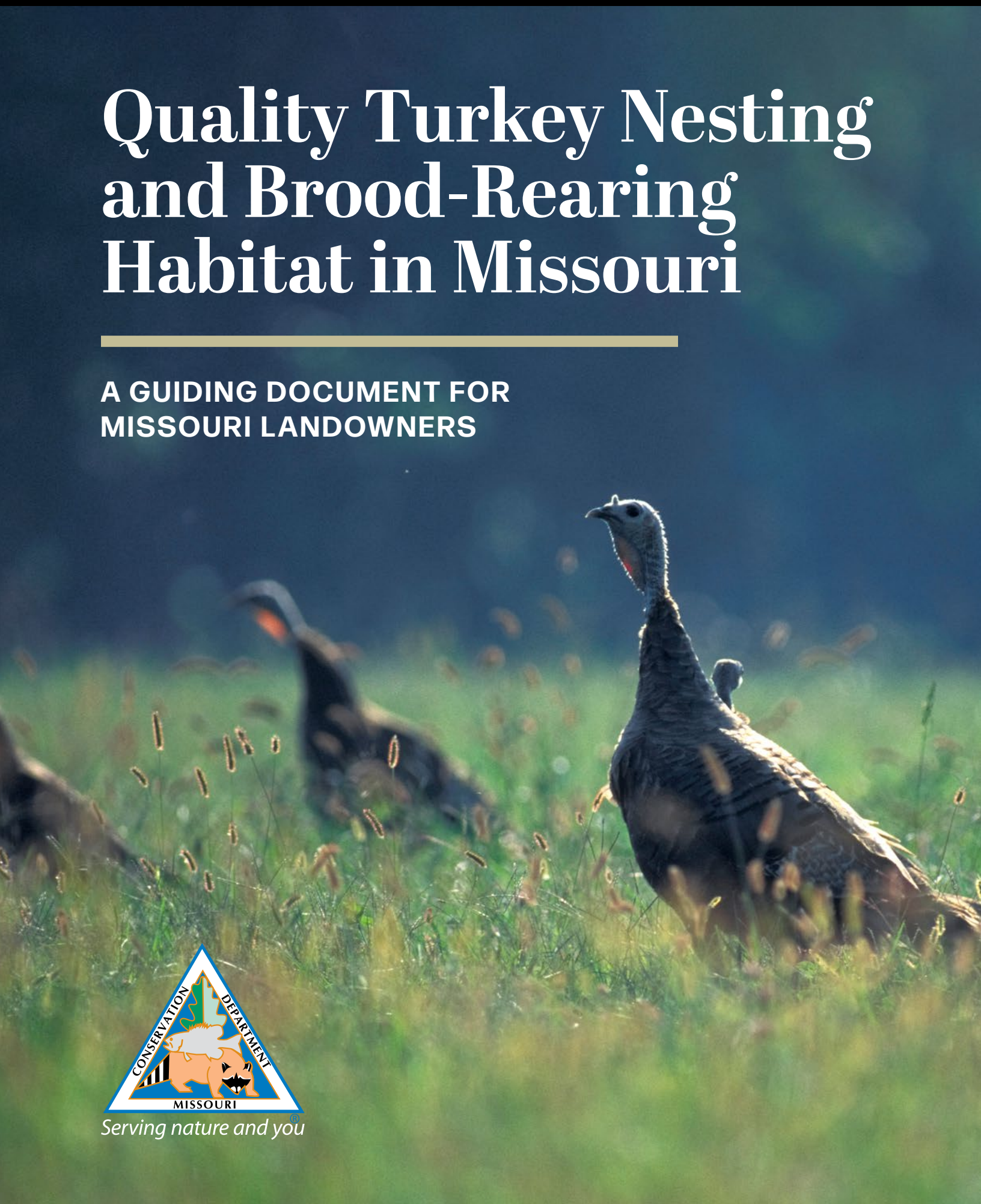
MISSOURI DEPARTMENT OF CONSERVATION

Quality Turkey Nesting and Brood-Rearing Habitat in Missouri

A GUIDING DOCUMENT FOR MISSOURI LANDOWNERS



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Adult turkey hen on nest in forest.

