



THE
Upland
GAZETTE

Published by the North Carolina Wildlife Resources Commission
Fall 2013 / Volume 18, Issue 2, \$2.50



WILDLIFE CONSERVATION AND HABITAT MANAGEMENT

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31st Annual Fur, Fish 'N Game Rendezvous

By Crystal Cockman, Uwharrie Conservation Specialist, The LandTrust for Central North Carolina and John Isenhour, Technical Assistance Biologist, NCWRC



MELISSA MCGAW/NCWRC



JOHN ISENHOUR



Recently, natural resource professionals and volunteers from across the state came together in Richmond County to share their knowledge and skills with North Carolina's next generation of sportsmen and women. The 31st Annual Fur, Fish 'N Game Rendezvous was held July 7-12 at the North Carolina Cooperative Extension's Millstone 4-H Center. This unique camp focuses on conservation education for young men and women ages 12-15.

Over the course of a week, campers were immersed in outdoor activities and learned about a wide variety of topics related to wildlife and conservation. Wildlife Enforcement Officers and Hunter Education Specialists were on hand to assist campers in earning their N.C. Hunters Safety Certification. N.C. Wildlife Resources Commission and N.C. Forest Service staff provided sessions on wildlife management and forestry. A full week of conservation-based activities was provided at the Fur, Fish 'N Game Rendezvous. Interactive lessons on archery, orienteering, taxidermy, wildlife identification, canoeing, fly-fishing, bird watching, falconry, and dog training ensured a well-rounded exposure to an outdoor lifestyle. All the campers were exposed to shooting sports at the John F. Lentz Hunter Education Complex. An experienced trapper from the N.C. Trapper Association educated the young folks about the role of trapping in wildlife management and assisted campers in setting their own traps. This was an awesome opportunity for campers to



Hunters and anglers were the original conservationists, helping to restore many game animals, such as turkeys, white-tailed deer and striped bass. **Help us to conserve the great diversity of birds, mammals, reptiles, amphibians, mollusks and fish that are essential components of North Carolina's wildlife heritage.**

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

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Subscriptions *The Upland Gazette*
Division of Wildlife Management,
N.C. Wildlife Resources Commission
1710 Mail Service Center
Raleigh, NC 27699-1710

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BONITA JONES

A Note from the Editor

Most *Upland Gazette* readers will not see these words until November even though I write them during the heat of August. Hunting season is just around the corner in September, and this time of year always brings my thoughts to the most common bird in North America—the mourning dove. The ubiquitous

mourning dove lives in almost every habitat found in America from the western mountains and plains to the farms and fields of the eastern United States. Few biologists would argue that the mourning dove is one of the most adaptable birds to the activities of humans. Doves are just as at home in a remote Hyde County corn field as they are in the backyards of the Capital City of Raleigh or a clearcut choked with pokeberry along the Blue Ridge Mountains.

Whenever I think of these wonderful habitat generalists, I am quick to turn my thoughts to more “specialized” species that don’t do quite so well with the activities of humans. These “specialists” include species like bobwhite quail, Bachman sparrows, loggerhead shrikes, red-cockaded woodpeckers, many shorebirds, red wolves, elk, and a laundry list of other birds, mammals, reptiles, and amphibians. We write about many of these species and their habitats in the *Upland Gazette*. Managing habitat for many of these specialists is a difficult proposition, at best. Sometimes, we simply don’t have enough money, manpower, or land to do the things we need to do to make these species as abundant as we want them to be on as large an area as we would like. That does not mean we give up, but it sure can be discouraging sometimes.



MARK JONES

This mourning dove nested in a yard patrolled by 3 “real” bird dogs and one very “birdy” poodle.

When I get discouraged, I go back to thinking about the mourning dove. That little bird seems impervious to everything. For proof, over the last several summers, a pair (not necessarily the same birds) has raised a clutch in a low hanging loblolly pine branch hanging over my fenced-in yard. This fenced yard is patrolled by three very “birdy” German wire-haired pointers who love to bring me doves retrieved from a hunt. Oh, and there is also a tiny little poodle who came with the wife—I think it was in the marriage contract somewhere. Anyway, these four very hungry canines cause little concern for a pair of determined mourning doves. If doves can bring off a nest in a “Jurassic Park” environment like my back yard, then it is no wonder they are America’s most abundant bird. In this world where many species struggle with the loss of wildlife habitat, it is comforting to know the mourning dove thrives in almost any environment.

Mark D. Jones

SUPERVISING WILDLIFE BIOLOGIST
PRIVATE LANDS WILDLIFE HABITAT GROUP

learn a lot about outdoor and hunting-related topics in just a week's time.

Because the camp is so popular each year, a special advanced camp has been developed for those who have attended basic camp in previous years. One of the highlights for advanced campers this year was a Wednesday morning crow hunt and survival expedition. Neither the threat of rain, nor a predawn wake-up call could stifle the excitement of the 2013 crow hunt. Cereal was scarfed down, vans were loaded, and the four groups (19 campers and 10 adults) scattered across the countryside for the morning adventure.

For our group, the crows got off to a slow start with birds working close but not closing to within shotgun range at our first two stops. While this was a little frustrating for campers and guides alike, we were seeing crows, and the weather was improving as the morning progressed. At the next few stops, things picked up as small groups of crows began responding to the electronic call and seemed to dip below the forest canopy with a little coaxing from a mouth call. By the time we loaded up at our last stop, all the hunters in our group had gotten to shoot at a crow, and two birds had fallen to this rag-tag, mosquito-bitten group of 10. However, more importantly, lessons had been learned and memories were made during this humid July morning.

