Wild Turkey Ecology and Management

for Mississippi and the Southeastern U.S.

For many, the gobble of the wild turkey tom on a crisp spring morning is one of the great wonders of the Southern outdoors. Across the region, many hunters, nature lovers, and landowners are enchanted by this fascinating bird and dedicate countless resources to its conservation and management. This publication explores issues important to the wild turkey and takes a close look at 1) the history of the bird's near demise and triumphant resurgence, 2) details of its biology and ecology, and 3) management practices that benefit and sustain populations.

Steve Gulledge

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History of Wild Turkeys in the Southeast

Historically, the Southeast's landscape was rich with wild turkeys. Early explorers documented the bird's abundance, and their writings detail encounters that suggest turkeys were plentiful throughout much of the region. Nonetheless, by the early 20th century, native wildlife species, including wild turkeys, faced serious trouble across much of the region. By the 1920s, the southeastern United States had become a leading timber exporter, and much of the region's forests were felled.

Logging practices of the era were vastly different than today's, with little thought given to restoring what was cut. Forest loss dramatically changed the landscape, and turkeys were relegated to the few remaining remote wildernesses and swamps. Year-round market and subsistence hunting also took a heavy toll. Many states attempted to alleviate the decline in wild turkey populations by enacting regulations preventing turkey harvest during the summer months. However, these efforts were insufficient and came too late to turn the tide.

The combination of habitat loss and severe overharvest sent populations spiraling downward, and the once abundant wild turkey was nearly wiped out. Wild turkeys hovered near the verge of extinction by the beginning of the Second World War.

During the 1930s, restoring wild turkey populations became a top priority for many state fish and wildlife agencies in the Southeast. While some suitable habitat was still available, early efforts to restore turkeys were greatly hampered by a lack of effective means to trap and relocate wild birds. To overcome this problem, some states began purchasing "game farm" turkeys for release into the wild. Unfortunately, farm-bred turkeys simply did not have the instincts needed to survive and reproduce in the wild. Nearly all of these farm-reared releases ended in failure.

Releasing game farm turkeys into the wild was an early and unsuccessful endeavor toward restoring wild turkey populations in the Southeast.

In the 1950s, the "cannon netting" technique was developed to capture wild birds. This technique consisted of a large net attached to steel projectiles fired from mortar-like cannons. Cannon nets were mobile, easily camouflaged, and able to be used in tight quarters such as logging roads or wooded openings. Cannon netting was simple but effective, and after years of slow progress, turkey restoration became an achievable reality across the South. Restocking efforts were soon in full swing and continued for several decades. Birds were captured from areas of abundance and released into unoccupied areas of suitable habitat elsewhere. Conservation officers ensured that newly established flocks were protected and allowed to grow. Furthermore, many of the Southeast's forests were recovering and beginning to mature. As more habitat became available, flocks expanded, and turkey populations experienced exponential growth. In many areas across the Southeast, restocking efforts were not deemed complete until the 1990s.

With populations healthy and growing, biologists began to focus on increasing their understanding of the wild turkey's needs. During the 1980s and 90s, long-term field studies were undertaken in various states across the Southeast. These research projects yielded a never-before-seen glimpse into the life of the wild turkey. By tagging turkeys with radio transmitters, researchers could closely monitor and document many of the facets of their biology, such as survival rates, habitat selection, home range size, causes of mortality, nesting and reproduction, and more. Through these projects, a much clearer understanding of the wild turkey's life cycle developed. Findings from modern-era wild turkey research direct the bird's

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In Mississippi, the hard work of turkey restoration was conducted from the late 1950s into the early 1990s. Birds were captured in areas of abundance and released into unoccupied areas of suitable habitat elsewhere.

management and help ensure that wild turkeys remain a part of the Southern outdoors far into the future.

Today, there are nearly 2.8 million wild turkeys throughout the southeastern United States—a far cry from the meager thousands that constituted the population at its low ebb in the early 1940s. Turkey hunting has become a popular sport and, over the last two decades, has been one of the few forms of hunting in which participation has grown. Turkey hunters are often characterized as a dedicated group with unique customs and traditions governing the pursuit of their favored quarry. Due to their dedication, turkey hunting is a considerable commercial engine, generating over $4.1 billion in economic output nationally. The bird's habitat requirements overlap

The ability to capture turkeys in the wild was key to their restoration and research. Here, a wildlife official prepares a cannon net to capture wild turkeys (top left). With turkeys close by, the net is triggered by personnel hidden in nearby blinds (top right). Turkeys can then be fitted with bands and GPS transmitters for monitoring before being released (bottom photos).

with a considerable number of other wildlife that benefit from management efforts aimed at enhancing wild turkey populations for hunters. Without question, the restoration of the wild turkey, one of wildlife conservation's greatest success stories, is a benefit to all those who have an appreciation for the natural world.

Life Stages and Ecology

Understanding an animal's unique biology is the underpinning of wildlife management. Through knowledge of specific life habits of turkeys, managers can learn to identify needs that must be met to ensure their flocks flourish. These requirements vary with the seasons and can differ as turkeys grow. The following sections provide an overview of the basic behaviors and biology of the wild turkey.

THE WILD TURKEY'S YEAR

Courtship

The most significant events in the wild turkey's year center on the breeding season when the processes of mating, nesting, and brood rearing are carried out. The turkey's breeding season begins during late February or early March and typically runs through early summer. Adult males are the first to announce its onset with their gobbling. Gobbling is the primary way gobblers attract hens and is most intense during the hour or so straddling sunrise. During the early breeding season, gobbling can be sporadic, and it may completely cease during periods of inclement weather. By April, the gobbler's early-morning serenade has usually become more dependable (Figure 1).

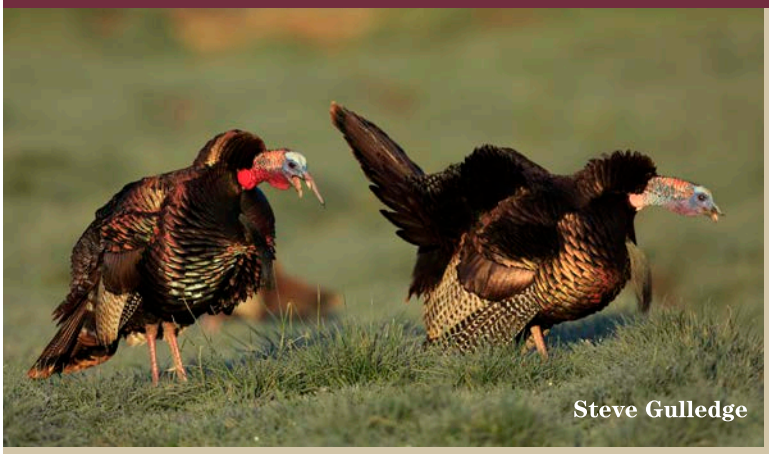
As the breeding season progresses, males become increasingly aggressive toward one another, and bachelor flocks that spent the prior winter together begin to break apart. Soon thereafter, wintering hen

A gobbler in strut—the courtship display of an adult male. The gobbler works to impress hens for breeding opportunities.

Steve Gulledge

flocks also begin to break apart and disperse to upland areas with nearby nesting habitat. Both gobbler and hen flock breakup typically occurs a few weeks after gobbling begins and results in some individuals moving several miles from their winter range (Figure 2). By spring green-up, this shuffle is mostly complete. Smaller flocks, usually composed of one or two gobblers and fewer than a dozen hens, will have settled onto the ranges they will occupy throughout spring.

WHEN DO TURKEYS GOBBLE?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Wild turkeys make a variety of sounds and calls, but none inspire turkey enthusiasts more than the male's gobble. The gobble of the wild turkey can best be described as a shrill yet throaty gurgle, and the intensity of the gobble can change as individual birds age. While turkeys may gobble any month of the year, most gobbling occurs during the mating season in late winter and early spring. The allure of a gobbling tom is the essence of spring turkey hunting, making the vocalization a central theme in the birds' pursuit. As such, timing gobbling intensity is an important topic to hunters.

Research in Mississippi has shown that weather is an important predictor of gobbling activity. Toms tend to gobble more readily on days with relatively dry atmospheric conditions, which often occur following the passing of a cool front. Gobbling intensity also varies throughout the breeding season.

Observational data collected by hunters for the Mississippi Department of Wildlife, Fisheries, and Parks demonstrates how gobbling rates vary across Mississippi from March to May. Gobbling activity begins in earnest earlier in southern Mississippi. On average, turkeys in southern portions of the state reach their maximum gobbling rates by the last 10 days of March, with a secondary peak of intensity occurring during the second week of April. In more northern counties, gobbling in March is sporadic, with activity steadily rising to a single peak during the first two weeks of April.

Hunting pressure has been shown to influence gobbling rates and may explain noticeable declines in activity later in the hunting season (Figure 1).

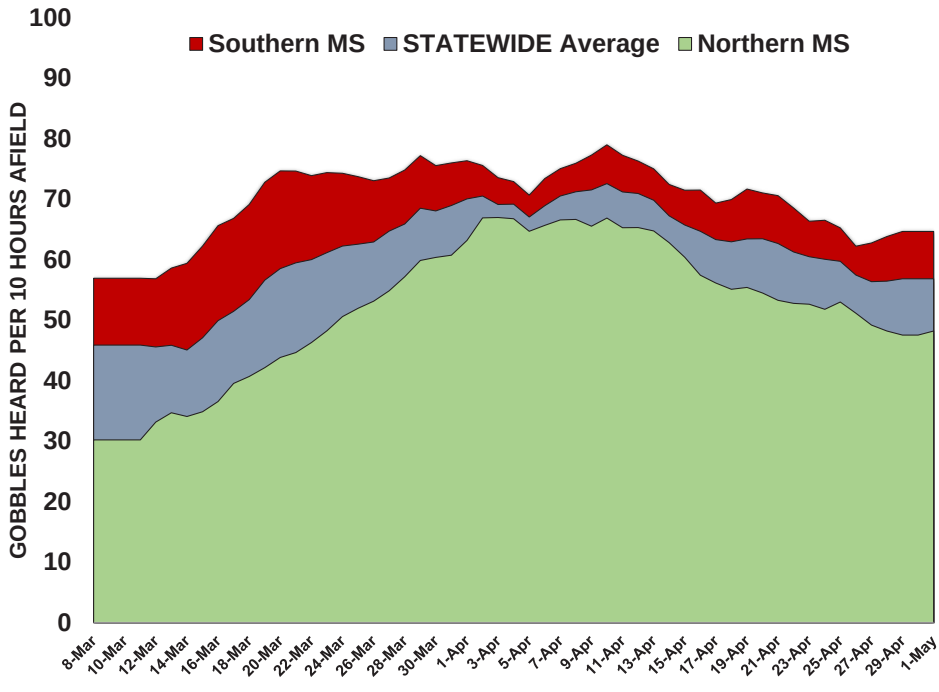

Figure 1. Gobbles heard per 10 hours of hunting by participants in the Mississippi Department of Wildlife, Fisheries, and Parks' Spring Gobbler Hunting Survey. These data represent 2.9 million gobbles heard across 465,000 hours in Mississippi from 1995 to 2018.

