission has developed programs to reestablish the longleaf pine as a major component of the forested landscape in the state's Coastal Plain. In particular, the Landowner Incentive Program (LIP) targets restoration of fire-dependent longleaf pine ecosystems by restoring habitat for at-risk species. Commission biologists use management plans that improve biodiversity and follow natural community restoration goals. By restoring and conserving longleaf pine forests, some of North Carolina's past can be preserved for the future.

A major goal of LIP is to identify landowners in Bladen, Cumberland, Duplin and Sampson counties who may be interested in enrolling in this

program. Landowners are selected based on several factors including presence of target species on their land, existing habitat quality, potential for success, tract size, and contribution to habitat and species conservation. Once landowners have been selected, the LIP biologist works with them to develop a management plan. This plan features a variety of management activities and cost-share practices to enhance longleaf pine habitats. These include prescribed fire, chemical hardwood removal, restoring native groundcover (grasses and forbs), and creating field borders. Funds for this program will be available until June 30, 2010, and the Commission will continue to enroll landowners as funds remain available.

Additional Government Programs

There are several other government programs that can assist with longleaf pine restoration.

Opposite page: Longleaf pine catkins. Right, top to bottom: Prescribed burning, Red-cockaded woodpecker, spraying fescue pasture.

- The North Carolina Division of Forest Resources (NCDFR) can provide cost share for longleaf pine establishment and assist with prescribed burning. NCDFR promotes longleaf by providing a higher cost share for establishment of longleaf (60 percent) compared to loblolly (40 percent).
- The Conservation Reserve Program's (CRP) longleaf pine initiative can be used to convert agricultural fields to longleaf pine. The program provides a 10- to 15-year contract with soil rental and various other incentive payments.
- The Commission's Cooperative Upland Restoration and Enhancement (CURE) program, which has goals similar to LIP, also offers several restoration methods. Among these are creating early successional habitat for wildlife, providing cost-share opportunities to implement management practices such as adding field borders with soil rental payments, planting native vegetation, and using prescribed burning.

CURE areas may also be eligible for the LIP to further reduce the costs of restoring and maintaining longleaf pine habitat.

These and other government wildlife and habitat programs are available and allow for joint program participation on a single property. Landowners with questions should check with their local Wildlife Commission biologist.

Restoration and Red-Cockaded Woodpeckers

Some landowners have concerns about possible limitations if restoration of their land results in establishment of red-cockaded woodpeckers (RCWs), a federally endangered species native to longleaf pine ecosystems. These concerns can be mitigated by enrolling in the Safe Harbor program, which is designed to protect

listed species while encouraging habitat improvements. With Safe Harbor, landowners are only responsible for the number of RCWs on the property when the agreement is signed. For example, if there are no RCWs initially and habitat improvements result in the establishment of a RCW population, the landowner is not restricted from logging or other activities that may negatively impact the RCW's. If a new RCW population becomes established, the birds can be removed prior to activities (such as logging) that may threaten them. The U.S. Fish & Wildlife Service and/or the Commission will remove these birds; landowners may not harm them or cut cavity trees at any time.

Benefits of Prescribed Burning

Many pine stands where remnant longleaf exist are dominated by other species such as loblolly and slash pine. These pines can help initial restoration efforts by providing fuels for burning. Frequent low-intensity fires reduce the dominance of these other pines by decreasing seedling survival and allowing longleaf to become more prominent. When stands are thinned by removing other pine species and retaining longleaf, more light reaches the ground, which produces more groundcover and allows longleaf to naturally regenerate.

The resulting open canopy and frequent fire also promotes the growth of herbaceous plants. In the absence of fire, many plants native to longleaf pine ecosystems will diminish in quality as a source of food and cover for wildlife. Food and cover is essential to species including many songbirds and bobwhite quail. While bobwhites do not require trees to persist or even thrive, a stand of longleaf with its natural groundcover provides a link to a rich culture of southern quail hunting that was unique to the Coastal Plain of the South. Bobwhite quail can be hunted from New Jersey to

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NCWRC/MICHAEL CHAMPION



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Winter Songbirds Benefit from CURE Early Successional Habitat Efforts

Many articles have been written about the benefits of habitat management for quail. However, little mention has been made regarding the many other species that also benefit from early successional management. During the winter, a whole host of “little brown” songbirds have inhabited and benefited from the many field buffers, fallow fields, and prescribed-burned woodlots established for quail. Even though overall goals were to improve quail numbers, more than 98 percent of the birds using these stands are songbirds!