For the second half of the morning, the hunting parties gathered on the banks of Big Mountain Creek with a total of seven crows to show for their predawn waking efforts. But there was no time to rest, as each camper was given the opportunity to fish for their lunch. No fancy graphite rods and bait casting reels were available for this challenge. The campers got a bamboo pole, a piece of monofilament line, and two fish hooks. The mission assigned by long time Rendezvous supporter and crow hunt coordinator Terry Sharpe, "use what you have been given and what you can find to catch fish, or you just eat vegetables." The

One of the highlights for advanced campers this year was a Wednesday morning crow hunt and survival expedition.

wettest June in recent history and subsequent heavy runoff made for tough fishing conditions, but the veggies and blueberries were plentiful, so no one went without. As the "hobo meals" were placed on the campfire coals and lunchtime approached, three long days at camp began catching up with the teenagers. Even with yawns, stretches, and some nodding off, it was evident that the



CRYSTAL COCKMAN

A Fur, Fish 'N Game camper shows the fruits of a mourning crow hunt.

campers thoroughly enjoyed the morning and were thankful for the leaders who helped make these activities possible.

The Fur, Fish 'N Game Rendezvous is just one of several camps hosted at Camp Millstone each summer. The camp was established in 1939 on a site where granite was once quarried to produce millstones. The 320-acre property is surrounded by the Wildlife Commission's Sandhills Game Lands, and this

bestows a sense of remoteness. This special camp, that gets young people in the outdoors to learn so many conservation lessons, would not happen without a great deal of support. Many volunteers and organizations dedicate time and funds to this camp. Scholarships to offset the cost of attending the Rendezvous have been provided by several county wildlife clubs including the Wake County Wildlife

Club which has been promoting and developing the Rendezvous since its beginning. In 2013, the club sponsored 30 campers, and club members spent many hours serving as camp instructors. Several long-time wildlife club members such as V.W. Cobb, Dave Woodward, and Allen Basala are at Millstone each year helping out however they can to make sure the Rendezvous is a success. This camp is best summed up by Allen Basala, as "an investment in North Carolina's future conservation leaders." This investment has paid huge dividends as evidenced by the many Rendezvous alumni working in the conservation field or simply passing on a strong conservation ethic to their friends and family. You can learn more and register for next year's camp on the 4-H website at www.nc4h.org. 🌿

**Coauthor and NCWRC Biologist John Isenhour was a camper at the Fur, Fish 'N Game Rendezvous in 1987.*



Burning During the Nesting Season

Desirable or Disastrous for Turkey Management?

MELISSA MCGAW/NCWRC

By Eric L. Kilburg, Christopher E. Moorman, and Christopher S. DePerno
Fisheries, Wildlife, and Conservation Biology Program, North Carolina State University

The Question of Fire and Turkey Nesting

Open-canopy longleaf pine forests historically dominated the southeastern Coastal Plain from Virginia to Texas and burned frequently (approximately every 2-5 years). Although Native Americans ignited many fires to drive game, clear fields for agriculture, and control pests, lightning-caused fires largely determined the plant and wildlife communities of the Coastal Plain. Accordingly, fires were most prominent at the onset of the stormy season when the rate of lightning strikes was high but moisture remained low. In North Carolina, this window of optimal ignition occurred during late spring and early summer (commonly referred to as growing-season burns) and coincided with the nesting activities of many ground-nesting birds such as the wild turkey.

Despite the historic prevalence of these growing-season fires in the longleaf pine ecosystem, wildlife managers have long been concerned that burning forest stands during the wild turkey nesting season could destroy many nests and cause populations to decline. Therefore, prescribed burns, necessary to maintain open pine stands with abundant grasses and forbs important for many native wildlife species, were restricted to late winter (commonly referred to as dormant-season burns). However, burning forest stands during the early growing season may benefit wild turkeys. Growing-season fires increase forest openness by top-killing scrub oaks and shrubs shortly after leaf-out occurs, and the resulting improved visibility in the understory may reduce turkeys' vulnerability to predation. Furthermore, greater sunlight in the more open forest promotes the growth of grasses, forbs, and associated insects which are important forages for nesting hens and chicks.

Still, the extent of nest destruction resulting from burning during the nesting season has not been well quantified and remains a point of concern. Additionally, hens often nest in shrubby cover which may be less available if growing-season burns are included in forest management. Therefore, we assessed wild turkey nest survival and nest placement in a longleaf pine community managed with frequent prescribed burns during the wild turkey nesting season.

Our Study Area—Fort Bragg, North Carolina

Fort Bragg, located in the Sandhills region, has emphasized the use of growing-season burns since 1989 and attempts to burn approximately one-third of the 100,000 acres of managed forest each year. These fires often occur between April and June when turkeys are nesting. Fire and soil moisture largely determined the distribution of vegetation communities at Fort Bragg. Dry, sandy uplands tended to burn thoroughly and were dominated by a canopy of fire-tolerant longleaf pine with scrub turkey oak and wiregrass in the understory. Greater moisture along permanently flowing streams precluded fire and supported closed canopies of bottomland hardwoods with sparse groundcover. A third, dynamic community occurred along the transition between these bottomland hardwoods and the adjacent upland pines where frequent fire and abundant moisture interacted. In this narrow transitional zone, or ecotone, fire maintained low shrubs, ferns, and other herbaceous plants under a pine canopy. Lastly, numerous acres of non-forested grassland, largely used for military training, were maintained by mowing, burning, and disking.