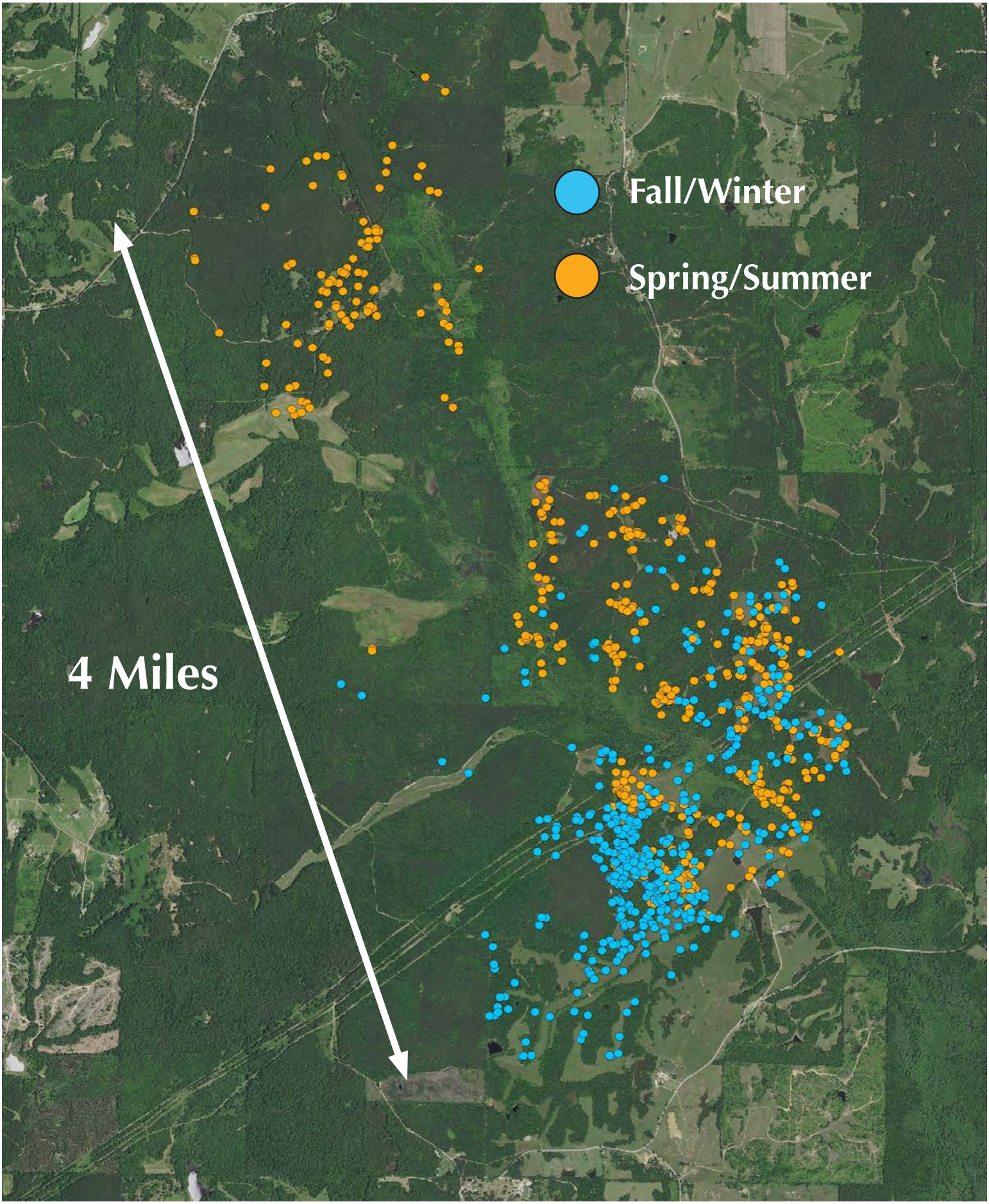

Figure 2. Wild turkeys may exhibit considerable range shifts from winter to spring. This figure illustrates the movements of a GPS-tagged gobbler, which moved several miles in North Mississippi between his winter and spring ranges.

Nesting

Nesting begins after spring green-up. Studies of Eastern wild turkeys suggest most adult hens attempt to nest each spring. Nesting rates of juveniles are lower and highly variable, especially when their environment does not provide for the best physical condition. Hens typically lay one egg per day, usually in the late morning or early afternoon, until a complete clutch contains 8 to 12 eggs. Between laying visits, the hen conceals the nest with leaves or dead vegetation. Throughout the laying phase, hens become increasingly solitary and secretive and may only interact briefly with other turkeys. Periodic incubation can occur during the final days of egg-laying, but constant incubation usually does not begin until after the last egg has been laid. In Mississippi and much of the southeastern United States, most hens begin incubating nests between mid-April and mid-May.

WILD TURKEY INCUBATION

For the embryos inside an egg to develop, a hen turkey must constantly warm the nest with her body heat through a process known as incubation. Like many events in the animal kingdom, the seasonal timing of incubation is a compromise geared toward maximizing the odds of success. In wild turkeys, the hatch must coincide with midsummer's peak insect abundance, meaning incubation must begin about a month beforehand. Although weather conditions may slightly shift nesting's commencement from year to year, studies of radio-tagged hens show that average nesting dates are relatively fixed. Very little incubation occurs before mid-April, and most hens do not begin incubation until the few weeks straddling either side of May 1 (Figure 3).

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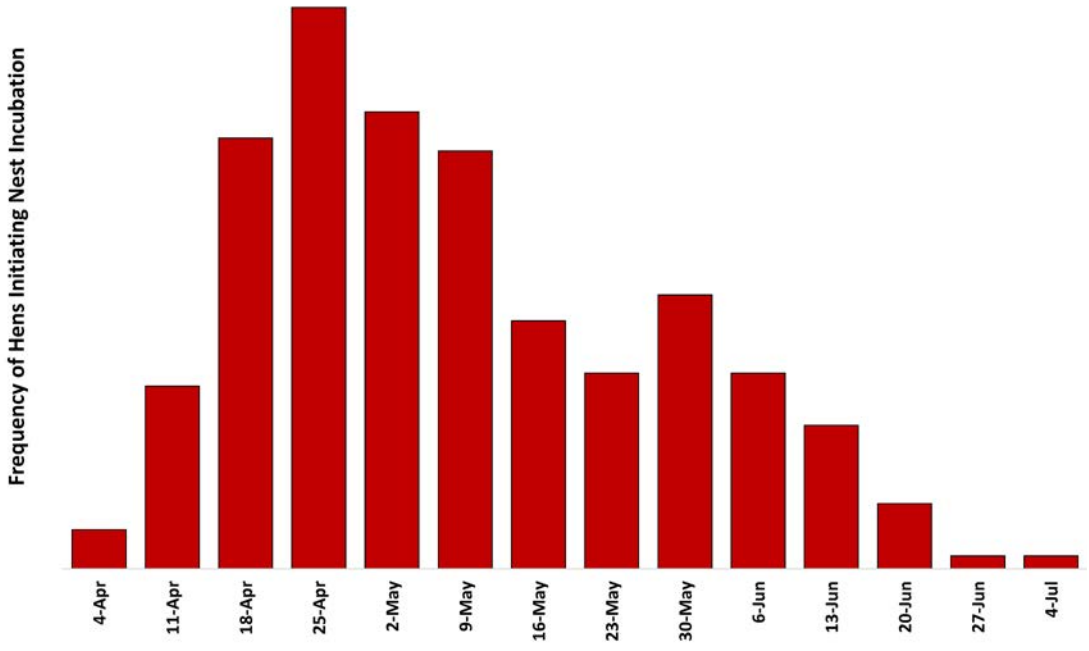


Figure 3. Onset of nest incubation in wild turkeys in Mississippi. Red bars indicate onset of incubation, by week, for 250 radio-tagged wild turkeys on telemetry studies in Attala, Copiah, Franklin, Lamar, Marshall, and Perry Counties.

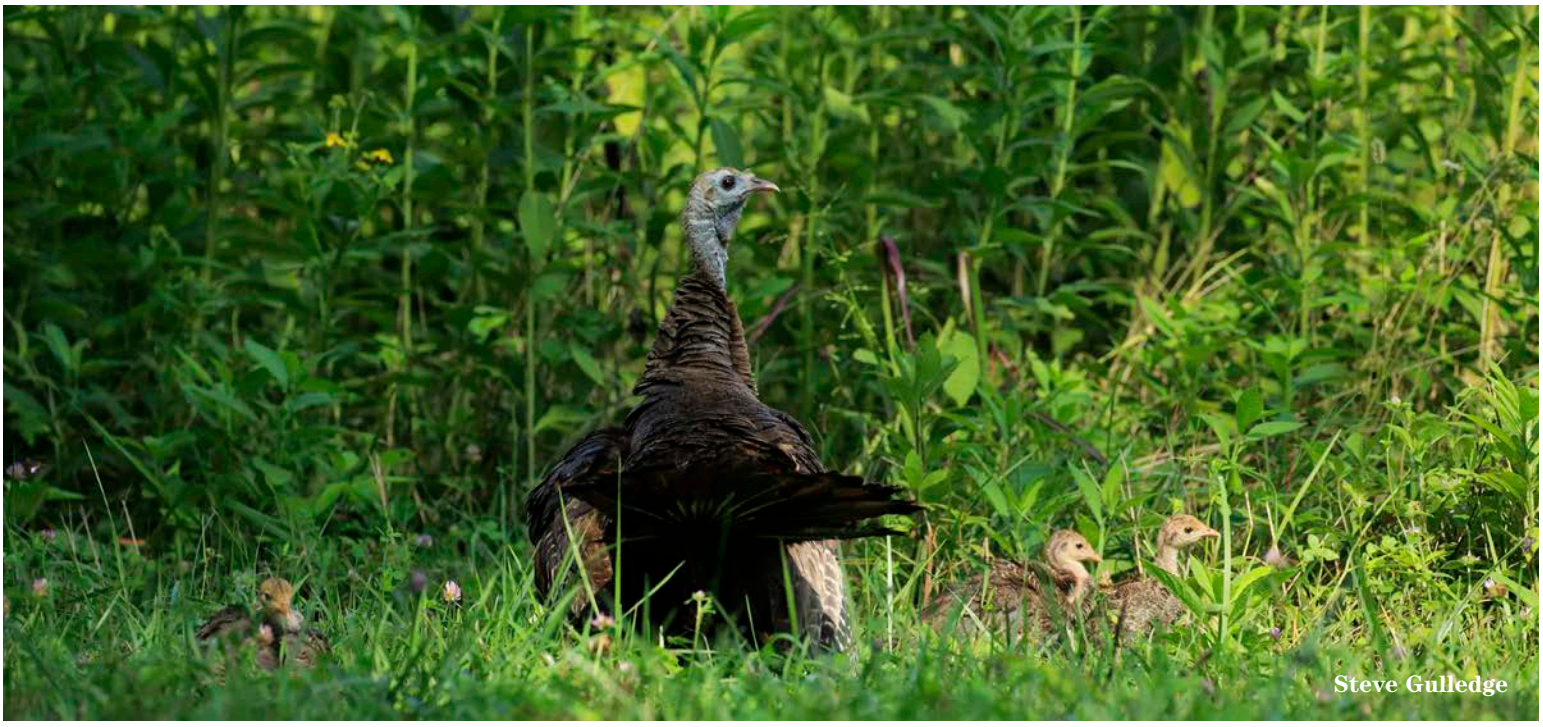
Hen turkeys incubate their nests almost continuously for about 28 days, leaving only for short, midday feeding breaks once every day or two. This four-week span is a vulnerable time for the hen. Camouflage is her only defense against predators, so concealment offered by vegetation around the nest is important for safety and a successful hatch. When danger approaches, the hen's instinct is to remain motionless until the last possible moment. This tactic prevents many predators from pinpointing her location, but the majority of turkey nests still are unsuccessful. Studies indicate only 20 to 40 percent of nesting attempts actually hatch a brood. This number varies from year to year; during great hatch years, nearly half may be successful; in bad years, less than 20 percent may yield any young. Weather can also play a role in the likelihood of nesting success. During wet, rainy periods, scenting conditions are enhanced for scent-hunting predators, like coyotes, and nesting success tends to drop.