Introduction

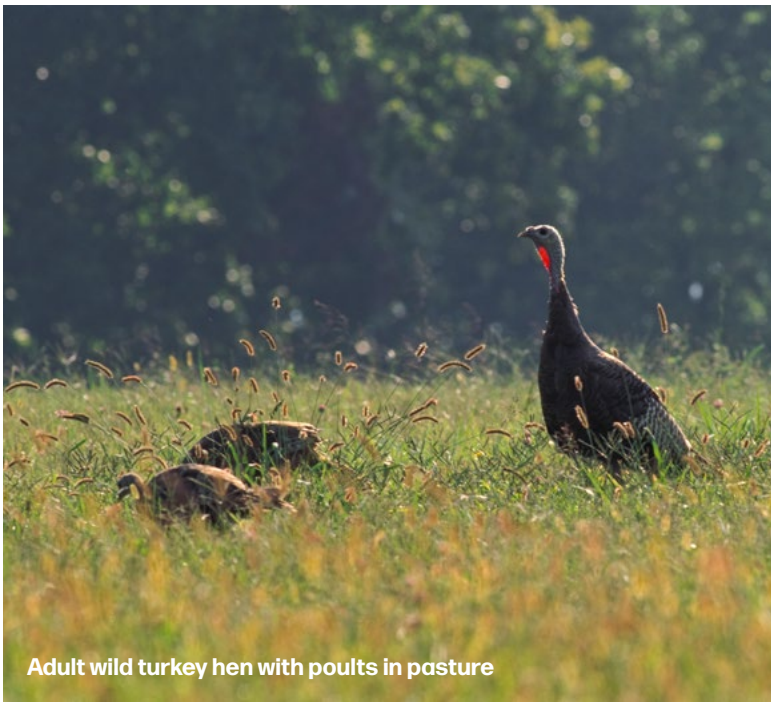
Wild turkeys *(Meleagris gallopavo; hereafter turkey*) are an iconic and deeply rooted part of Missouri's natural history and heritage. Prior to European settlement, turkeys were abundant in Missouri and across much of the southeast and midwestern United States. Due primarily to unregulated harvest and large-scale changes in natural landscapes, turkey numbers plummeted.

By the early 1950s, the turkey population in Missouri was believed to be below 2,500 individuals (Pierce II and Isabelle 2017). Around that time a concerted effort was made to restore turkey populations. Turkey numbers not only rebounded in areas where they already existed, but populations were strong enough to introduce individuals into new areas; even areas where they weren't native. In recent years, however, turkey populations have declined, and hunters and other turkey enthusiasts are justifiably concerned and wonder what should be done. Our first task is to understand the cause of this population decline. Only by better understanding why the population has gone through this downturn can we know how to reverse the trend.

At first glance, there are so many factors that influence a turkey population that it becomes overwhelming. Weather, predators, hunting pressure, habitat loss or modification, declines in insect populations, disease, agricultural chemicals, and many other factors likely all play some role in turkey abundance. We can tune out some of the noise by viewing all factors through a population dynamics lens. When we model a population, we look at key demographic rates: adult survival rates, reproduction rates, and poult survival rates. Seeing how these rates have changed over the years gives us a clue about which factors are the biggest contributors for a decline in turkey numbers.

Luckily, in Missouri, we have a long history of turkey research. Missouri Department of Conservation (MDC) researchers measured demographic rates in the 1980s and 2010s, a period before and after the population decline was observed. The only demographic rates that have substantially changed are related to poult production; essentially, fewer poults reaching adulthood than when the population was at its peak. Hen survival has increased since the 1980s and hen harvest rate has declined from around 4% to 1%. Therefore, if the goal is to create more turkeys, the focus should be on increasing nest success and poult survival.

It is likely that some combination of habitat loss/degradation, higher predator densities, changes in spring weather patterns, and an overall decline in insect diversity and abundance is contributing to decreased production. While not a simple answer in terms of effort and expense, increasing the number of acres of good nesting and brooding cover has the potential to address each of the root problems. Providing bigger patches of nesting cover or converting marginal nesting cover to great cover gives a hen more options for nest placement. With extra space, she can pick a place that is more likely to protect her from predation and perhaps even some weather events. Similarly, great brooding habitat is essentially a bug factory that doubles as protection from predators.