BRITTANY PETERSON

Two turkey hens await handling by researchers.

Over the course of our study, only 1 of 30 turkey nests was destroyed by prescribed fire.



ERIC KILBURG

How We Determined the Impact of Fire

From January to March 2011 and 2012, we captured wild turkeys using rocket-powered nets at sites baited with corn. Captured females were leg-banded and equipped with radio-transmitters tied around the wings in a “back-pack-style”. Transmitters were about the size of a small cell phone and emitted a unique radio frequency that allowed us to monitor the movement and nesting activities of each hen. We tracked to radioed females, using hand-held receivers, about 3 times weekly to locate nests. Thereafter, we checked hens daily to determine nest fates and causes of failure. Females were sensitive to nest disturbance, so we made every attempt to avoid flushing nesting hens until the nesting attempt was complete. Also, we included nests of non-radioed females found opportunistically in our assessment of cover selection but excluded these nests from survival analysis because they could not be monitored.

We calculated the percent of nests exposed to fire each week of the nesting season. To make this calculation, we multiplied the percent of the land area of Fort Bragg burned each week of the nesting season (determined from burning records) by the percent of radioed hens actively nesting. This simple calculation likely overestimates the true fire exposure rate because not all nests in a burned area are guaranteed to be destroyed, and nests are not located randomly. Instead, hens may select nest sites in areas, including bottomland hardwood stands, less likely to burn. Therefore, our estimate is likely the worst case scenario.

Upon completion of each nesting attempt, we recorded the vegetation type where the nest was located (upland pine, bottomland hardwood, transitional ecotone, or non-forested). We compared the percent of nests in each vegetation community to the percent land area of each community at Fort Bragg to determine which communities were selected for nesting.

Our Results

We captured and radio-marked 65 hens over the two-year study. We located 42 nests, but only 30 of the 42 nests could be used to assess survival. The 12 additional nests were excluded because either they were opportunistically found or because the nest was abandoned due to observer interference. However, all 42 nests were used to assess cover selected by hens for nesting. Nesting occurred from April 4 until July 4 in 2011 but was roughly a week earlier in 2012 due to warmer weather. Each year, approximately 20% of the study area was prescribed burned while radioed hens were nesting. Based on the timing of nesting and burning activities, we estimated that approximately 6% of nests would have been exposed to fire each year if nests were located randomly across the military base. However, only 1 of the 30 monitored nests (3.3%) was destroyed by fire over both years.

Predation was the primary cause of failure, claiming 16 nests, and one nest was abandoned because of military activity. Twelve nests successfully hatched. All 12 of these successful nests were located in the ecotone (9) and bottomland hardwood (3) communities, and simulated models indicated the probability of a nest surviving to hatch (calculated

from daily probabilities of survival) was greater in these lowland communities (60%) than in upland pine and non-forested communities (10%). The overall probability of nest survival during of the study was 35%.

Although ecotones composed only about 6% of the land area at Fort Bragg, 55% of all nests were located in this community. That is, hens selected ecotones for nesting at a higher rate than availability. Conversely, upland pine covered 74% of our study area, but only 21% of nests occurred in that community. Finally, the percent of hens nesting in bottomland hardwood and non-forested communities was similar to the availability of these communities suggesting females were neither drawn to nor dissuaded from nesting there.

What does it all mean?

Although a large portion of Fort Bragg was burned each year, and much of that occurred during the nesting season, prescribed burns did not destroy a considerable number of nests because the likelihood a nest was active and located in an area scheduled to burn was low. Also, not all females nest at the same time; some hens nest later than others, and re-nesting is common following the loss of a first nest. Moreover, the nesting season lasted 14 weeks even though a successful nest takes only about 6 weeks to lay and incubate. As a result, fires were applied before some hens began nesting and after some nests already hatched, so most nests were not exposed to fire. Additionally, predation caused 53% of nests to fail prior to the full 6 weeks and further reduced the probability of a nest being active when a fire occurred. Finally, nests in moist bottomland hardwood vegetation were unlikely to burn even if the surrounding forest was ignited.

Fire may have influenced nest placement through effects on the distribution of vegetation communities. Hens often nest near shrubs which provide excellent concealment. We observed this at Fort Bragg when females selected ecotones (48% shrub cover) for nesting and avoided upland pine (14% shrub cover). Upland pine stands burned thoroughly, and sparse vegetation, primarily wiregrass, provided little cover for nesting. Greater moisture in ecotones reduced fire intensity and allowed low shrubs to persist. In the absence of frequent fire, low shrubs in ecotones likely would develop into thickets much less suitable for nesting.

Fire Recommendations for Turkey Management

Burning during the nesting season does not cause a significant risk of nest destruction and may increase forage availability for wild turkey broods. Because burning during late winter tends to increase shrub sprouting and nesting cover availability, we suggest a combination of dormant (winter-time burning) and early growing-season burns be incorporated into management plans to achieve a balance of nesting and brooding cover. Alternatively, annual winter burns can be used to reduce shrub cover, and longer intervals between spring burns (4–5 years) will allow woody stems to increase. It is clear from our results that burning during the nesting season is compatible with wild turkey management.