Most wintering songbirds are very different from the breeding songbird community we see during the spring and summer months. In North Carolina, a large portion of these species are migrants who have spent their summer breeding in Canada and the northeast United States and have migrated south for the winter. These include white-throated, song, savanna, and swamp sparrow and dark-eyed junco. Other species can also be seen such as Northern cardinal, field sparrow and Northern bobwhite—all of which are found here year-round

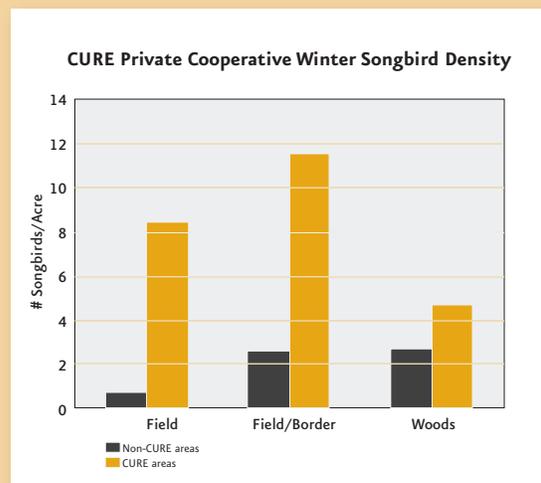
and have potentially used the same stands during the breeding season.

Biologists working in the CURE Surveys Program have been monitoring the CURE private cooperatives since their initiation, and some of the strongest songbird responses to management have been seen during these winter months. Transect surveys were conducted throughout the cooperatives to evaluate the songbird populations at a landscape level and within the CURE-managed field borders, fields and wooded stands. Stands were surveyed for songbirds, which are associated with early successional grassland or shrubland habitat types.

Results from 2002-2006 indicate that CURE management stands were magnets for songbirds during the winter. Five species of sparrows comprised the majority (76 percent) of the observations, which were dominated by song and white-throated sparrows. Thirty-Seven species were recorded within the managed habitat areas. CURE-managed stands included small fields and field buffers

managed for fallow habitat and wooded stands, which were thinned and/or prescribe burned. For comparison, more than six to seven times as many wintering songbirds were observed within these managed areas compared to fields under normal agricultural cultivation. To a lesser degree, thinned and burned woods also maintained more than twice as many songbird observations as compared to unmanaged woods.

However, winter songbird counts often noted great variations in songbird abundance from year to year and from site to site. Dynamic annual cycles were potentially related to overall winter severity, weather patterns, and breeding success in the North. When waves of migrants did arrive, songbirds were driven into these habitat areas. Some managed CURE field borders along the Coastal Plain in peak years noted 33 songbirds/acre, compared to the overall average of 11 songbirds/acre. Higher winter counts were also generally noted along the Coastal Plain compared to the Piedmont. These differences were potentially related to migratory patterns that follow along the coast.



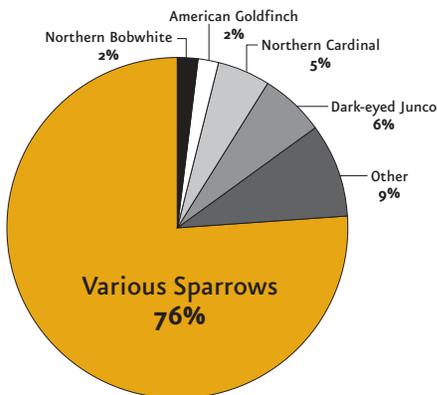
Not only were more songbirds found in CURE-managed stands, but songbird density estimates across the CURE landscapes also appeared to improve as well. By estimating bird densities in proportion to stand and treatment types within the landscape, CURE songbird trends were significantly positive from 2002-2006. When compared to regionally selected Audubon Society Christmas Bird Counts, CURE cooperatives have appeared to reverse the downward regional trend of wintering early successional songbirds.