Adult wild turkey hen with poults in pasture

The long-term sustainability of Missouri's turkey populations, as with many other species, is a shared responsibility among wildlife agencies, private landowners, and countless others. Since the bottleneck that appears to be limiting turkey population is poult production, MDC has made a concerted effort to prioritize the creation of nesting and brood-rearing habitat. To commit to this goal, and to ensure that gains are made, MDC launched the Turkey Habitat Initiative (THI) in 2023. THI intends to build partnerships to educate landowners and land managers on methods to create high-quality nesting and brood-rearing habitat in Missouri. This habitat management guide is intended to serve as a resource for what good turkey habitat looks like and how to begin creating it.

Turkey Production: A Good Place To Start

Turkeys are a generalist species: they use a wide variety of habitat and food resources, but the places turkeys can be seen in the winter is not necessarily where they may be found in the spring or summer. Since we are focused on nesting and brooding habitat or cover, we first need to understand what hens need during this period and attributes that define high quality nesting and brooding cover.

Wild turkey poult

Nesting Ecology

Hens begin nesting two to four weeks after breeding with a gobbler. Once a hen is ready to lay her eggs, she will seek a good nesting location and begin laying one egg per day for 10-14 days. When she is not laying an egg, she leaves the nest site to avoid drawing attention to the location. Once the eggs are all laid, the hen will spend as many as 23 hours per day on the nest incubating, leaving only to drink water, forage, and defecate. Once all the eggs in a clutch are laid, incubation lasts for around 28 days and the eggs will hatch at the same time.

Turkeys consistently opt to establish nests in areas where ground-level vegetation cover is dense, while actively avoiding nesting in regions characterized by bare ground (Byrne and Chamberlain 2013). Hens avoid each other when seeking nest locations, so small patches of nesting cover rarely hold more than a single hen. Nest survival, in most studies, was most strongly influenced by habitat structure adjacent to the nest. Successful nests are often surrounded by thorny vegetation as the understory cover (Fuller et al. 2015). Forest nests exhibited a variety of understory vegetation cover types, including vines, various woody shrubs, and debris from fallen trees or logging operations (Byrne and Chamberlain 2013).

Nest predation represents a significant cause of nest failure across the entire range of turkeys. Key nest predators include racoons *(Procyon lotor),* striped skunks *(Mephitis mephitis),* bobcats *(Lynx rufus),* coyotes *(Canis latrans),* gray foxes *(Urocyon cinereoargenteus),* and domestic dogs *(Canis lupus familiaris)*, and crows *(Corbus brachyrhynchos).* Other studies found that the presence of tall dense vegetation within a 15-foot radius around the nest, is more characteristic of successful nests, compared to unsuccessful nests (Badyaev 1995). To some extent, nest predation is influenced by the frequency with which potential predators come across nests (Byrne and Chamberlain 2015). Therefore, a larger expanse of adequate cover and concealment increases the likelihood of a hen successfully hatching her brood. While we can never eliminate nest predation, creating larger and more abundant patches of nesting cover should decrease predation risk at the population level.

High-quality nesting cover is temporary on the landscape. Consequently, land managers must consistently plan and conduct management practices that result in the brushy, thorny, and dense vegetation hens prefer for nesting sites. Periodic disturbances, such as prescribed fire or active timber management play a crucial role in creating the conditions that promote the growth of high-quality nesting habitat across a broad area. This, in turn, can lead to a temporary surge in reproduction, (Byrne and Chamberlain 2013).

While both nesting and brooding cover are important, it is crucial to recognize the distinction between the two. Nesting habitat is tailored to provide a secure location to incubate eggs, while brood-rearing habitat needs to provide a good supply of bugs and a vegetative structure that allows poults to move freely and remain hidden from predators. From the period after the hen is bred until the eggs hatch, nesting cover is the most important turkey habitat on the landscape. For the first 28-days of the poult's life, brooding habitat is critical. Unfortunately, nesting habitat is not usually high-quality brood cover, so both need to be close enough for poult survival to be high.

Primary nesting cover attributes

Concealment: Vegetation provides a high level of concealment – dense understory 2-3 feet tall typically made up of a mixture of grasses and forbs, woody vegetation, and dead woody cover – and improves chances of survival. The species of plants are less important than the overall structure of the vegetation, but hens appear to select nest sites with more thorny vegetation when available.

Water and forage: Though hens decrease food intake while incubating the nest, ready access to water and forage is important.