LandTrust for Central North Carolina Receives Commission Award

By John Isenhour, Technical Assistance Biologist, NCWRC

On June 20, 2013 staff members from the LandTrust for Central North Carolina ventured from their office in Salisbury to the Wildlife Resources Commission's office in Raleigh in order to accept the 2013 Excellence in Wildlife Management, Lawrence G. Diedrick Small Game Award. This award is named for the late Lawrence Diedrick, a former Wildlife Commissioner, who was a passionate small game hunter and a strong advocate for sound wildlife conservation. The award recognizes individuals and organizations for the promotion of habitat management for small game species. The LandTrust has demonstrated their dedication to land protection and habitat management to benefit not just small game species but all local wildlife species.

The following excerpt from the LandTrust's nomination for the Diedrick award highlights their efforts benefitting wildlife species and present and future North Carolinians.

"If the LandTrust had to be compared to an animal, I would liken them to a snapping turtle. While esthetically this comparison may not be as appealing as a colorful butterfly or a strong soaring eagle, it seems to fit how they achieve their conservation objectives. They protect conservation properties with strong easements which are much like the shell that protects the snapping turtle's core. But, they are not content to rest with what they currently protect; they are constantly on the lookout for additional conservation targets that they can "snap up" for future generations. In the current economy, just like a snapping turtle, they often have to stick their neck out to protect these properties.

"To date they hold conservation easements on 16,029 acres and own 4,182 acres within their nine county work area. The LandTrust has transferred 606 acres to and assisted with the acquisition of another 1,205 acres by local, state, and federal agencies. They have worked to purchase and transfer several pieces of property to governmental agencies which have been incorporated into the North Carolina Wildlife Resources Commission's Game Land's Program. These include Second Creek Game Land (1,113 acres), King Mountain Tract (354 acres), and the Lawrenceville Tract (112 acres).

"The LandTrust has also 'stuck its neck out' by actively managing property they own. In the past three years, they have thinned 145 acres of loblolly pine plantation to promote wildlife habitat and plant diversity. All proceeds from these timber harvests have been utilized



Members of the Landtrust for Central North Carolina (center two: Crystal Cockman and Jason Walser) receive the Lawrence G. Diedrick Award from (L to R) David Cobb, Chief, David Hoyle and Mitch St. Clair, Commissioners, and Gordon Myers, Executive Director with NCWRC.

to implement additional land management activities. They have established 15 acres of native grasses, treated 20 acres of non-native plants, converted 15 acres of agriculture field to mast producing trees, and had 515 acres of prescribed burns conducted on their properties. The LandTrust staff has and continues to stick their neck out to do the right thing for wildlife and serve as a good example for private landowners and natural resource students who visit their property.

"Over the coming years, many thousands of acres in the southern Piedmont would no longer be composed of wildlife habitat if it were not for the efforts of the LandTrust. It is very clear to see that the staff and board members do not believe that their responsibility stops at protecting property, but they also understand the significance of land management to benefit wildlife species. This small group of people has knowingly added stress to themselves and their families to protect and manage natural areas in their part of the world. Their efforts have benefited small game species, big game species, non-game species, and the humans that find value in these critters."

For more information on the work of the LandTrust for Central North Carolina, visit their website at <http://www.landtrustcnc.org/>.

For information on improving wildlife habitat on your property, contact North Carolina Wildlife Resources Commission, Technical Assistance Biologist John Isenhour at 704-637-2400, Ext. 101. 🐾





Grasshopper Sparrow

BRITTANY PETERSON

Do Songbirds Benefit from Converting Fescue to Native Grass?

By Chris Moorman and Ryan Klimstra,
North Carolina State University,
Craig Harper, University of Tennessee, and
Jeff Marcus, Wildlife Diversity Biologist, NCWRC

heads in early to mid-May. Forage quality declines significantly once seedheads are produced. Also, endophyte fungus levels and associated toxicity in tall fescue are highest at this time. Thus, to obtain the highest-quality hay, CSG should be cut by early May. This is rarely accomplished, and the vast majority of CSG hay in North Carolina is cut from mid-May through early June well after seedheads are produced.

NWSG grow most vigorously from May through July. However, there are differences among species. Eastern gamagrass and switchgrass produce seedheads in mid- to late May. Thus, if these

species are hayed initially after late May, forage quality declines dramatically. Big and little bluestem and indiagrass mature later. These species can be hayed as late as mid- to late June, prior to seedhead development. This is an important consideration if songbirds are a management concern.

Considerations Among Bird Species

Over the years, we have learned much about the biology of grassland and shrubland songbirds. We know that some songbirds, such as grasshopper sparrow and eastern meadowlark, primarily use areas dominated by grasses, with some forbs, but little or no woody cover. They are true grassland obligates (that is, they are found only in grasslands). Other species, such as field sparrow and indigo bunting, prefer considerable forb cover (such as ragweed and pokeweed), as well as scattered brambles (blackberry) and woody cover (such as sumac). Incidentally, bobwhites, which are not songbirds, are also much more abundant when this type of mixed grass, forb, and shrubby cover is prevalent.