The establishment of early successional habitats is not only advantageous to quail, but also benefits a whole host of wintering songbirds. By providing cover and food, fallow borders and fields, and thinned, burned woodlots offer important habitats for songbirds trying to make it through the cold winter months. By creating these types of habitats, more opportunities can be provided to the quail hunter to flush a covey during the fall and also to the occasional birdwatcher to see the variety of seasonally different songbirds that call North Carolina home. 🌿



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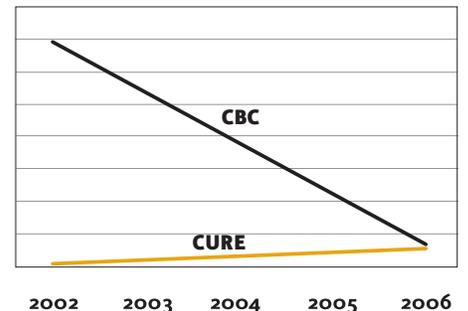
Songbird Species Using Winter CURE Habitat



Northern bobwhite



Winter Songbird Landscape Trends for CURE Private Cooperatives and Regional Christmas Bird Count (CBC) References



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Kansas, but there is only one place quail can be hunted in such a majestic and unique ecosystem as the longleaf pine forest.

Benefits to Other Species

Maintaining longleaf pine forest through thinning and burning also benefits other game species that are not directly dependent upon longleaf habitat including white-tailed deer, wild turkeys, mourning doves, cottontail rabbits, and black bears. Burning increases the food supply for these and other species by providing more palatable grasses and increased production of seeds and soft mast.

There is a future for longleaf pine habitat and its associated wildlife despite the demands of habitat for North Carolina's increasing human population and the current lack of quality longleaf stands. Through the Landowner Incentive Program and other wildlife and habitat initiatives, government agencies and private landowners can continue to work together to promote longleaf restoration. ♣

Michael Champion,

NCWRC LIP Technical Assistance Biologist



NCWRC

Fire-maintained longleaf pine forests provide crucial habitat for many high priority wildlife species and plants.

Calling All Dove Hunters

Remember to Sign Up for the Harvest Information Program

As most dove hunters are aware, certification in the Harvest Information Program (HIP) is a requirement to hunt doves as well as all other migratory game birds. If you plan to hunt doves during the 2008-2009 season, please make sure that you ask for HIP certification when you purchase your license. HIP certification is required in each state where you hunt migratory game birds and is free of charge in North Carolina. The HIP program is administered by the U.S. Fish & Wildlife Service (USFWS) and is the primary means used to estimate hunter numbers, days afield, and harvest of individual species of migratory game birds.

Signing up for HIP is simple. You are asked a short series of screening questions regarding your past hunting experience. If your license agent does not ask these screening questions even though you have requested to be HIP certified, please remind the agent to do so. The list of HIP registrants is used by the USFWS for more in-depth surveys. For example, each year approximately 2,000 dove hunters in North Carolina are asked by the USFWS to provide hunting information from their dove hunts. Last year more than 300 dove hunters were asked to provide dove wings from their harvested doves. The new dove wing survey is being used to estimate annual production of dove populations, while the dove hunt survey is used to estimate dove hunter numbers and harvest. For example, during the 2005 and 2006 dove seasons, an average of 43,000 dove hunters harvested an average of 802,000 doves each year. ♣



Joe Fuller,

NCWRC Migratory Game Bird Coordinator

For more information about the dove hunting season, please visit our website at www.ncwildlife.org or contact our customer service department at 1-888-248-6834.

The Mechanics of Monitoring Mourning Doves

Dove Banding Yields Important Data for Scientific Surveys



Mourning dove banded by NCWRC personnel.