"Studies indicate only 20 to 40 percent of nesting attempts actually hatch a brood."

About one in three adult hens will attempt to renest after losing their first clutch, but their ability to do so is influenced by the effort put into the first attempt. As with initial nests, re-nesting rates are much lower for juveniles, and very few attempt a second nest in their first spring.

Brood Rearing

Young turkeys are called poults or, collectively, a brood. Poults are able to leave their nests soon after hatching. This abrupt departure from the nest allows them to immediately begin feeding but also exposes them to many risks. They are flightless for their first few weeks and ill-equipped to escape many dangers. Most studies indicate that at least half of all poults do not survive the first few weeks after hatching. In extreme cases, only 10 to 20 percent of poults hatched during early summer will survive into the fall. Because the brood is vulnerable to many predators, hens with young are extremely wary and watch closely for the slightest hint of danger. They also seek out very specific low-growing, lush vegetation as cover so they can forage safely. Additionally, lush vegetation attracts insects that are an important food source for growing poults. The availability of this "brood cover" may strongly influence poult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survival rates during this period since habitats with abundant food and adequate cover reduce exposure to predators. Hen "experience" may also play a role in determining the brood's fate, as some researchers have demonstrated that poult mortality is highest for broods from juvenile hens. Older hens tend to be more experienced in identifying areas with good food and cover. Given the extreme mortality rates of young turkeys, aspects of brood ecology are viewed as a major limiting factor to population growth. As a result, management efforts often focus on increasing brooding cover.

> "Habitats with abundant food and adequate cover reduce exposure to predators."

After 10 to 14 days, poults develop primary wing feathers and become capable of short flights to low-hanging branches. By their third week, young turkeys are capable fliers. This allows for quick escapes and nighttime off-the-ground roosting, both of which greatly increase their chances of survival. Around midsummer, some adult hens (usually three to five) and their broods will form into large groups and remain together until the following breeding season.

Gobblers do not play a role in parenting and instead spend most of the post-breeding season apart from hens and their young. Gobbler flocks that were together before the breeding season will have regrouped by midsummer. Throughout the summer, gobblers mostly travel and feed around open fields and in mature woods, shifting their movements as different food sources become available.

Overwintering

Beginning in September and October, turkey flocks transition away from open habitats of lush vegetation and insects toward areas of big, older-aged timber to feed on newly available hard and soft mast. They mostly remain within these forests until flock breakup the following spring. However, it is not uncommon to occasionally see large flocks of turkeys in harvested crop fields in winter. Movements to wintering areas can be up to several miles, although the distance traveled depends on mature forest availability and acorn crop abundance.

Winter flocks can sometimes become very large and are usually segregated by sex, and in the case of gobblers, age. Slight differences in habitat preference are also noticeable between hens and gobblers. Adult gobbler groups more readily utilize uplands, such as pine woods or pine-hardwood transitions along secondary creeks, whereas hen flocks almost exclusively utilize bottomlands in winter. This difference in habitat use is believed to help reduce competition for winter's limited resources.

POPULATION DYNAMICS

The growth of any population is determined by whether recruitment of young outweighs all combined sources of death and loss. Once they reach adulthood, turkeys have higher annual survival rates than many other game bird species. Studies report adult turkey survival rates range from 40 to 80 percent, with most suggesting that, on average, two or three of every five will die throughout the year. Predators, legal and illegal harvest, and disease are the primary causes of death.

While hens and gobblers share similar overall survival rates, the primary causes of death are very different between the sexes. The ultimate cause of death for most hens is predation, of which the bulk occurs during the nesting and brooding season. Although predation and other natural sources of mortality do impact gobblers, far more gobblers are killed by hunters than predators. In moderate to heavily hunted areas, hunter harvest may remove one-quarter to one-half of the adult gobblers each year. On the


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other hand, juvenile gobblers, known as jakes, are typically harvested at much lower rates. Less than 10 percent of mortality occurs outside the spring for adult gobblers and jakes.

Although adult turkey survival is high most years, reproductive success varies considerably, making annual reproduction much more important than survival in determining turkey abundance. Very noticeable changes in local flock size often occur from year to year based on the reproductive season's outcome. It is not uncommon for turkey numbers to increase or decrease by as much as 50 percent of their long-term average following a good or bad hatch year. A number of factors, such as weather, habitat quality, and predators, act in concert to determine a population's annual change and, unfortunately, erratic ups and downs are unavoidable for turkey populations.

FOODS AND NUTRITIONAL NEEDS

Often described as "opportunistic omnivores," turkeys consume many forms of plant, insect, and animal matter. Their broad diet shifts with the seasons and can be very focused throughout the year or at particular life stages. Some of their most important diet components include acorns, fruits, seeds, and insects. Their primary means of foraging is to scratch through leaf litter and expose food items buried underneath. They also use their beaks to strip seed heads off grasses and agricultural crops, feed on small ground-living organisms (e.g., snakes, lizards, frogs, insects, and other invertebrates), and hop between tree limbs and pluck fruits or buds. Throughout the year, nearly three-quarters of a turkey's diet is composed of some form of plant matter.

Nesting hens and young poults have special dietary needs. Due to the physiological demands of egg production, hens often increase protein consumption before and during egg laying. Insects are their primary source of dietary protein, and during the nesting period, hens are often found feeding along field margins or other grassy areas where grasshoppers, leafhoppers, and other invertebrates are readily available. Calcium and phosphorous are important micronutrients needed to produce eggs, so hens often seek out fresh plant growth or snails, crayfish, and other crustaceans to incorporate these essential minerals into their diet. Similar to nesting hens, newly hatched poults require protein-laden diets to fuel the rapid growth they undergo during their first few months. The unique energetic demand of poults also requires insect-rich diets, making bug availability an important determinant of good brooding habitat.
Starvation of healthy wild turkeys is essentially nonexistent in the southeastern United States; good habitat provides all the food necessary to support large populations. Nonetheless, some hunters and land managers may decide it is necessary to supplement the turkey's natural diet. Direct artificial feeding (typically with grains like corn, milo, and wheat) at established feed sites yields few demonstrable benefits to wild turkeys in the Southeast. In addition, supplemental feeding may have several unintended consequences:

- Increased rates of disease transmission.
- Exposure to potentially harmful toxins associated with grain crops, such as corn, wheat, and sorghum (see page 13).
- Intensified predation rates.

Artificial feeding may have benefits in extreme environments such as the Desert Southwest or in northern latitudes that receive deep snow, but the practice should be avoided in the southeastern United States. The problems created usually far outweigh their potential benefits.

HOME RANGE

Wild turkeys are highly mobile and often use different vegetation types on a seasonal basis. Thus, the amount of land individuals visit throughout the year can be quite surprising, especially when considering range shifts from wintering to breeding areas. Studies conducted on turkey home ranges in Mississippi have shown their ranges vary, both between individuals and across seasons. Also, home ranges are generally larger for gobblers than hens. The average annual gobbler home range can exceed 3,800 acres, but the area used within a given season is usually much smaller for most gobblers. The core areas—where

gobblers spend the most time—may only encompass a few hundred acres during certain seasons. Some evidence suggests intensive hunting pressure can shift gobbler core areas, although the potential for this to occur likely varies between individuals. Other studies suggest that dominant gobblers tend to have smaller ranges and are more likely to overwinter near their breeding-season range than subdominant gobblers.

Annual home ranges for hens range from 1,500 to 3,000 acres and are often anchored by major creek drainages. Hen ranges tend to be smallest during the nesting and brooding periods, but some have been known to move their broods over a mile while searching for brooding cover. Hens with broods may cover great distances soon after hatching, but they usually settle into areas of 40 to 200 acres as the poults age. Resource availability has been shown to strongly influence home range size, and turkeys residing in high-quality areas with a diverse abundance of food resources tend to have smaller ranges. This is especially true of hens in forests with high mast production.

Mast: Nuts, seeds, buds, or fruits of trees and shrubs. Hard mast includes acorns, hickory nuts, and American beech seeds. Soft mast includes persimmons, huckleberries, blackberries, and muscadines.

DISEASES, PARASITES, AND TOXINS

Wild turkeys are susceptible to various diseases, infections, and toxins, but these are rarely limiting factors on their populations. Exceptions do arise, and localized outbreaks of substantial disease-related mortality can result in short-term declines of turkey populations. For example, observational evidence suggested that disease transmission played a major role in turkey population crashes throughout Mississippi during the late 1980s and early 1990s. As a precaution, wild turkeys found dead from unknown causes and wild turkeys that are obviously sick should be reported to wildlife officials for documentation and testing.

The most common wild turkey disease is avian pox. Avian pox is a virus that infects many bird species and causes lesions or nodules on the head, neck, and sometimes within the esophagus. Some infected individuals recover, but most fall victim to predation as a result of their weakened condition. Avian pox is most prevalent during the summer and early fall and is mostly spread through ticks and blood-feeding insects (especially mosquitoes). Infection can also occur by inhaling infected dander or ingesting infected scabs shed from lesions.

Attracting and concentrating wildlife around game feeders can enable the spread of diseases, such as avian pox.