Proximity to habitat types: Nest sites are often near edges of two habitat types, such as at the edge of an open area that abuts a patch of timber.

Brooding Ecology

Once a clutch of eggs has hatched, poults are susceptible to both predation and inclement weather. During the early brooding period, a poult's number one goal is to eat and grow. When poults reach a sufficient size, usually between 9 and 14 days old, most will be able to thermoregulate (ability to regulate their body temperature to maintain an optimal level for their health and well-being). In addition to being able to thermoregulate, by 14-days-old, poults should be able roost off the ground, thereby reducing predation, and making weather less of an issue. After 28 days, survival rates are believed to be similar to adults, though research is lacking during this period. So, high-quality brooding cover should be rich in bugs and other forage and provide escape cover for poults.

Tall grasses provide nesting cover.

Turkey broods are closely associated with open, early successional vegetation communities (Chamberlain et al. 2020). Ideal brood habitat should offer ground-level, horizontal, visual obstruction, suitable for both ground roosting and daytime activities (Seiss et al. 1990; Lopez et al. 1997; Spears et al. 2007; Byrne and Chamberlain 2013). High-quality brood habitat is also characterized by ground cover dominated by forbs and brambles up to 2 feet tall, often forming an overhead, or "umbrella" canopy that conceals poults yet allows for mobility underneath (McCord et al. 2014).

Understanding what this "umbrella cover" looks like is imperative for providing high-quality brood cover for a poult's survival. The recommended cover should include shrub cover with woody-stemmed vegetation greater than 0.5 to 1.5 feet tall and less than 4 inches in diameter (Spears et al. 2007). While larger trees can exist in the overstory, they are not mandatory until poults begin to seek roost trees. The quantity of 3- to 6-foot-tall shrubs was found to be significant in various studies focusing on brood-rearing habitat during the first nine days post-hatch (Spears et al. 2007). Shrubs of the 3- to 6-feet-tall category were deemed sufficiently large to provide hiding cover for both poults and the brooding hen, as well as offering vegetation into which poults could retreat (Spears et al. 2007). When shrub density gets too high, however, hens may avoid the area. In this context, hens and broods will use an area with some shrubs, which allow escape cover when needed. But too many shrubs can cause a hen to not want to use the area as it may be more of a visual obstruction.

Primary brooding cover attributes

Proximity to nesting cover: If brooding cover is too far from nesting cover, very young poults will struggle to survive. Barriers are similarly problematic and can include things like flowing water or very dense low vegetation, such as tall fescue *(Lolium arundinaceum).* While an environment with little ground-level obstruction is easier to traverse, poults won't find many insects in that environment and predators will be able to easily see them (e.g. a mature forest stand that does not have a robust herbaceous layer).

Bug producing vegetation: Brood-rearing habitat should consist of a highly diverse mix of vegetation that provides cover and an abundance of food sources for young turkeys. Poults require a diet between 26-28% protein for growth, and plant matter makes up a very small portion of their diet during the first few months of life. Most of this protein comes from arthropods, such as ants, bees, beetles, and scorpions. The availability of insects influences a brood's use of habitat. Encouraging the growth of native grasses, forbs, and shrubs is vital, as they attract a wide variety of insects.

As a land manager, you play a vital role in conserving and enhancing turkey populations through habitat management. Moving forward we will provide information needed to create or improve existing nesting habitat. The first step is to assess what you already have available: Is your property primarily wooded or open? Do you use your property to graze livestock or grow crops? Is your property flat or hilly, or dry or wet during the spring? Do you hope to create habitat for all species or are you focused on game species? These considerations and many more come into play when thinking about how to manage a property.

The information in this guide is generalized and broken down into broad categories, but we hope it is useful and begins a conversation. If you are serious about improving your property to benefit turkeys and the other species that they share the landscape with, the best approach is to contact your MDC private land conservationist (PLC). MDC PLCs meet with landowners and managers to help them create wildlife management plans for their property at no cost to the landowner or manager. Take advantage of this resource, they are here to help.