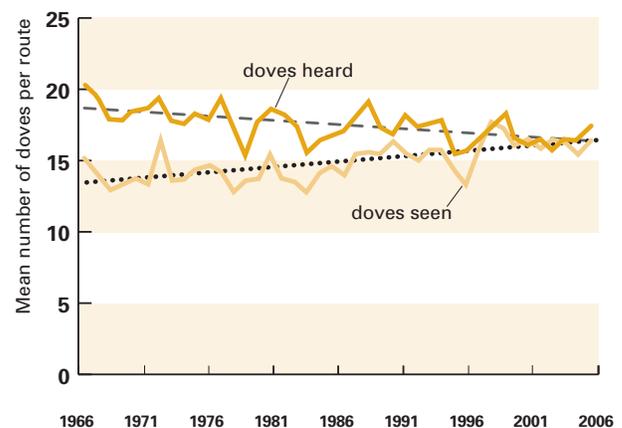
NCWRC/SUSANNAH THOMPSON

In terms of hunter participation and total harvest, mourning doves are the most popular game bird in North Carolina and throughout much of the United States. Given their ability to succeed in a variety of habitats, mourning doves are found throughout North Carolina and usually in good numbers. To monitor the population status of mourning doves, the N.C. Wildlife Resources Commission, the U.S. Fish & Wildlife Service, and other partners have participated in a nationwide survey program since 1965. The primary monitoring technique is the Call-Count Survey (CCS). Each year in late May, biologists monitor 20 randomly located motor routes in North Carolina. These routes are 20 miles in length and biologists stop at each one-mile interval to conduct their surveys. During each three-minute stop, all individual mourning doves heard calling and all doves actually observed are tallied. This data forms the basis for looking at long-term trends. More than 1,000 call-count routes are located throughout the United States.

Two other surveys also track mourning dove populations. The more general Breeding Bird Survey (BBS) is a roadside survey similar to the CCS that encompasses all species of birds rather than focusing solely on mourning doves. More than 4,000 BBS routes are located in the United States and Canada. In addition, the annual Christmas Bird Count (CBC) sponsored by the Audubon Society tracks mourning doves. This survey, as its name implies, occurs in the winter and records only doves observed.

For dove harvest purposes, the nation is divided into three units; the Eastern, Central and Western Management Units. North Carolina is included in the Eastern Management Unit (EMU), which roughly encompasses all states east of the Mississippi River. Accordingly, population trends are normally reported on a management unit basis. Long-term population trends for the EMU from the four separate

surveys indicate mixed results. Doves heard calling on the CCS suggest a significant long-term decline in the EMU (Fig. 1). However, doves seen on the CCS, the BBS, and CBC all suggest that dove populations have remained stable or perhaps increased over the long-term. Over the last 10-year period, mourning dove populations appear stable based on overall available survey data. In North Carolina, the CCS data suggest that populations have increased over the long- and short-term; however, the increasing trend is not statistically significant.



Long-term (1966-2007) Results of the Mourning Dove Call Count Survey in the Eastern Dove Management Unit.

Although population trends from the surveys provide somewhat conflicting results, most biologists believe that mourning dove populations have remained relatively stable over the long-term throughout the EMU. Given the conflicting results and imprecise nature of these surveys, especially over the short term, biologists have been working on new methods to monitor dove populations. Although still in the development stage, the new techniques involve analysis of annual banding and reproductive data. Banding data allow biologists to estimate large-scale population size, survival rates, and harvest rates (the percentage of the population harvested each year) of mourning doves. In addition, a new experimental wing survey (similar to the federal duck wing survey) will allow the management units to determine reproductive performance of the dove population for a given year. Collectively, these new surveys, along with the existing long-term trend surveys, should provide managers with better insight into mourning dove population dynamics and population trends. These data should ultimately lead to better informed management decisions for this important resource. ♣

Joe Fuller,

NCWRC Migratory Game Bird Coordinator



JEFF PIPPEN

Wildlife Profiles are Back!

Read All About N.C. Critters

The Wildlife Profiles are a great educational tool and can take you and your child or your class a long way toward understanding each species.

The profiles are a work in progress. More species will be added in 2008, so check back often.

Fox Squirrel

Wild Facts

Classification
Class: Mammalia
Order: Rodentia

Average Size
Length: 20-26 in.
Weight: 1 1/2 to 2 1/2 lbs.

Food
Pine seeds, acorns, hickory nuts, buds, berries, fungi and some insects.

Breeding
Fox squirrels generally mate in midwinter. Females breed when they are 1 year old, and occasionally, in years when food availability is high; older females may breed again in summer and produce a second litter.

Young
Litters of 1 to 5 young are usually born in February or March after a gestation period of 44 days. Fox squirrels are blind and hairless at birth and open their eyes after 4 to 5 weeks. Young are weaned at 8 to 9 weeks of age and may remain with the adult for another month.

Life Expectancy
Fox squirrels that survive to become adults live an average of 3 to 4 years. Maximum life expectancy in the wild is generally 6 to 7 years, but individuals have been known to live as long as 12 years.

NCWRC Interaction: How You Can Help

Fox squirrels prefer habitats composed of mature, open pine-oak and longleaf pine forests. But certain management practices, such as large-scale replacement of longleaf pine with loblolly pine, shortened stand rotation, and fire-suppression, coupled with suburban and urban development, have led to a reduction and fragmentation of preferred habitat.