Histomoniasis, or blackhead disease, is another disease that affects wild turkeys. Blackhead disease is actually a protozoan parasite, *Histomonas meleagridis*, that travels through intermediate hosts before infecting wild turkeys. Although rare, it is nearly always fatal. Blackhead disease can be transmitted to wild turkeys by chickens and chicken litter spread on pastures and fields as fertilizer. Recent testing of commercial broiler, breeder, and layer chickens has shown that chicken litter from broiler houses is usually free of blackhead disease because the associated parasite is unable to complete its life cycle during the short span in which broilers are grown. Chicken litter from breeder and layer houses is more likely to have higher rates of infection and should not be applied to fields where wild turkeys are present.

Lymphoproliferative disease virus (LPDV) has been documented recently in Mississippi and other states in the Southeast. This virus can cause unsightly tumorous growths on the head, legs, internal organs, or within the muscle tissue. Surveys suggest a high proportion of turkeys may carry LPDV, but acute symptoms seem to appear only within a small percentage of infected individuals. At present, little is known about mortality rates associated with infection. However, it is suspected that predation would be severe if tumors around the eyes restricted vision. There is still much to be learned about the ecology of this virus and how it impacts wild turkey populations. The exact means by which this virus is most often transmitted are unknown.

Corn and other small grains contaminated with fungi of the *Aspergillus* genus can produce poisons known as aflatoxins that, when ingested by animals, may cause them serious physiological harm. Wild turkeys are particularly susceptible to the effects of aflatoxins, with juvenile birds showing the least tolerance. Research conducted by the Southeastern Cooperative Wildlife Disease Study at the University of Georgia demonstrated that liver damage, blood disorders, and diminished immune system function occur in young wild turkeys after ingesting corn contaminated with low levels (100 parts per billion) of aflatoxin. Aflatoxicosis has been shown to cease egg production in domestic turkey hens. Testing has demonstrated that corn sold as "wildlife feed" or "deer corn" may contain aflatoxin at levels that negatively impact the health of wild turkeys. Direct-feeding corn purchased from retailers is not recommended, and avoiding this practice is one of the easiest ways to reduce the chances of disease within wild turkey flocks.

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AFLATOXINS

Aflatoxins are produced by fungi of the genus *Aspergillus*. *Aspergillus* spores occur naturally in the soil and may be transported to corn, cereal grains, and peanuts by wind or insects. Aflatoxin exposure can cause organ dysfunction, internal bleeding, and death. Long term, low-level consumption of aflatoxins tends to result in decreased feeding rate and nutrient uptake, decreased reproductive performance, birth defects, tumors, and suppressed immune system function. Susceptibility to aflatoxins differs among species, but birds tend to be more susceptible to its effects than mammals. The disease and health risks to turkeys and other wildlife are why natural resource professionals do not recommend this practice.

Habitat Requirements

Early wildlife biologists believed wild turkeys could only exist in areas of expansive, untouched wilderness. This belief was based on observations when remote forested areas with little to no human influence were the only places turkeys had survived overhunting and large-scale habitat destruction during the first few decades of the 20th century. Field experience and research has since proven these beliefs to be unfounded; wild turkeys demonstrate a much broader range of habitat tolerance than originally understood. Still, wild turkeys have specific habitat needs that vary with the seasons and differ depending upon age, sex, and reproductive status. Understanding these needs shapes the direction of management actions.

FORESTED AREAS

The Latin name of the Eastern wild turkey, *Meleagris gallopavo sylvestris*, loosely translated means "fowl of the forest." As this name implies, turkeys are dependent upon forest cover, and while fields and open areas are frequently used, turkeys do spend most of their time in woodlands. Turkeys generally seek out forest stands with open understories, moderate ground-level vegetation, well-developed midstories, and older trees in the canopy. Areas with dense understories are only used during the nesting and brooding period when concealment cover becomes essential for successful reproduction.

> "The ideal forest seems to be when hardwoods comprise one-fourth to one-third of a given landscape."

Mature hardwood forests of oaks and other mast producers are especially important to wild turkeys. The closed canopies and shaded understories of these forests yield open conditions for foraging and loafing and serve as a hub of turkey activity throughout the year. The ideal forest seems to be when hardwoods comprise one-fourth to one-third of a given landscape. Less than this amount of hardwoods tends to

While the entire landscape need not be composed of hardwood stands like these, aim for one-third of the landscape to be in diverse hardwood forest for maximum turkey abundance.

yield fewer turkeys, but greater amounts do not necessarily translate into more turkeys. At local levels, such as within a home range, much of an individual turkey's time is focused in areas where hardwoods are most abundant. This is especially true for hens.

Hardwood forests containing a diversity of tree species tend to be better habitat due to the variety of food resources they provide. Likewise, having mixed oak species within a stand is best, as some species may bear acorns heavily in a given year while others fail. Oaks can be lumped into the red or white oak families. White oak acorns mature in a single growing season, whereas red oak acorns require two growing seasons to mature. As a result, red oaks are more consistent mast producers because weather conditions in a given year have less of an impact on acorn crops. White oak acorn production is favorable 2 out of every 5 years, meaning white oak acorns are scarce 3 out of every 5 years. Acorns from the red oak family also tend to be available into late winter, which makes them especially valuable to turkeys. Consequently, forests dominated by cherrybark oak, water oak, willow oak, black oak, southern red oak, and other members of the red oak family are most often used by turkeys. Regardless, managing a hardwood stand with a mix of white and red oaks will help ensure some acorns are available throughout the fall and winter each year. Other mast-producing species important to turkeys include American beech, black gum, flowering dogwood, hackberry or sugarberry, pecan, persimmon, sourwood, magnolia, and elm.

Other forest types besides hardwoods are also used by turkeys, as long as they provide relatively open understories. Older-aged, mixed pine-hardwood stands are preferred when available, but pine-dominated stands in the pole to saw-log size classes can provide desirable habitat when properly managed. Plantation pine stands offer habitat to turkeys but only during the first few years following establishment and, later, after they have reached merchantable size. From a plantation's fourth or fifth year until the time of its first commercial thinning, the developing stand is too thick to provide conditions favorable for turkeys, and plantations receive very little use by turkeys during this stage.


MSU Extension


Bronson Strickland


Don Chance, MSU

This early growth stage pine plantation (top) will provide nesting habitat for 2 to 3 more years before it grows too thick for turkey use. From that point until it is thinned at or near the commercial growth stage, it will provide very little benefit to turkeys.

Moderate plant growth near the ground enhances forested habitats. Tender, green shoots of vegetation and the seeds of many naturally occurring woodland grasses provide food during the spring and summer. While forest understories filled with expanses of briars and other thorny vines are generally avoided, scattered blackberry and dewberry patches provide soft mast foods.

During the growing season, lush herbaceous growth provides an abundance of insects for turkeys of all ages. Switchcane thickets in low-lying forests are used as escape cover. Given the seasonal needs of wild turkeys throughout the year, diverse species and growth stages of trees, shrubs, and understory vegetation within timber stands is essential to meeting their forest habitat requirements.

Southern Dogwood

Don Chance, MSU

Elderberry

Turkeys eat soft mast foods, including dogwood berries, elderberries, blackberries, muscadines, and summer grapes. Soft mast photos: Bill Hamrick, MSU Extension

Summer Grape

Muscadine

Blackberry

ROOSTING HABITAT

With the exception of nesting hens or those with young broods, turkeys spend each night roosted in trees. This behavior allows them to sleep more safely and avoid predators on the ground. Turkeys prefer to roost in conifers—possibly for the thermal protection offered by their needles—but if unavailable, they will readily roost in hardwoods. Although the nomadic nature of turkey flocks sometimes forces them to roost at unfamiliar locations, many roost sites are used with regularity, and some "ancestral" roosts may be used by successive generations of turkeys.

Frequently used roosts are often associated with terrain features such as stream edges, "finger" ridges, hillside slopes, field edges, and cypress sloughs or other tree-lined bodies of water. In some parts of the country, such as the Great Plains or the Southwest, a lack of roosting habitat can be a limiting factor. However, available roosting areas are rarely an issue in

heavily forested areas in the southeastern United States. Nevertheless, proximity to perennial roost locations can have a considerable impact on local movements of turkeys, and retention of known roost sites should be an important management consideration on smaller properties.

NESTING HABITAT

Turkey nests are relatively simple structures consisting of a shallow depression in the ground, often created against the base of a tree, downed log, or tree top. Turkeys nest in a variety of settings, including mature forests, fields, clear cuts, and rights-of-way. Although the type of landcover where turkeys nest may be broad, the commonality among nearly all nest locations is that they are found in areas containing thick, shrubby plant growth within the first 3 feet aboveground. This thick vegetation provides screening cover that visually conceals the hen and may also help in concealing her scent. This type of brush cover, commonly referred to as early-successional cover, is found during the earliest stages of plant community development, often occurring 2 to 5 years following an environmental disturbance such as a tornado or fire. Development of moderately dense, early-successional cover needed for nesting can occur in large blocks, such as forest stands following a timber harvest or prescribed burn, or on a much smaller scale, such as a briar patch flourishing in a recently created opening from one or more trees downed from high winds.

The arrangement and availability of nesting habitat is important. Research in Mississippi has demonstrated that some areas yield higher odds of successful hatching than others. Nesting habitats that are small, isolated, or otherwise easily searched by predators offer much lower odds for nest success. Ideal nesting cover is well-distributed with abundant access and escape avenues throughout and allows for nests to be located in less obvious places or areas that cannot be efficiently searched. The least desirable is nesting cover adjacent to travel corridors frequently used by predators.

Turkeys generally nest in areas with thick, shrubby plant growth near the ground to offer the hen concealment as she incubates her nest.

Nesting cover can be found in the understory of pine stands 3–4 years following a prescribed burn.

BROOD HABITAT

Much like nesting cover, vegetation structure is an important component of suitable turkey brood habitat. Areas of early successional vegetation 1 to 2 feet tall with some open ground underneath are often the most suitable for brooding. Vegetation height is low enough for hens to watch for predators but high enough to help conceal poults. More open ground underneath contains fewer obstructions and obstacles for small poults and allows them to forage more efficiently. Open areas near forested edges, road and utility rights-of-way, "grown-up" field margins, or woodlands with moderate understories may all serve as brooding cover. Keep in mind that growing poults need protein, so areas offering the greatest abundance of insects while providing structural cover will be the best brood habitat.

As turkey poults age, the areas they frequent may change (Figure 4). Pastures of livestock forage grasses, like Bahia or fescue, provide less than ideal conditions for recently hatched poults. By their second month, however, young turkeys have developed the strength needed to push through the dense grass mats that these grasses form, and grazed pasture edges become a common place to spot hens and their young.

Where do turkeys take their young?