The nesting chronology of grassland and shrubland songbirds is fairly similar. The males begin establishing their territory in mid-April, and nesting begins by late April or early May. These species often have multiple clutches because after the initial clutch hatches and

chicks subsequently leave the nest, the adults will re-nest. Egg-laying, incubation, and brooding for these species are completed in about 25 days (until chicks leave the nest). Bobwhites have a different nesting/brooding strategy from the songbirds. Bobwhites begin nesting about the same time, but peak nesting occurs in June/July in North Carolina, and bobwhites continue to nest through September. Thus, the peak of bobwhite nesting occurs after the primary initial nesting period of grassland and shrubland songbirds. Obviously, the timing of nesting/brooding is very important as related to management of pastures and hayfields.

Space requirements vary with these species. Grasshopper sparrows and eastern meadowlarks like large openings and are most prevalent in areas that are considered a grassland matrix (most of the surrounding landscape is open, not forested). Field sparrows and indigo buntings may be found in smaller fields including those surrounded by woods and brushy cover. Bobwhites are a little different in that they use cover similar to field sparrows and indigo buntings, but they are most abundant in landscapes that are mostly open which is similar to grasshopper sparrows and eastern meadowlarks. Thus, you can see how the surrounding landscape is just as important for some of these species as is the composition and structure of your field.

Recent Research in North Carolina

Recent research conducted in North Carolina looked at the composition and structure of various types of pastures and hayfields and monitored use by birds. The types of fields studied included NWSG pastures and hayfields, CSG pastures and hayfields, and NWSG fields that were managed specifically for wildlife (that is, they were burned or mowed every few years but were never hayed or grazed). The results were quite interesting and provide insight on pasture and hayfield management when wildlife is an important consideration on your property.

Eastern meadowlarks were more abundant in CSG pastures (i.e., they were grazed rather than hayed) than in other field types (Figure 1). Grasshopper sparrows occurred in similar

The answer is... maybe. It's according to how you manage your pastures and hayfields, and it depends on which songbirds you desire. Not all songbirds have the same structural or space requirements, so not all species benefit from any one type of cover or management strategy. Below, we explain how different grasses and management strategies can benefit or be disruptive for various songbird species.

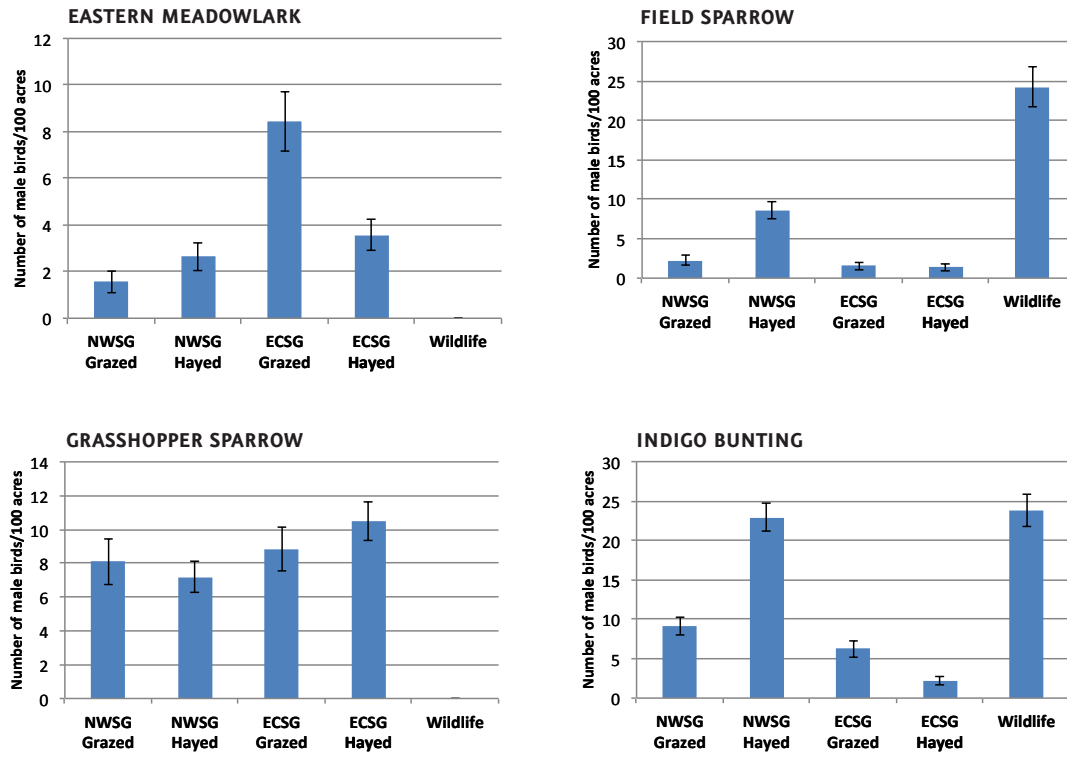
Considerations Among Grasses

Native warm-season grasses (NWSG) have been promoted for wildlife that use early-successional communities for several years. This is because the structure of cover provided by NWSG is very different from non-native cool-season grasses (CSG) such as tall fescue and orchardgrass. In an effort to enhance habitat for various wildlife species, many programs offer incentives to convert CSG to NWSG. This includes areas managed specifically for wildlife as well as pastures and hayfields managed for forage production.