Seasonal Habitat for Turkeys in Missouri

Turkeys can be found just about anywhere, from urban to rural landscapes, or from areas of heavy agriculture to remote patches of forest. This leads many to classify turkeys as generalists, meaning they can use a wide variety of habitats. This is somewhat misleading as turkeys require very specific habitat attributes during certain times of the year and at different periods in their life cycle. While agricultural fields can provide good forage during the tough winter months, they do not satisfy the needs of a nesting hen. Similarly, a mature stand of oaks is excellent for mast production, a key food source in the fall for turkeys, but a lack of a robust herbaceous layer can make this stand far less valuable to poults.

No matter what habitat types your property has to offer, you can positively affect your turkey population. Focus on management units you can improve and count those as turkey habitat management successes. By focusing efforts on stands that naturally are better nesting or brooding cover, rather than trying to force compositional change, we can more efficiently create good turkey habitat.

Spring Habitat (March to May)

During the spring, turkeys enter their breeding season. Gobblers actively court hens, displaying their vibrant plumage and vocalizing to attract mates and signal their location to other gobblers. During this time there are few habitat requirements for optimal production.

Turkey eggs in nest

Nesting cover: As hens prepare to nest, they seek out areas with dense cover, such as native grasses, shrubs and brush piles, and downed trees. These locations provide protection and concealment at the ground level for a nesting hen and her eggs.

Proximity to food and water: Breeding hens require easy access to nutritional food sources for egg production. Spring green-up provides new forbs and insects, which are vital components of their diet. Nesting sites can often be near a water source.

Strutting zones: Gobblers prefer open areas with good visibility, such as fields, meadows, or logging roads, to display for hens.

Brooding cover: Early nests are starting to hatch in May. Brooding cover needs to be close to the nest site and is characterized by having a layer of forbs and grasses that are thick enough to conceal a poult, while being sparse enough for poults to move around and forage. Ideal brooding cover should be relatively open above 2 feet; hens should be able to see over the grass/forb layer for approaching predators. Areas with thick patches of woody vegetation will be avoided even if all other habitat needs are available.

Adult wild turkey hen in savannah

Summer Habitat (Late May to August)

Summer is a critical time for brood rearing, as hatched poults require specific habitat elements to survive and grow. There are key habitat needs during this time.

Diverse vegetation: Brood-rearing habitats should have a mix of open areas for foraging and dense cover for protection. Native grasses, forbs, and shrubs attract insects, serving as the primary food source for young poults.

Sheltered cover: Tall grasses, shrubs, and small brush piles offer essential shelter for poults, protecting them from weather conditions and predators.

Abundant insects: Insects are crucial for poult growth and development. Maintaining areas with high insect populations provides a reliable food source for growing poults.

Wild turkey hens forage for hard mast in the fall

Fall Habitat (September to November)

During the fall, turkeys transition to a different habitat as they prepare for winter. The key habitat needs during this period are slightly different.

Food sources: Turkeys begin to shift their diet to focus on high-energy foods to prepare for winter. Acorns, seeds, and other mast crops become essential food sources.

Roosting sites: Turkeys require secure rooting sites in trees. Mature trees with sturdy branches and dense foliage provide suitable roosting locations.

Cover for safety: Turkeys seek out areas with good visibility and escape cover to avoid predators.

Adult gobbler navigates snowy terrain in search of food

Winter Habitat (December to February)

As winter sets in, turkeys face challenges in finding sufficient food sources and shelter. During this time turkeys shift their needs.

Winter food sources: Turkeys rely heavily on mast crops such as acorns and other nuts during the winter months. Prolonged deep snow has the potential to negatively impact winter survival, but access to high quality food sources can help turkeys weather extended periods of bad weather.

Roosting sites: Secure roosting locations become even more critical during winter nights, as cold temperatures and snow increase their vulnerability to predators. During extreme cold, turkeys may remain on the roost much longer than normal. When roosted, turkeys can let their feathers protect them.

Wooded area undergoing a prescribed burn.

A Quick Word on Succession and Disturbance

You have heard of the concept of habitat succession whether you were aware of it or not.

Succession is best illustrated with a blank slate. Imagine a patch of timber that was clear-cut and then burned. Year one, there are no trees and the spring after the harvest there is a lush forb and grass layer. This would be referred to as early successional habitat. The first species that come into that patch of ground are fast growing plants that have evolved to take advantage of the opening in the canopy. In a year or two, woody plants start to arrive and within a decade there would be a thicket of fast-growing woody species dominating the area. The first two to five years of succession are characterized by rapid change. The patch of land will be markedly different each year.