Good brood habitat has one commonality: it contains lush plant growth and abundant insects near the ground. These conditions can be found in managed hardwood or pine forests, as well as open areas containing old-field vegetation.

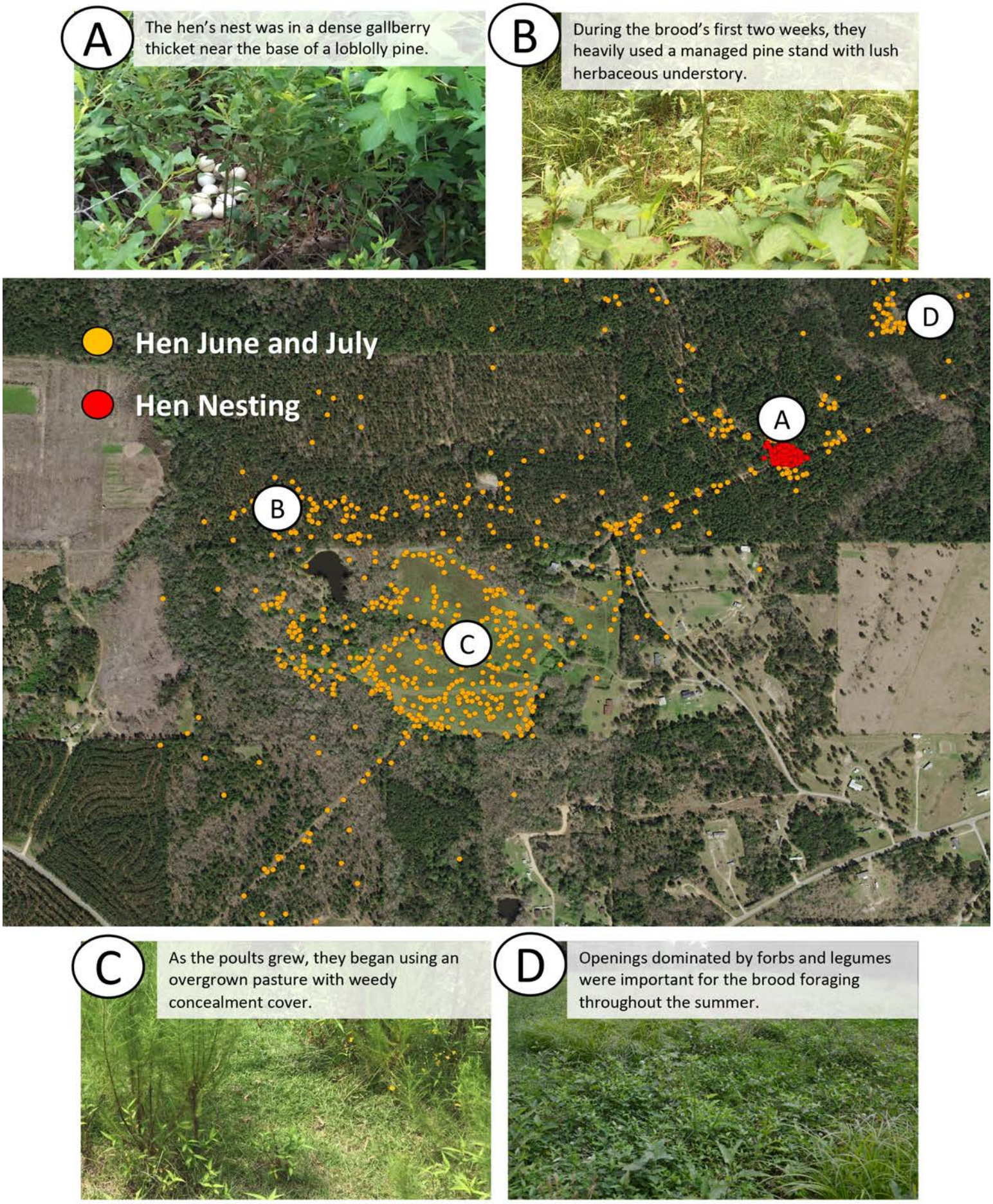


Figure 4. A hen in South Mississippi was caught and tagged with a GPS transmitter to monitor her movements during spring and summer. She successfully nested (red dots) and then used several different habitats for brooding throughout June and July.

OPEN HABITATS

Open areas are important features of good turkey habitat. Long, linear openings and small to moderately sized fields are used heavily by turkeys throughout the year. Managed old fields, crop fields, rights-of-way, levees, recent clear cuts, food plots, and the aforementioned grazed pastures can all serve as openings for turkeys. During rainy weather, turkeys often move into open areas where they can rely more heavily on their keen eyesight to detect predators. Field edges are often favored loafing areas for flocks; they provide display areas for strutting gobblers and produce an abundance of insects for bugging grounds. For this reason, the highest quality brood habitat is typically found in open vegetation types, and proximity to these areas can play a role in turkey use of other nearby types of landcover. During spring, turkeys often shift their ranges in order to access more open areas, so openings are an especially important landscape feature on smaller properties interested in attracting turkeys during the spring gobbler season.

Various types of openings provide turkeys with display areas, "bugging" areas, and, when properly managed, high-quality brood habitat.

Exotic pasture grasses, such as these along this levee, can provide good bugging areas for adult turkeys and poults older than 1 month. However, such openings are difficult for young poults to navigate and avoid predators.

WILD TURKEY LANDSCAPES

The preceding descriptions of turkey habitat should demonstrate the bird's contrasting requirements, in which older, open timber and younger, thick cover are both essential at various stages of the life cycle. Accordingly, the ideal turkey landscape is comprised of a patchwork of different forest types of different ages, openings, and travel corridors (Figure 5). These different habitats among the landscape reduce the need for nomadic movements, which improves physiological condition, survival, and abundance. Throughout most of Mississippi, densities of 6 to 12 turkeys per square mile are the norm. Exceptional landscapes where all habitat components are well-represented and evenly distributed may yield two dozen or more birds per square mile.

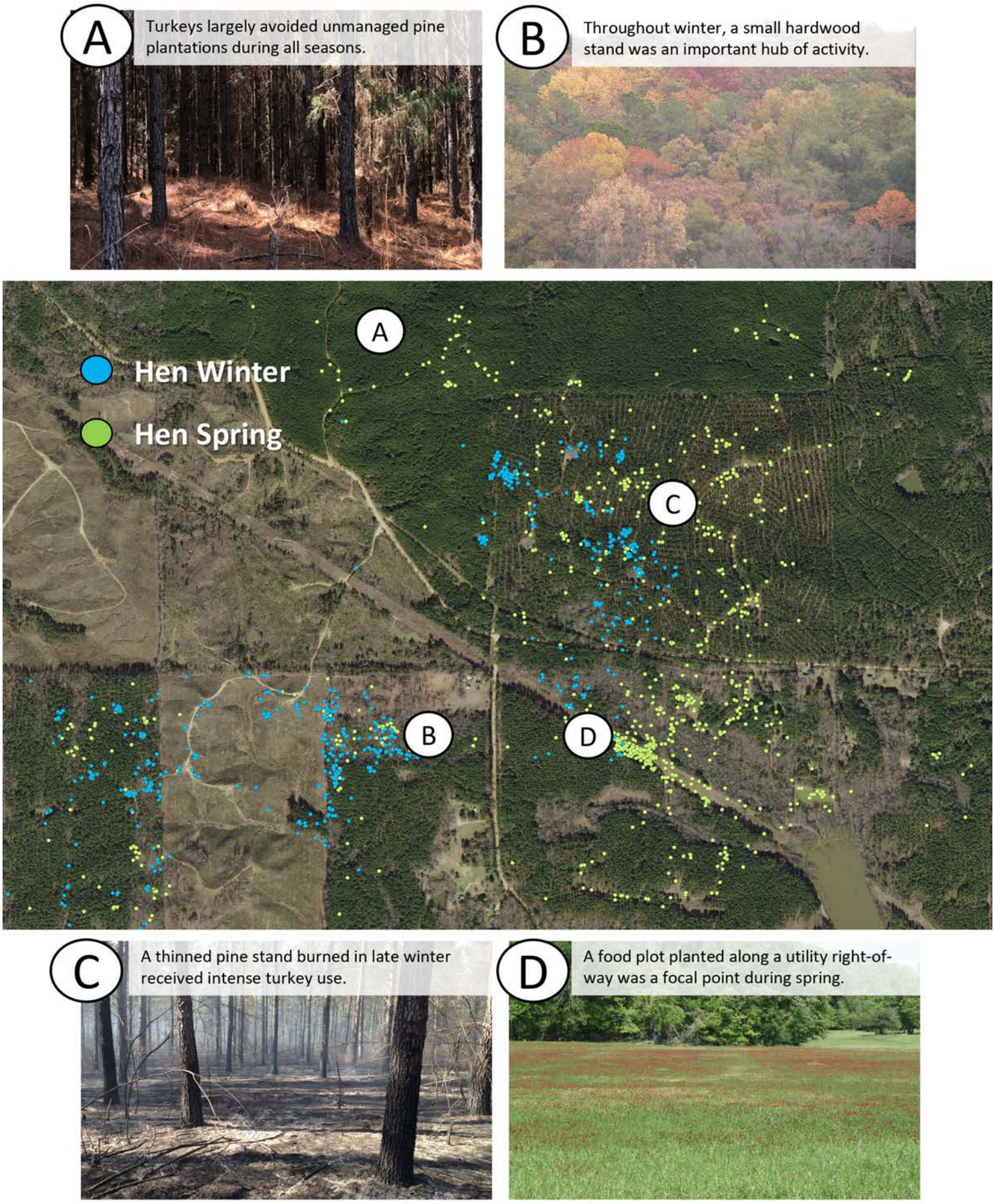


Figure 5. A hen was caught and tagged with a GPS transmitter in Central Mississippi, allowing her movements to be tracked at 30-minute intervals during winter and spring. Lettered points on the map correspond to photos that depict what the vegetation looks like at ground level.

Habitat Management

Although much has improved over the years, a shortage of quality habitat continues to be the main limiting factor for turkey populations in Mississippi today. However, landowners can implement many habitat management practices that will improve habitat conditions for wild turkeys and attract them to their property. Turkeys benefit from active land management, especially in forested settings (Figure 6). As a result, they are an ideal species to manage for on working lands with multiple land use objectives. Give careful consideration to the habitat needs of turkeys in conjunction with land management decisions, as some decisions may reduce the quality or extent of necessary habitat components.

> "When developing a wild turkey management plan, seek advice from a wildlife biologist, a registered forester, and other natural resource professionals with expertise in a broad range of land management practices."