NWSG can provide outstanding forage for livestock because annual production meets or exceeds that of CSG, and the quality of NWSG and CSG are roughly equal provided they are grazed or hayed at the appropriate time. This, of course, differs by species. Tall fescue and orchardgrass grow vigorously from late March through April and typically produce seed-

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FIGURE 1. Each graph shows the number of male birds per 100 acres in each of the 5 field types. Individual male birds defend territories and attract mates by singing and are fairly easy to detect when they sing during surveys, so the numbers of male birds per acre is a good index of population size. We surveyed for birds in 17 native warm-season grass (NWSG) and exotic, cool-season grass (ECSG) fields across the western Piedmont of North Carolina in 2009 and 2010.



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numbers among all fields that were hayed or grazed, but were not found in the fields that had never been hayed or grazed. Field sparrows and indigo buntings were most abundant in fields that had taller vertical structure, including NWSG managed for wildlife and NWSG that had not been hayed prior to evaluation. Abundance of eastern meadowlarks, grasshopper sparrows, and indigo buntings increased with field size, but field sparrow abundance did not increase with field size.

Data from this study show how the structure of cover influences songbird use more than grass species composition. Eastern meadowlarks and grasshopper sparrows may use grass fields if the structure is relatively low (within 2-3 feet). If the structure is taller, then field sparrows and indigo bunting are more likely to use the field. However, the timing of management highly influences breeding success and resulting populations. If fields are hayed or grazed too heavily during the primary nesting season, reproductive efforts will obviously fail. What this means is that CSG fields may be traps for grassland birds. The structure may be attractive, but if haying occurs from May through early June, nests are destroyed. The same is true for NWSG fields (especially eastern gamagrass and switchgrass) that are hayed during nesting, or for pastures (regardless of type) that are grazed too closely. This information may help explain the population declines of some of these species in North Carolina.

What can be done to help?

Delaying initial hay harvest of CSG after the primary nesting season is not feasible because haying CSG in mid- to late June provides extremely low-quality forage. However, if CSG hayfields are converted to bluestems and indiagrass, then initial hay harvests can occur after the primary nesting season for grassland songbirds. If it is possible to add forbs to the planting while still meeting hay production objectives, this plant diversity may benefit several birds. Although planting bluestems and indiagrass may help grassland songbirds, it is not a cure-all. Haying at this time is at the peak of the bobwhite nesting season, and data from research conducted in Tennessee has shown that for many grassland bird populations to remain stable, second nesting attempts also must be successful. Thus, haying at any time will have some detrimental effect. Nonetheless, delaying haying after initial nesting attempts will allow more grassland bird nests to be successful.

Grazing is the other widespread grassland management practice used across North Carolina. Intensive grazing leaves little cover for grassland birds to construct nests. However, light to moderate grazing, in both CSG and NWSG, provides the necessary cover and structure needed by these birds. Light to moderate grazing can increase the amount of forbs present, benefitting several species. Indeed, a well-managed grazing strategy is much better for grassland birds, bobwhites, and other wildlife than haying (regardless of timing).

Area sensitivity is the most important issue beyond field management that must be considered. It is possible that eastern meadowlarks and grasshopper sparrows in the North Carolina study selected among field types based on field size. Abundance of eastern meadowlarks and grasshopper sparrows increased with field size, regardless of management, indicating some level of area sensitivity. Grazed CSG fields were larger, on average, than other field types, which could explain why meadowlarks were most abundant in these fields. Conversely, NWSG fields that were not hayed or grazed (Figure 1) were relatively small and likely not suitable for area-sensitive birds, such as meadowlarks and grasshopper sparrows. Small fields surrounded by mature forest, regardless of management, do not provide suitable habitat for area-sensitive birds, including bobwhite quail.

To ensure wildlife and livestock goals and expectations are met, professionals and landowners must understand the consequences of different management regimes for different species of grasses.

For additional information on establishing, haying, and grazing NWSG, visit <https://utextension.tennessee.edu/publications/Pages/nativeGrasses.aspx>.

If you are interested in managing NWSG in the Piedmont, contact NCWRC Technical Assistance Biologist, John Isenhour at 704-637-2400, Ext. 101.

Alien Invaders!

By Kelly Douglass, Stewardship Biologist, NCWRC

Ever wonder if there is life on another planet? Well, what if you knew there were alien invaders right in your own backyard? That is the case for most private landowners in the state of North Carolina. My job at the North Carolina Wildlife Resources Commission is to help private forestland owners in the Piedmont region of North Carolina manage their property for wildlife, and almost every single piece of property I have visited in the last three years has had at least one exotic, invasive species present.

E.O. Wilson, the great American author and naturalist, once said “on a global basis...the two great destroyers of biodiversity are, first habitat destruction, and second, invasion by exotic species.”

What is an exotic species?

Most biologists would claim that native species are those that occurred in the U.S. at the time of European exploration around the late 1490s or early 1500s while exotic species (also called alien, introduced, non-indigenous, or non-native species) are those that occur here as a result of direct, indirect, deliberate, and/or accidental actions by humans.

There are actually two types of exotic species: benign exotics and invasive exotics. Benign exotics are species that depend on humans for their survival like pansies or other cultivated plants that do not produce viable seeds or tissues. Invasive exotics are species that can survive and reproduce without human intervention like kudzu or Japanese honeysuckle.

According to the Center for Invasive Species and Ecosystem Health, we have over 2,700 exotic species in North America. That includes 1,596 plants, 473 insects, 192 diseases and pathogens, 102 fish, 92 birds, 82 reptiles, 66 mollusks, 32 mammals, 31 crustaceans, 31 arachnids, 30 nematodes, and 7 amphibians.