After woody species create a canopy effect over the herbaceous layer, succession starts to slow down. Depending on site conditions, hardwood tree species will start to become dominant, shading out some of the other early successional species. At some point, perhaps as many as 50 years later, the dominant hardwoods have created a near complete canopy. In practical terms there is much less sunlight reaching the forest floor, suppressing the growth of early successional species. Those conditions favor the species that are classified as "late successional." These species often favor different growing conditions and in many cases are of inferior quality to wildlife; maple trees are a perfect example. While beautiful in the fall, they do very little to improve wildlife habitat and are a good indicator that your timber is in a later stage of succession. Late successional stands of timber often have more moist soil, due in part to the complete canopy cover, but also because late successional species prefer that environment and have evolved to perpetuate it. Maple leaves, for example, take longer to dry out and shrivel up when they fall. This allows for less evaporation and, in turn, keeps soil wetter for longer.

The good news is that you can reset the succession timer without resorting to a clear cut. In most cases you will just need to introduce some sort of disturbance to a parcel of ground to get the desired effect. In the case of the stand mentioned above, a timber harvest or timber stand improvement (TSI) project will help to remove undesirable species while opening the canopy to allow for more sunlight. A prescribed fire will also remove some of the leaf litter and woody debris exposing bare soil, which will in turn, will invigorate forb and grass growth of an earlier successional stage.

Similar processes happen in open environments as well, but we are far more prone to managing succession in open areas than in forested areas. Grazing, for example, is a form of disturbance that limits succession.

Habitat Disturbance through Prescribed Burns

Prescribed burning is a valuable disturbance tool for habitat management. By understanding the timing and effects of prescribed burns, landowners can effectively manage wildlife habitats while minimizing unintended impacts on ecosystems. Understanding the pros and cons of both dormant season and growing season burns is important for a landowner's specific habitat goals.

Growing Season Burns

Burning during the growing season, including spring, summer, and fall (April through early October), offers several benefits for landowners managing wildlife habitats. These burns are often conducted when vegetation is actively growing but, in the case of fall burns, before it becomes too dry (so as to minimize the risk of wildfires). There are some advantages of growing season burns.

Enhanced nutrient cycling: Burning during the growing season can stimulate nutrient cycling by returning organic matter to the soil as ash. This promotes the release of nutrients, such as nitrogen and phosphorus, which are essential for plant growth.

Weed suppression: Growing season burns can help suppress the growth of invasive species and nonnative vegetation. By removing accumulated thatch and reducing competition from undesirable species, these burns create opportunities for native plants to thrive.

Habitat improvement: Burning during the growing season can enhance wildlife habitat by promoting new growth of native grasses, forbs, and shrubs. These green habitats provide valuable cover and foraging opportunities for a variety of wildlife species, including turkeys.

Dormant Season Burns

Burning during the dormant season, typically from late fall to early spring (November to March), also offers benefits for habitat management. These burns are conducted when vegetation is dormant, and weather conditions are favorable with lower wind speeds and higher humidity levels. There are many reasons why dormant season burns can be advantageous.

Fuel reduction: Dormant season burns help reduce fuel accumulation, including dead plant material and leaf litter, which can become a fire hazard during the dry season. By removing excess fuel, these burns decrease the risk of wildfires and promote safer burning conditions.

Invasive species control: Burning during the dormant season can target invasive woody species, such as eastern red cedar, without harming native vegetation. These burns can effectively reduce woody encroachment and improve habitat quality for wildlife.

Enhanced seed germination: Dormant season burns can promote seed germination and seedling establishment by breaking seed dormancy and reducing competition from established vegetation leading to increased plant diversity and habitat resilience over time.

Considerations for Burning

Weather conditions: Always monitor weather conditions and obtain necessary permits before conducting prescribed burns. Avoid burning during periods of high wind, low humidity, or drought conditions to minimize the risk of wildfires.

Safety precautions: Prioritize safety by following established burn plans, notifying neighbors and local authorities, and having adequate firefighting equipment on hand during prescribed burns.

Consultation: Consider consulting with local wildlife agencies, fire departments, or conservation organizations for guidance on planning, timing, and best practices for prescribed burns specific to your area.

By strategically timing prescribed burns, during both the growing and dormant seasons, landowners can maximize the effectiveness of habitat management efforts while minimizing potential risks to wildlife and property.