An important first step for improving turkey habitat should be preparing a comprehensive management plan. In most cases, management plans help to establish a balance between multiple objectives, such as loss of timber revenue versus maintaining quality wildlife habitat. The planning process should identify landowner goals and priorities, assess existing resources, and recognize limiting factors for improvements. When developing a wild turkey management plan, seek advice from a wildlife biologist, a registered forester, and other natural resource professionals with expertise in a broad range of land management practices. They will be able to provide insight that will help landowners better determine the ideal management practices for their property. Also, local knowledge of the property will help strengthen a management plan's components. For instance, turkeys are creatures of habit and often will use specific places, such as roost sites and loafing areas, each year. By identifying these areas in advance, you can avoid or limit changes that may negatively impact turkey use throughout a property.

Stands of mixed pine-hardwood can be prime areas for adult turkeys.

FOREST MANAGEMENT

Much like the other states that make up the southeastern U.S., more than half of Mississippi's landcover is forested, and as previously mentioned, this broad vegetation type is where wild turkeys spend much of their time. The intensity of forest management for turkeys should depend on stand type, composition, and the surrounding landscape, as well as other land use objectives for the property. Decisions surrounding timber harvests, as well as management actions during the long process of timber growth, can mean the difference between landscapes with abundant or scarce turkey populations.

Regardless of timber type, forest management for wild turkeys should focus on maintaining a diverse understory that can meet the various life stage requirements. Specific management techniques will vary based on stand and site conditions, but objec-

Hardwoods can be managed for timber production and still provide good turkey habitat.

tives should seek to promote some areas with the lush, thick understory needed by nesting hens and poults, while also retaining areas of open, park-like forest more used by adult turkeys throughout much of the year.

Hardwood Management

Hardwood forests are an integral component of turkey habitat. Therefore, hardwood stand management plays an oversized role in determining whether local turkey populations grow or shrink. In many cases where turkeys are a primary consideration, the best course of action may be to leave hardwood stands alone, particularly if open, older-aged forests are limited nearby. This does not mean that all hardwood stands are equal nor that they don't need to be managed. In fact, proactive hardwood management may sometimes be necessary to improve turkey habitat or meet other silvicultural objectives. Active hardwood management is particularly relevant when hardwood stands comprise a large percentage of the landscape (more than 40 percent) and their disturbance represents the most obvious opportunity to create nesting and brooding habitat, or when commercial timber harvest is necessary to meet other competing objectives.

When conditions do warrant direct hardwood management, always consider the stand's future condition. Short-sighted management practices in which only the most valuable trees are harvested with no thought to the forest's future condition reduces diversity of desirable species and size classes. This practice, commonly known as "high-grading," may yield less-desirable habitat and will likely reduce long-term financial value. Adopting forest management practices that prevent degradation of existing stands and promote regeneration of desirable tree species is the best approach for sustainable wild turkey habitat.

Hardwood stands are typically managed under broad yet distinctive techniques, based on intermediate and long-term objectives. These approaches center around decisions of when and how to begin a new developing stand through replacement of the existing timber. Hardwood management may be tailored to these differing approaches based on site conditions and landowner considerations. Even-aged silvicultural techniques (e.g., clear cuts, seed tree, shelterwood cuts) produce stands composed of similar aged timber and may arise from artificial plantings or methods that harness natural tree regeneration (e.g., seeds or stump sprouting). Even-aged regeneration is most appropriate when management objectives focus on a high percentage of oaks in future forests. The tradeoff with this approach is that turkeys generally avoid the young hardwood stands produced by even-aged management as they grow through the sapling size classes. Thus, even-aged hardwood rotations should be long (60 to 120 years), and even-aged cuts should be limited in scale and scope to ensure enough turkey habitat is available within a local landscape.

Uneven-aged silvicultural management seeks to produce hardwood forests composed of multiple tree species, ages, and sizes. These mixed conditions are created by the periodic selective removal of single trees or small groups of trees. Natural tree regeneration is encouraged in the gaps created during harvests, which produces the desired forest structure over time. This approach is beneficial to turkeys because it provides near-continuous habitat availability within the stand while avoiding the need for expan-

sive areas they will not use for a number of years. However, in practice, successful uneven-aged hardwood management can be difficult to implement and may not maximize financial return. Extensive knowledge of the relationship between site conditions, tree species, and their potential response to different cutting scenarios is critical to maintaining desirable species balance under uneven-aged scenarios.

Hardwood forests can also be improved through commercial or noncommercial intermediate treatments (thinning or crop tree release) that remove undesirable tree species or less vigorous trees to redistribute resources to the remaining trees. The benefits of removing less desirable and unhealthy trees while leaving well-formed and vigorously growing individuals, particularly oak species, can be threefold: 1) it allows more sunlight to reach the forest floor and stimulates increased growth of grasses and broadleaf plants, 2) it reduces competition and can improve acorn production, and 3) it improves the health and quality of the timber stand and may ultimately lead to greater financial value.

Where turkeys are a management objective, considerable acreage of mature hardwood or natural mixed pine-hardwood should be retained and undisturbed.

Wide-scale conversion of hardwood forests to pine forests or other types of landcover will decrease turkey abundance and require more intensive management of the remaining acreage. Therefore, an important goal for turkey management should be to retain considerable acreage of mature hardwood or natural mixed hardwood-pine forests where possible. Interspersion of hardwood acreage is most critical in regions dominated by intensive agricultural or plantation pine forestry practices. Setting aside streamside management zones (SMZs) of hardwood timber in these types of landscapes is a crucial conservation-practice. Hardwood SMZs intermixed among less suitable landcover types provide travel corridors for safer access to adjacent areas that turkeys are seeking. Consideration should be given to SMZ width and may involve having to make tradeoffs with other land management and land use objectives. Research has demonstrated that turkeys use SMZs of 100 yards or wider more often than those of lesser widths.

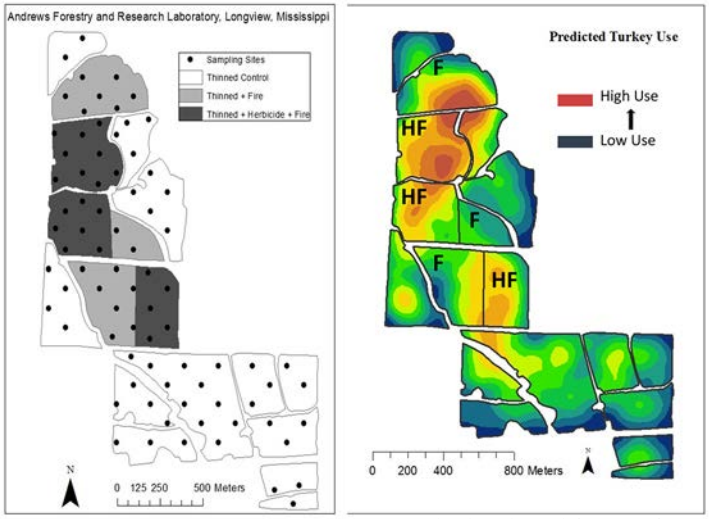
Streamside management zones in areas where timber harvests have been conducted not only help with soil erosion and water quality but also provide travel corridors for wildlife. Research has shown that wider streamside management zones are used more by turkeys.

Pine Management

Much of the Southeast's landscape is dominated by pine timber. Like hardwoods, older-aged stands of naturally occurring pine or mixed pine-hardwood can provide good turkey habitat with relatively low management intensity. However, these types of forests are becoming less common and, following harvest, are most often replaced with pine monocultures (commonly known as pine plantations). While these forests can provide suitable habitat for wild turkeys, they require more active management practices to create favorable conditions.

Unlike hardwoods, pine forests in the Southeast are managed almost exclusively via even-aged silvicultural practices known as plantation forestry. Thus, most pine stands in the Southeast are clear cut at final harvest, then site-prepped and replanted in uniform rows of loblolly pine. The open ground created by clear cutting initially provides foraging areas for wild turkeys. However, within a few years' time, vegetation becomes too thick and, except for nesting, turkey activity within these areas is reduced to traveling and foraging along their edges. Nesting habitat in replanted clear cuts can be prolonged by planting pines at wider spaced intervals and avoiding intensive site preparation practices. Once the crowns of young pines crowd together and form a closed canopy, the pine plantation holds little value as wild turkey habitat. Unless the pines are thinned, the stand will continue to offer little to no value as turkey habitat. Therefore, to benefit turkeys, pine

Forest management influences turkey use on a property. The top photo shows a thinned and burned timber stand with an herbicide application to control mid-story hardwood trees. The bottom photo shows a stand thinned to a lesser degree with no prescribed fire or herbicide treatments. The figure below shows that pine stands that receive both prescribed fire and herbicide treatments, as in the top photo, have the greatest use by turkeys, and unburned stands have the least use.



HF = herbicide and fire; F = fire

Source: Johannah McCollum. The Effects of Habitat Management on Wildlife Use in a Managed Loblolly Pine Forest. Thesis, Mississippi State University.

Thinning of pine stands offers an opportunity to increase nesting and brooding cover for turkeys.

plantations should be thinned as soon as merchantable. Thinning recommendations for pine plantations eventually remove about half of the standing timber volume. As discussed in the previous Hardwood Management section, thinning allows for greater amounts of sunlight to reach the forest floor and stimulates the growth of broadleaf plants and grasses that provide food and cover. The conversion of these once-dense pine plantations to more open pine forests is attractive to turkeys, and they often begin using these areas within a few days of being thinned. Favorable habitat conditions will persist for several years, but similar to clear cuts, understory vegetation will ultimately become too thick if management practices such as prescribed burning, herbicide applications, mechanical mulching, and additional thinning are not implemented to maintain open conditions.

Pine forests with closed canopies allow very little sunlight to reach the forest floor. As a result, shade-tolerant trees will often dominate the understory and mid-story, resulting in little wildlife habitat.

A pine forest managed for wildlife habitat will have a more open canopy, resulting in the growth of herbaceous plants in the understory that provide food and cover for turkeys and other wildlife.

Turkeys do best in pine forests managed for saw timber with harvest rotation lengths of 30 or more years to maximize the availability of older-aged timber classes that are more suitable for turkeys. Similarly, management plans that involve clear cutting should acknowledge the need for older timber and provide travel corridors between unharvested areas. Where practical, clear cuts should be less than 100 acres, irregularly shaped, and not adjacent to young plantations that are still developing as turkey habitat. Strategically and periodically locating clear cuts throughout a property intersperses different habitats and age classes of timber, thereby creating more diverse landscapes in which turkeys can thrive.

WILDLIFE OPENINGS, PASTURES, AND FOOD PLOTS

Of all the improvements that can be done to make a property attractive to turkeys, few things will yield better results than the creation of permanent openings. Although landowners often plant openings in wildlife food plots, some of these openings should be left in native vegetation. Devoting up to 10 percent of a landscape to wildlife openings is commonly recommended, and the quality of nearby forested habitats should dictate the degree to which wildlife openings are made available.

Creating widely dispersed openings of 1–5 acres is one of the most beneficial practices for increasing wild turkey use of a particular property.