How do they get here?

Most exotic species are introduced intentionally from other countries by people with good intentions to improve wildlife habitat, stabilize or prevent soil erosion, beautify their yards and homes, provide recreational opportunities like hunting or fishing, or for many other reasons. Species such as Chinese silvergrass and oriental bittersweet were introduced into the U.S. from Asia as early as 1736 for use as ornamental and horticultural plants. Autumn olive and bicolor lespedeza (shrub lespedeza or VA-70) were introduced from China and Japan in the 1800s for wildlife habitat and as ornamental plants. Nutria were introduced from South America for the fur trade, feral hogs were introduced (either escaped or released) for hunting purposes, and grass carp, brown trout, and flathead catfish were introduced for pond management and/or fishing purposes. Kudzu and sericea lespedeza were introduced into the U.S. from Asia in the late 1800s and early 1900s for erosion control and forage. Chinaberry and paulownia (princess tree) were introduced into North America in the early- to mid-1800s from Asia for



Wisteria

KELLY DOUGLASS

ornamental plantings but have also been imported for wood products such as cabinetry. Mute swans were introduced into North America from Asia and Europe for city parks, zoos, and family estates in the late 1800s to early 1900s.

Though most exotic species have been introduced into the U.S. intentionally, some have hitched a ride here unintentionally through a variety of transportation methods. For example, the zebra mussel, native to the Black and Caspian Seas but discovered in the Great Lakes in 1988, was thought to have been introduced through the discharged ballast water of ships. Hydrilla, although released intentionally in the 1960s from aquariums into waterways in Florida, has made its way to at least 27 other states by traveling on boats and fishing equipment. Fragments of the plant can root and develop into a new plant. The emerald ash borer, recently discovered in the U.S. in 2002, most likely hitched a ride in ash wood being used to stabilize

cargo in ships or crate heavy consumer products from Russia, China, Japan, or Korea. And Japanese stiltgrass was accidentally introduced into the U.S. in 1919 while being used as packing material for porcelain being shipped to America from Asia.

How do they become invasive?

First and foremost, they are extremely productive. They can grow and reproduce rapidly, can breed or reproduce at early ages, have longer growing seasons which means faster growth to maturity, and can reproduce via multiple pathways (via roots, stems, and/or seeds). Feral hogs, for example, can have 4-12 piglets per litter with 2 litters per year and can reach sexual maturity at 6-10 months of age. Purple loosestrife can produce hundreds of thousands of seeds per plant, and zebra mussels can produce up to 1 million eggs per year.

Many of the exotic, invasive plants have long seed viability (i.e., high dormancy rates), multiple adaptations for seed dispersal, and high and/or staggered germination rates. Eurasian water milfoil fragments can be carried on boats or trailers to new locations hundreds of miles away, and autumn olive berries can be eaten by birds and deposited wherever they fly. Japanese stiltgrass can produce 100 to 1,000 seeds per plant that can remain viable in the soil for at least 3 years and are transported easily on animal fur and human clothing.

Some exotic, invasive plants, such as tree-of-heaven, have allelopathic properties and can release chemicals into the soil that inhibit the growth of or kill surrounding plants. In addition, a single mature tree can produce up to 300,000 seeds per year that can be dispersed by wind and water.

Exotic, invasive species also compete aggressively for resources such as food, water, nesting sites, and cover and can tolerate a wide variety of

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habitats and conditions. Many have salinity, drought, shade, and/or flooding tolerances, can handle high sedimentation and high nutrient-load waters, and can handle extremely cold or hot weather. They can also adapt easily and expand their range quickly. Many exotic, invasive species have at least one, if not several, of these characteristics. Most exotic, invasive species also lack natural predators or pests in the new ecosystem and may be resistant to native predators. For example, multiflora rose and trifoliolate orange are resistant to grazing from cattle because of their thorns.

What effects do they have on our ecosystems?

First, they can have community-level impacts such as native species displacement. For example, Japanese knotweed can alter organic matter decomposition and soil chemistry to favor itself competitively. Japanese stiltgrass out-competes native herbs, and porcelainberry and kudzu shade-out native plants. European honeybees can displace native pollinators by outcompeting them for floral resources, and coyotes can hybridize with native wolf species to reduce genetic purity.

Second, they can have direct or indirect effects on wildlife habitat and populations. Some exotic, invasive species such as feral hogs can destroy habitat and disturb soil causing a direct negative impact on native wildlife. Bush honeysuckle and buckthorn are favored by birds because of their strong branches, but the shrubs also ease predator access which can result in reduced nest success. Many birds prefer exotic fruits and are attracted to the showy flowers and colorful berries which only aids in the plant's dispersal and can alter the foraging activity of birds. Changes in fruit availability and nutrition can also have direct impacts on the health of wildlife populations. Other exotic species, such as autumn olive, can completely shade out the understory of a forest reducing the herb layer that is consumed by eastern box turtles and other ground-dwelling wildlife. We also know that insects are closely related to plant diversity and native plant species. Some insects are specialized pollinators or host-specific species. Therefore, if the number (or distribution) of invasive plants increases, the number of native plants will decrease. As a result, the number of insects (species abundance or distribution) will also decrease causing a decline in potential prey for insectivorous wildlife and a decline in pollination services.