Homeowners and developers can create habitat for fox squirrels by creating areas on their property that encourage the growth and/or maintenance of mature hardwoods and longleaf pines. Management around streams can provide both habitat and travel corridors for fox squirrels, which would aid in reducing fragmentation between preferred habitats.



Spare the Herbicide and Spoil the Habitat



Land Managers' TOOLBOX



NCWRC/JEFF MARCUS

A NCWRC Technician uses a herbicide to control woody regeneration after cutting trees to enhance early successional habitat.

Exotic plants can wreak havoc when establishing and managing early successional habitat.

Tree-of-Heaven, Sericea Lespedeza, Johnson Grass, European Privet, Honey Locust, Common Bermuda and Tall Fescue are just a few of the invasive exotic plants that often take over. Add encroaching native woody vegetation such as sweetgum, red maple, and green ash and you have an army trying to reduce the species diversity and longevity of the most well-designed habitat project. Prescribed burning and disking are the preferred method to control many of these species, but several of these plants simply love the disruption associated with these two activities.

For situations where burning and disking alone won't work, the following herbicides are invaluable to enhance early successional habitat.

Glyphosate: Trade names include Round-up®, GLY-star®, Accord®, Eraser®, Razor®, Rodeo®. This is the most commonly used herbicide. This non-selective post-emergent herbicide is absorbed by actively growing plant foliage and translocates into the root system where it kills the plant. This herbicide is often used for site preparation when converting to Native Warm Season Grass. Treating Tall Fescue with two quarts of glyphosate in the fall, followed by a second

treatment at the same rate in the spring, will provide excellent control prior to native grass planting. Bermuda grass can be controlled with Glyphosate using multiple summer applications at a rate of six quarts per acre. Spot treatments with a five percent solution of glyphosate can be applied during the growing season for woody plant control. Keep in mind that glyphosate does not offer pre-emergent control, and some species have developed resistance; so use this herbicide at proper labeled rates.

2,4-D: Trade names include Salvo®, Savage®, Weedone®. This is a selective herbicide that controls a variety of broadleaf weeds while having little impact on grass species. This herbicide is marketed in several formulations including amino, ester and solid pellets. 2,4-D can be used for broadcast control of broadleaf competition or spot treatment for woody control. In broadcast applications, beneficial plants such as ragweed, goldenrod, lespedezas, and partridge pea can be damaged or killed. There is little pre-emergent control provided by 2,4-D, so many of these annual species will seed in the following year. Extreme caution should be used when applying 2,4-D in area with broadleaf crop productions as damage can be severe to crops such as cotton and tomatoes.

Triclopyr: Trade names include Garlon®, Triclopyr®, Tahoe® Renovate3®, Remedy®. This is another selective herbicide, which controls a variety of woody plant species while not impacting grass species. Triclopyr can be applied to foliage with either a broadcast or spot method to control various plants including sericea lespedeza and other exotic legumes. However, the downside of Triclopyr is that it will also kill desirable legumes. It can also be used to treat individual woody stems with a basal bark or "Hack and Squirt" treatment. Basal bark treatment can be applied using penetrating oil during the dormant season. "Hack and Squirt" treatments apply concentrated herbicide into cuts in tree bark. Early successional habitat can be improved and maintained by applying triclopyr to woody vegetation in a 30- to 50-foot swath along logging roads, field edges, and logging decks to promote grasses and annual forbs.

Imazapic: Trade names include Plateau® and Panoramic® This selective herbicide provides pre- and post-emergent control of numerous perennial grasses, annual grasses, and broadleaf species. This herbicide is most often used to establish native warm season grasses, but can be beneficial in releasing native warm season grasses and forbs in habitat areas. Imazapic provides up to 60 days of weed control depending on application rate. It is important to know that not all native warm season grasses tolerate the same rate of Imazapic, and it should not be used over switchgrass at all. Imazapic does not provide control for Bermuda grass and can, in fact, promote Bermuda growth.