Creating openings to improve turkey habitat can be expensive; hiring a skilled bulldozer operator can cost $75 or more per hour. However, reclaiming or maintaining existing openings, such as logging decks or utility rights-of-way, can be a cost-effective way to provide openings for turkeys. Also, new openings can be created and roadsides "daylighted" as part of timber harvest activities. Daylighting is expanding interior road rights-of-way by clear cutting and/or heavily thinning timber extending 30 to 50 feet outward from the roadbed. Stumps are then removed, and with occasional disking, the area can be managed in native cover or as linear food plots. Daylighted roadways can serve as travel corridors and loafing areas, and provide interspersed openings throughout

Daylighted roads are an effective technique for adding turkey habitat in a landscape of managed forests.

a property. They are especially beneficial to turkeys in heavily forested areas. Studies conducted in Mississippi suggest that roadway management may influence the degree to which turkeys use certain pine plantations.

Old Fields

Areas containing old field type vegetation, such as native grasses, broadleaf weeds, and brambles, should be managed similarly to forest understories. This will provide open foraging, brood habitat, and

Disking old fields in the fall sets back succession and promotes the growth of broadleaf plants and grasses in the spring and summer. Notice that the area strip-disked in the fall (top photo) is dominated by ragweed and partridge pea the following growing season (bottom photo).

nesting cover in a successional transition over several years. Where practical, this goal can be accomplished with prescribed fire. If prescribed fire is not an option, disking in strips or blocks can be used to manage old fields. Disking "sets back" succession of woody saplings and thick grasses and encourages germination of beneficial broadleaf weeds and annual grasses. Disking is best conducted in fall or winter and should be implemented on a rotational basis of every other year so that different stages of plant growth are available. Disking to promote early successional cover does not need to be as intensive as when preparing a seed bed. Instead, one or two shallow passes with a disk accomplishes the goal of resetting vegetative succession and promoting a more desirable plant community.

Disking to promote early successional cover depends on the type of disk used and the vegetation being disked. When disking fields planted in native warm-season grasses with thick root systems (big bluestem and Indiangrass), an off-set disk will produce better results. On the other hand, a tandem disk may be adequate for fields and openings dominated by broomsedge.

Pastures

Although improved pastures for livestock and hay production are poor areas for nesting and brooding, adult and young turkeys do benefit some from these areas. During spring, when driving along roads and highways adjacent to livestock pastures, it is not uncommon to see cattle grazing in the foreground and a group of turkeys with one or two gobblers on full display at the back of the pasture. The foliage of clovers and seed heads of some improved pasture grasses, such as bahiagrass and fescue, are readily consumed by turkeys in late spring and summer. Turkey nesting cover should not be encouraged in improved pastures because these grasses do not provide adequate overhead concealment. Instead, pastures should be burned, mowed, or heavily grazed before the spring so that hens will seek nest sites elsewhere. Delay mowing until July to avoid potential nesters if grass cover has not been reduced immediately before the nesting season. Also, remember that fertilization with chicken litter is a common practice for pasture management, but **litter from laying houses should not be used**.

> "Few things yield more benefits to turkeys than creating permanent openings."


Steve Gulledge

Food Plots

Wildlife food plots are popular among hunters because they help supplement natural food resources and increase viewing of game animals. Food plots can complement other management practices but should not be viewed as a remedy for lack of quality habitat. Investing time and money in providing


Steve Gulledge

Chufa can be a great supplemental food plot for turkeys, if you have the right soil. For turkeys to be able to scratch and dig in the soil to uncover the chufa tubers, the soil must be sandy or loamy.

well-managed forested areas will have much greater positive impacts on turkey abundance than food plots. However, strategically located food plots can focus turkey travel patterns, making them an especially useful feature for a property.

Most cool-season plantings for white-tailed deer also are used by turkeys. Food plots containing some amount of clovers are especially attractive to turkeys. Turkeys readily forage on clover leaves during the winter and spring, and the abundance of insects found in clover patches during the warm months make them attractive to hens for egg production and for brooding. Clovers are divided into perennials and annuals, and varieties are available for a wide range of soils. Clovers can be much slower to develop in the fall; mixing with cereal grains such as wheat or oats provides forage before clover growth becomes sufficient. Also, the late growth structure of these cereal grains can provide an element of cover to help conceal turkeys foraging in clover during late spring and early summer.

Several warm-season plantings also are great food plot options for turkeys. Chufa produces a nut-like tuber that turkeys readily consume, but it can be expensive to plant. Although planted in the spring, chufa nuts do not become available until early fall. Chufa does best when planted on sandy to loamy soils and should not be planted in heavy clays. Also, chufa should not be planted in areas where turkey and wild hogs coexist. Other spring and summer plantings such as sorghum and millet can be established to provide both high-energy foods and lush bugging areas. Refer to Mississippi State University Extension Publication 2111 *Supplemental Wildlife Food Planting Manual for the Southeast* for more detail on food plot establishment for turkeys and other wildlife.

PRESCRIBED BURNING

Few management practices are as valuable to wild turkeys as prescribed burning. Prescribed burning is most often applied within pine forests or open fields, but it is equally appropriate in oak-hickory dominated upland hardwoods. Burning should be excluded from bottomland forests because most hardwood species adapted to moist soil conditions are intolerant of fire.

Prescribed burning provides several benefits for turkeys. First, it reduces brush and debris and greatly increases visibility, which turkeys prefer for habitat selection. In addition, fires remove leaf litter, exposing hidden food items, and break down and recycle nutrients stored in dead plant material, returning them to the soil. Also, new plant growth in the few months following a prescribed burn is a highly nutritious food source and an excellent attractant for insects. The net result of a recent prescribed burn is

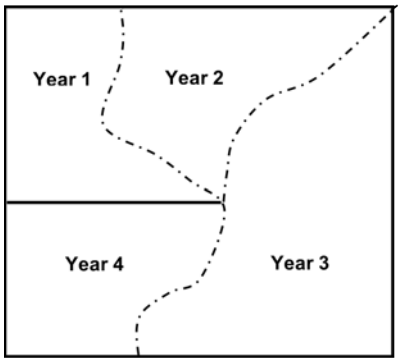
Prescribed burning is most often applied to pine stands but also can be used with care in upland hardwoods.

an area that is highly preferred and heavily used by turkeys.

In the years following a prescribed burn, understory vegetation transitions through successional stages that are well suited to the turkey's life cycle requirements. The ideal understory in forests managed with fire is composed of equal parts broadleaf weeds, grasses, and woody brush. The lush broadleaf weeds and grasses that grow for the first year or two following a fire provide excellent brooding habitat. During the next few years, understory and midstory woody plant species are in the growth stages that provide good nesting cover. Dominance of woody-stemmed plants increases with time following prescribed fire, and an understory composed exclusively of brush is a good indicator of the need for a repeat burn.

When creating a prescribed burn plan, it is best to partition a property into several different compartments to be burned on a rotational basis. This allows plant communities across a property to be maintained in different successional stages that provide food and cover for escape, loafing, nesting, and brooding. When managing for turkeys, a prescribed burning rotation that consists of burning one-third to one-fifth of the managed area at 2- to 4-year intervals is recommended.

Note: Always consult a natural resources management professional experienced in the legal and proper use of prescribed fire before burning. Mississippi has prescribed burn laws that require permits, training, certification as a burn applicator, and written plans to be afforded some level of liability protection. For additional details regarding legalities of prescribed fire, see MSU Forest and Wildlife Research Center Bulletin FO351 *Legal environment for forestry prescribed burning in Mississippi*.



A tract of property managed with prescribed fire on a 4-year burn rotation. Using roads and streams as fire breaks helps reduce the costs of creating new firebreaks.

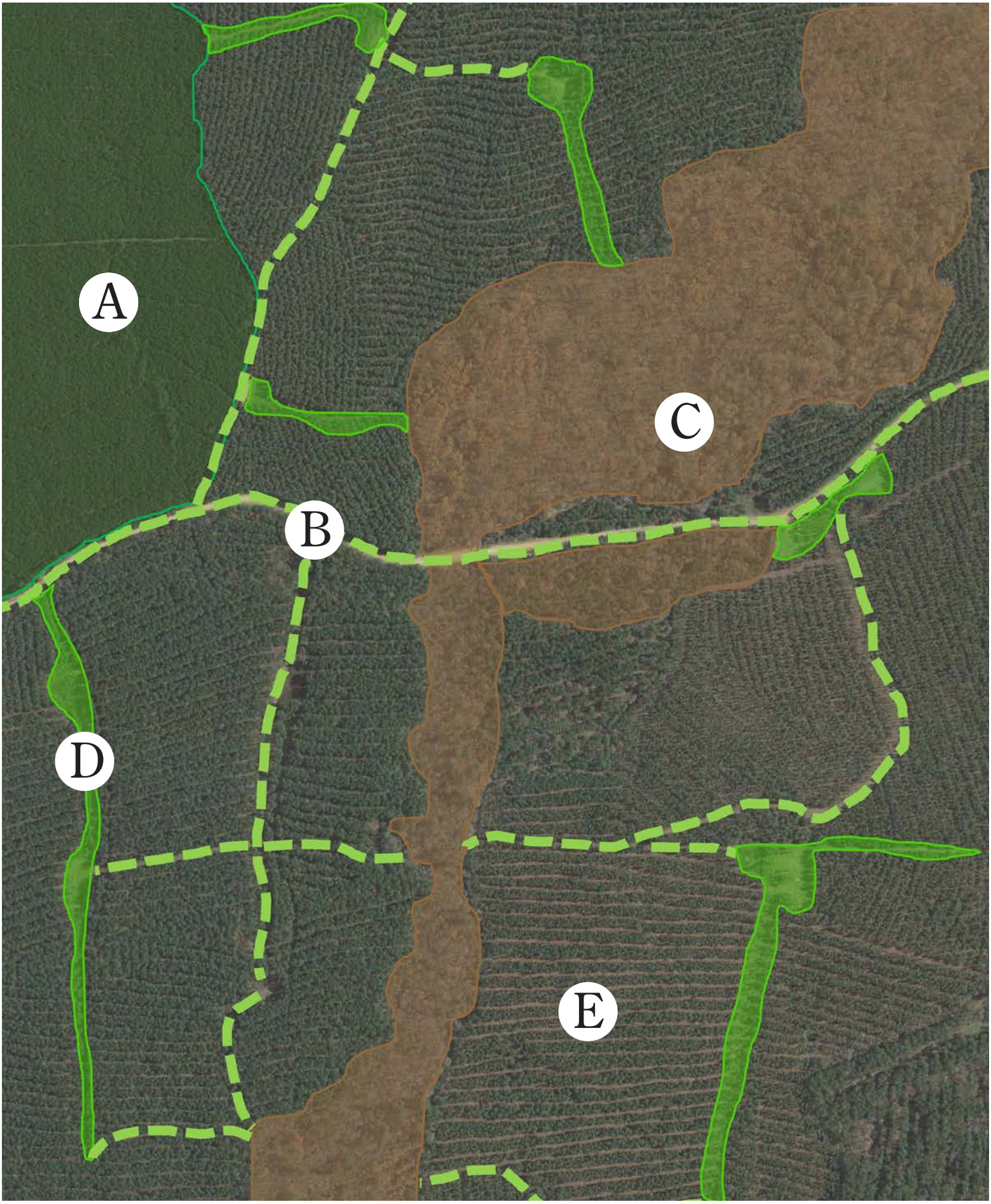


Figure 6. This figure, with accompanying illustrations on the following page, represent a hypothetical property in the southeastern United States, dominated by loblolly pine plantations. Letters represent typical management prescriptions aimed to enhance wild turkey habitat.