Third, invasive species can reduce forest health and timber productivity. Invasive plant competition, introduced diseases, and insect infestations in forestland can cause increased seedling mortality or cause problems with natural regeneration of forests. Allelopathic plants or vines, such as wisteria and morning glory, can increase seedling mortality and cause reduced growth rates of crop trees.

In addition, exotic, invasive species can have ecosystem level impacts by altering ecosystem processes such as disturbance regimes, hydrology, geomorphology, and soil chemistry. Cogongrass, for example, can increase fire intensity in ecosystems that are adapted to frequent, low intensity fires, and this can result in a decrease in native and/or rare plants associated with such ecosystems. Atlantic cordgrass can trap sediment on Pacific mudflats creating marshes and thereby removing important foraging habitat for many migratory shorebirds that feed specifically in mudflats. Chinese tallow tree and barberry can increase soil pH and nutrient loads in soil while salt cedar can dry up western river drains.

And finally, but perhaps most importantly, exotic, invasive species can reduce biodiversity. They can lead to a decline in endangered, threatened, special concern, and/or rare species or habitats. According to an

article published in *Ecological Economics* in 2005, "approximately 42% of threatened or endangered species are at risk due to non-native, invasive species."

What are some exotic, invasive plants in North Carolina?

Because I work primarily in the Piedmont region, I have compiled a list of exotic, invasive plants that I most commonly observe on private land in the Piedmont:

- **Trees:** tree-of-heaven, princess tree, chinaberry, mimosa
- **Vines:** kudzu, Chinese wisteria, Japanese honeysuckle, Oriental bittersweet, English ivy, and periwinkle
- **Shrubs:** Chinese privet, nandina, autumn olive, multiflora rose, Russian olive, bicolor lespedeza (shrub lespedeza or VA-70)
- **Grasses:** Japanese stilt grass, Chinese silvergrass, tall fescue, bamboo, Johnson grass, Bermudagrass, bahiagrass, weeping lovegrass
- **Aquatic:** alligatorweed, hydrilla, Japanese knotweed, purple loosestrife, parrot feather milfoil, giant salvinia
- **Herbs/forbs:** sericea lespedeza, garlic mustard, bull thistle

Princess Tree

KELLY DOUGLASS





Tree-of-Heaven

KELLY DOUGLASS

What can you do?

After reading about all the doom and gloom associated with exotic, invasive species, there is some good that can come from our situation. The old adage “an ounce of prevention is worth a pound of cure” is completely true when it comes to exotic, invasive species. Our best defense against invasive species is to prevent their introduction. Our next strategy is to eradicate or reduce the spread of the exotic, invasive species already here. So what can you do to help?

1. Learn which exotic, invasive species are in your area. Know how to identify them, report infestations to your local conservation agency, and tell your friends and family about the negative effects of exotic, invasive

species. See “A Field Guide for the Identification of Invasive Plants in Southern Forests” by James H. Miller, Erwin B. Chambliss, and Nancy J. Loewenstein (2010) free on-line at <http://www.treearch.fs.fed.us/pubs/35292>.

2. Buy local, native plants, mulch, and firewood. Reduce the demand for exotic species at plant nurseries and outdoor stores by buying locally. Plant only native or benign exotics on your property. Replace any exotic plants with native alternatives. Check out NC State University’s Going Native website at www.ncsu.edu/goingnative or the North Carolina Native Plant Society website at <http://www.ncwildflower.org/index.php> for recommendations on native alternatives.

3. Do not collect invasive plants, their seeds, or reproductive bodies. Do not purchase or transport materials containing exotic, invasive species (such as Oriental bittersweet wreaths), and do not collect seeds for friends and family. A great book to read is “Bringing Nature Home: How You Can Sustain Wildlife with Native Plants” by Douglas W. Tallamy (2009) \$15–20, on-line.

4. Control or eradicate exotic, invasive species on your property. Monitor your property annually, learn effective management practices, and treat the exotic, invasive species quickly before they become established. You will most likely need multiple chemical or mechanical treatments for invasive plants. Start with the mature, fruiting plants first, then attack the immature, non-fruiting plants. Be persistent and get help from volunteer groups like boy scouts, churches, neighborhoods, etc.

5. Do not keep exotic animals as pets. Do not release any exotic animals into the environment. Take them to an animal rescue facility, or have them humanely euthanized at a veterinarian clinic.

6. Get a habitat management plan. Seek guidance or assistance to identify and address exotic species on your property. Contact your local wildlife biologist for more information: www.ncwildlife.org.

7. Be conscious of moving livestock around on your property because seeds will travel in their digestive systems. Provide a quarantine location, usually for up to 24 hours, for each animal before letting them return to the original paddock/pasture.

8. Avoid driving or recreating in areas where exotic, invasive plants grow. Clean boats/trailers, vehicle undercarriages, boots, and equipment removing all plant material and mud. Brush dogs before leaving the site. Empty all live wells and bait buckets on-site.

9. Report invasive plant infestations to your local land management agency or one of the following agencies:

- EDDMapS (<http://www.eddmaps.org/>)
- NC Exotic Pest Plant Council (<http://nceppc.weebly.com/index.html>)
- The National Invasive Species Council (<http://www.invasivespecies.gov/>)
- Center for Invasive Species and Ecosystem Health (<http://www.invasive.org/>)
- USDA National Invasive Species Information Center (<http://www.invasivespeciesinfo.gov/>) 🐾



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