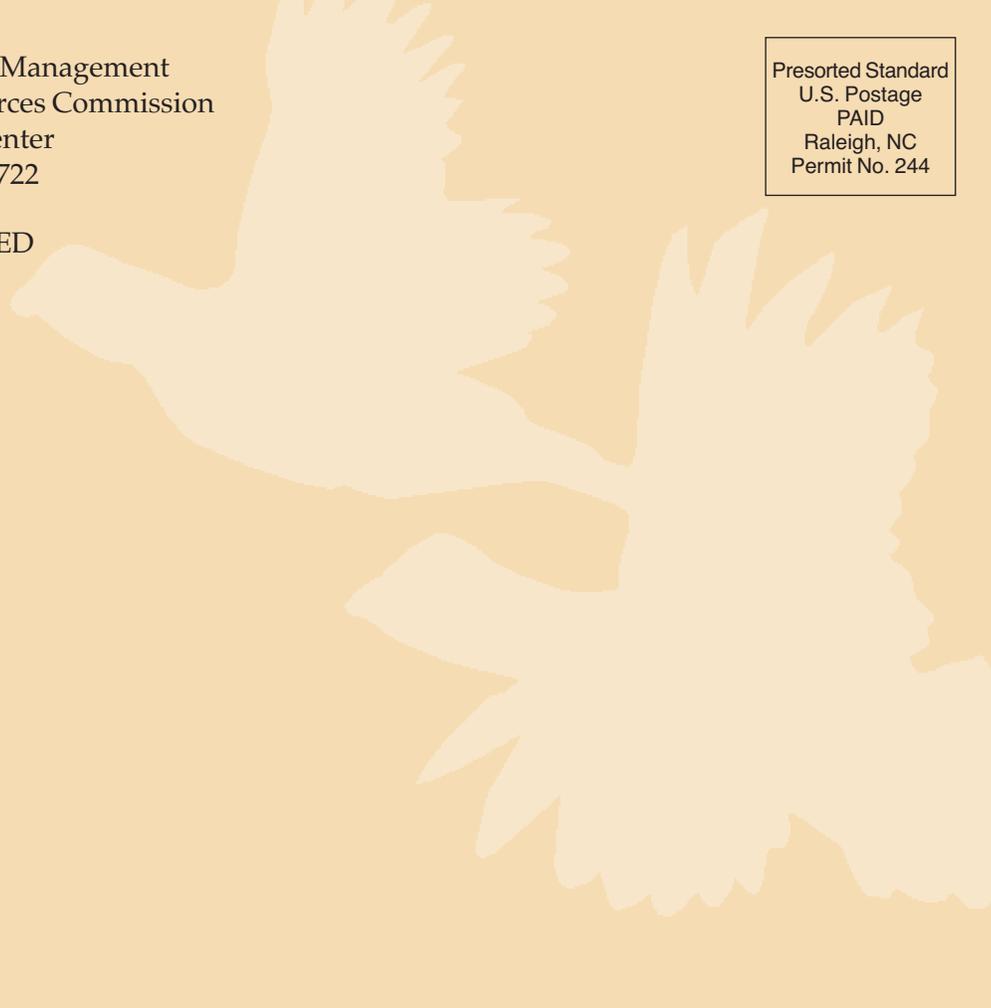
Imazapyr: Trade names include Arsenal®, Imazapyr®, Stalker®, Chopper®, Habitat® This non-selective herbicide is used most often in forest site preparation and mid-rotation forest release. Even though this herbicide is non-selective, the chemical formulation allows beneficial grasses,



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annual forbs and legumes to regenerate in treated areas quicker than other plant species. Imazapyr provides excellent control of hardwood species, other than legumes, in recently thinned pine stands and clear-cut areas. This herbicide is an excellent tool for maintaining early successional habitat along hedgerows, field edges, right-of-way cuts, and roadsides. Fall applications and reduced herbicide rates can further improve habitat regeneration. Imazapyr can also be effective on single stems using a "Hack and Squirt" application method.

Summary

Herbicides are a valuable tool in establishing and managing early successional habitat. As with any job, it is vital to know the objective prior to picking

your tools. Find out as much as you can about the herbicides listed above as well as others that may help you reach your objectives. Consult with cooperative extension specialists, discuss options with herbicide contractors and sales representatives, plan long-term habitat projects with a wildlife professional, and take the time to become a licensed herbicide applicator. Wise herbicide use can provide safe, effective, and cost-efficient early successional habitat management.

The North Carolina Wildlife Resources Commission does not endorse any herbicide companies, suppliers, producers or applicators. No discrimination is intended by trade name omissions from this article. ♣

John Isenhour,
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