A Forestry

Pine timber should be thinned as soon as merchantable to enhance forest understory.

B Roadways

"Daylight" roads by expanding shoulders and maintaining in quality vegetation.

C Hardwoods

Retain existing hardwood stands. Promote wide (≥75 yard) streamside management zones.

D Openings

Use roads, loading decks, and all other opportunities to create wildlife openings.

E Rx Burn

In managed pine stands, establish a prescribed burn rotation of 2- to 3-year frequency.

Photos: MDWFP

HERBICIDES


Wes Burger, MSU-FWRC

There are many brands of both non-selective and selective herbicides available on the market today. Regardless of brand name, specific types of herbicides that contain the same primary active ingredients should be equally effective when used according to their respective labels. However, be aware that, while different brands may contain the same primary active ingredients, cost differences can be due to the percentage of primary active ingredient and additional chemicals, such as surfactants. Another factor to consider may be any product guarantees provided by the manufacturer. Following are primary active ingredients of common herbicides:

- Glyphosate: Postemergence, non-selective herbicide used to control both grasses and broadleaf weeds.
- Clethodim: Postemergence, grass-selective herbicide.
- 2, 4-D: Postemergence, forb-selective herbicide used to control broadleaf weeds.
- 2, 4-DB: Postemergence, forb-selective herbicide used to control broadleaf weeds but does not impact legumes when applied during the proper growth stages and under favorable weather conditions. It is commonly used to control broadleaf weeds growing among clovers.
- Imazapyr: Postemergence, broad-spectrum, selective herbicide used to control many hardwood shrubs and trees. Also works well for controlling bermudagrass and provides control for a longer period of time because it is soil-active.
- Triclopyr: Postemergence, broad-spectrum, selective herbicide used to control woody vines, shrubs, and trees. Can be effective in eradicating hard-to-control perennial broadleaf weeds.

For details regarding herbicide selection and use, see MSU Extension Publication 1532 *Weed Control Guidelines for Mississippi*.

HERBICIDE APPLICATIONS

Targeted applications of both selective and non-selective herbicides are useful in habitat management. Herbicides can quickly reduce or eliminate unwanted vegetation and shift plant community structure and composition toward favorable conditions. The selection and specific use of herbicide treatments should be determined by an assessment of existing vegetation. Treat undesirable vegetation with chemicals or other methods that minimize damage to beneficial plants. Non-selective herbicides, such as those containing glyphosate, will kill most plants and should be avoided when treating large areas of native vegetation. Instead, use a selective herbicide that is effective on specific groups of plants while leaving others unharmed. For example, an herbicide containing imazapyr that targets woody brush while sparing herbaceous weeds and briars can be an excellent choice to enhance brood-rearing habitat in pine forests, especially when coupled with prescribed burning.

There are several ways to apply herbicides, and like the chemicals themselves, application methods should be tailored to achieve treatment goals while minimizing unwanted impacts. Broadcast applications by helicopter, skidder, or tractor are the least labor intensive but also the least selective. These applications are best suited for timber stands or fields where undesirable plants have become dominant and entrenched. Selective or spot hand applications can be directed only at problem species when un-

Injection methods such as "hack and squirt" are useful in removing undesirable wood stems in areas where broadcast applications are not an option.

desirables are mixed with beneficial plants. Injection methods, such as the "hack and squirt" technique, or spot applications with backpack sprayers are selective application methods that eliminate specific plants from areas where broadcast applications may damage desirable trees and vegetation. See MSU Extension Publication 3276 *Applying Herbicides with the Hack-and-Squirt Method*.

MECHANICAL MANIPULATIONS

Forestry mulching equipment, bulldozers, or heavy mowing machinery can be used to restore overgrown areas to suitable space for turkeys. These types of treatments are ideal for overgrown forest understories or open spaces where reclamation would be difficult and require repeated applications of prescribed fire or other methods. Using heavy machinery for habitat management can be costly, but it can quickly change habitat features. While mechanical disturbances immediately yield effective results, follow-up treatments with herbicides or prescribed fire are usually necessary for habitat maintenance.

INVASIVE SPECIES

There are many nonnative plant species that have been introduced to Mississippi's fields and forestlands that can reduce the quality of native habitats. Landowners should learn to identify and proactively control these problem species before they spread. Chinese privet infestation in forest stands, particularly bottomland hardwoods, and cogongrass invasion of fields and rights-of-way are specific examples of introduced plants that diminish habitat value for turkeys. Integrated strategies that incorporate multiple control methods such as mechanical removal, prescribed fire, and herbicides are often necessary for invasive control.

Invasive species can dominate an area and diminish or eliminate most turkey habitat. Here, Chinese privet is dominating the forest understory.

Predators and Predator Management

The relationship between turkeys and predators is complex, and straightforward conclusions about the influence of predators on turkeys are difficult to assess and manage.

Predators can have a tremendous impact on wild turkey populations. The majority of wild turkey deaths and unsuccessful nesting attempts are a result of predation. Therefore, habitat that provides excellent cover for escape, nesting, hiding, and safe movement between locations is just as essential as providing adequate food resources. These habitat components, in combination with their exceptional vision, hearing, and cryptic coloration, enable turkeys to better avoid predation. When habitat and other environmental conditions are favorable, turkey populations can flourish in spite of predation. For this reason, turkey abundance is not always governed by predator abundance.

Turkey predators can be divided into three categories: 1) those that prey on adult turkeys, 2) those that prey on young turkeys (poults), and 3) those that disrupt nests and eat their eggs. A few predators fit into all three categories.

Adult turkey predators constitute the smallest group and are primarily limited to bobcats, coyotes, foxes, and great horned owls. These same predators are a threat to poults, but poults are also susceptible to predation from snakes, raccoons, feral dogs and cats, hawks, and several smaller owl species. The suite of predators generally regarded as the most impactful on wild turkey populations are the nest predators. Some of the most common nest predators include raccoons, opossums, skunks, rat snakes, crows, and wild hogs.

No one predator species exclusively targets turkeys. In reality, turkeys constitute only a tiny fraction of most predatory animals' diets. Some predators of turkeys even prey on other predator species. For example, coyotes kill foxes and raccoons, both of which are common turkey predators. Several species of snakes are turkey nest predators, but they are, in turn, preyed upon by the hawks and owls that occasionally kill adult turkeys or their poults. Moreover, predation cannot be evaluated apart from confounding factors such as habitat or weather.

Studies have documented that predation rates differ based on proximity to certain habitat features. Likewise, human practices, such as supplemental feeding, can intensify predation on turkeys, as it has been demonstrated that nest losses are greater when hens nest near feeders.

Because of these complexities, straightforward conclusions about the influence of predators on turkeys are difficult to assess and manage. Nonetheless, many landowners and managers trap predators in order to increase turkey reproduction and survival. While predator management should not necessarily be discouraged, it is important to recognize its limitations. Reducing predation on game birds solely through predator removal has been studied extensively, and the conclusions on its effectiveness are mixed. Most studies suggest that, for predator removal to translate into noticeable increases in game species, it must occur over large areas (at least several thousand acres), be intensive (a high number of trap sites), and be continuous. Potential benefits are lost almost immediately when trapping is reduced in scale and intensity. This level of committment is costly, both financially and in time, and may not be feasible for many landowners and land managers. Furthermore, money and time spent on predator management is money and time not spent on habitat improvement. A much more lasting and economical strategy borrows on the integrated pest management method of agricultural systems:

- Assess the amount and type of predation impacting the species of interest.
- Adopt techniques, including habitat management, that minimize predation.
- Discontinue practices beneficial to predators or predation.
- Directly control predators by trapping if and when warranted.

Turkey Hunting

For the most part, wild turkeys in the Southeast are hunted during the gobblers-only season in spring. Some states do have fall, either-sex seasons, but interest in fall turkey hunting is generally low in the Southeast. The spring gobbler hunting season coincides with the breeding season, and the male's courtship behaviors play prominently into spring turkey hunting. Gobbling activity is, therefore, important for quality hunting experiences, and spring hunting seasons are set to ensure hunter exposure to gobbling. Surveys have shown that peak gobbling time may vary from year to year; meanwhile, daily atmospheric conditions and sex ratios within a local population can influence the amount of gobbling activity heard on any given morning. Due to the erratic fluctuations of turkey populations, the number of gobblers harvested from a local population can vary considerably from year to year.


Steve Gulledge

Summary

Wild turkeys are an incredible conservation success story. After becoming nearly extinct during the early decades of the 20th century, efforts by state wildlife agencies and their partners reestablished turkey populations and grew them to abundance. Wild turkey management has been continually refined by scientific studies describing the habits and habitat requirements of the species. Today, much is known about this magnificent bird, and landowners, hunters, and other conservationists work to ensure turkey populations remain high.

Fortunately, wild turkeys respond well to active land management, and the bird's needs fit with many other common landowner objectives in the Southeast. The key to wild turkey management is recognizing that turkey populations depend on habitats that maximize their survival and recruitment. While other issues do warrant consideration, the cornerstones of successful wild turkey management are simultaneously producing nesting and brooding habitat while managing forest conditions to provide areas where the birds feel at ease. Depending on the site, any number of management techniques may be needed: creating wildlife openings, initiating commercial timber harvests, conducting prescribed burns or herbicide applications, shaping the land with heavy equipment, and much, much more.

There are many additional resources available for more direct, on-the-ground assistance with wild turkey management. Consulting with a natural resource professional can be essential when developing a plan tailored to your individual property. State wildlife agencies employ wildlife biologists who visit private landowners to offer recommendations on wildlife and habitat management. Other governmental agencies, such as state forestry agencies or federal agencies like the Natural Resource Conservation Service (NRCS), may be able to provide resources to help you achieve your management goals. The National Wild Turkey Federation (NWTF) is a nongovernmental organization dedicated to the conservation of the wild turkey and can offer resources to those interested in turkey management. Finally, establishing relationships with consulting foresters and other private contractors is often invaluable in determining the most efficient and economical way to achieve land management goals.

Additional Resources

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