Effects of Burning During Nesting Season

Prescribed burns during the nesting season can have both positive and negative effects on wildlife habitat, particularly for ground-nesting species like turkeys. Most burning can be accomplished prior to the start of nesting season (before April, most years), but due to weather conditions or a busy schedule, many landowners only have a few days per year to safely burn. If the burning window closes without a burn many delay it a year fearing that a prescribed fire will burn up valuable turkey nests. Below are a few considerations when deciding whether to do a prescribed burn late in the burning season.

Positive Effects

Long-lasting habitat improvement: Prescribed burns during the early nesting season can create open areas and patchy vegetation, creating ideal brooding cover by stimulating growth of native grasses and forbs. This newly created habitat will benefit turkeys almost immediately and for several years after the burn, making prescribed fire one of the best ways to maximize your resources.

Increased foraging opportunities: Prescribed burns conducted during nesting season can increase foraging opportunities for turkeys and other wildlife species by removing accumulated thatch and suppressing invasive vegetation. The resulting habitat diversity and abundance of food resources support future nesting success and poult survival.

Negative Effects

Nesting disturbance: Prescribed burning during nesting season may temporarily disturb nesting birds and disrupt nesting activities. Turkeys may abandon nests if disturbed during incubation. Many hens will attempt to renest, but first nests are far more likely to succeed than second or third nests.

Risk of nest mortality: In some cases, prescribed burns during nesting season can increase the risk of nest mortality due to direct heat exposure or habitat alteration. If a prescribed burn greatly reduces the vegetation that turkeys desire when placing nests, they may need to move to a new location and attempt a second nest.

Balancing Benefits and Risks

While burning during nesting season may pose risks to nesting birds, the long-term benefits of habitat improvement and increased foraging opportunities often outweigh the short-term drawbacks. By carefully timing burns to minimize disturbance to nesting birds and consulting with wildlife experts, landowners can mitigate potential negative impacts while maximizing habitat enhancement.

Considerations for Burning During Nesting Season

Timing: Choose prescribed burn dates that minimize the risk of disturbing nesting birds whenever possible. If a late-season burn is needed, try to avoid burning during peak nesting season (April-June)

Creating options: If possible, design your long-term habitat management plan to create multiple patches of nesting and brooding habitat. A late season burn in a nesting area, can allow for other nesting options nearby.

Adaptive management: Implement adaptive management strategies to address any unexpected effects of burning during nesting season, such as modifying burn timing or intensity based on observed bird responses.

By considering the effects of burning during nesting season and implementing appropriate management strategies, landowners can effectively enhance wildlife habitats while supporting nesting success for turkeys.

Dynamic Habitat Stewardship: Enhancing Turkey Ecology Through Seasonal Management

To summarize, turkeys need a wide diversity of habitats to thrive, and desirable early successional habitat will become late successional habitat. Through deliberate land management, simple strategies can harness succession for our benefit and decrease the amount of land we actively manage each year. The basic idea behind habitat management is to disturb a third or quarter of your property each year, creating a gradient of early successional habitat across your property.

Those of us who aren't fortunate enough to have a large property to manage may be thinking, why break my 10-acre patch of timber into thirds to manage it, wouldn't it be better to just run fire through the entire stand? In some cases, that would probably be the best approach. But remember the previous discussion about needing nesting and brooding cover in proximity; one without the other is far less valuable. For small parcels, it may be a better approach to split them in half for management. Better yet, work with neighboring landowners in a cooperative manner to identify the biggest need in your area and ensure that gets addressed first. If your patch of land is on a dry ridge or flat and your neighbor has the land in the bottoms, your parcel may be better suited for brooding cover and your neighbors may be great nesting cover. By working together, you will be able to meet the needs of your local turkey population, minimize the amount of work you need to do individually, and simplify your management plan.

Enhancing Turkey Habitat Through Cooperative Landowner Initiatives

Establishing cooperative arrangements, such as turkey co-ops, among neighboring landowners can yield substantial benefits for both the landowners and turkey populations. These cooperative efforts leverage collective resources, expertise, and conservation practices to enhance habitat

Adult wild turkey hens foraging in grassy cover, using open habitat for foraging

quality and promote sustainable turkey management practices. Here are some keyways in which turkey co-ops can be advantageous:

Habitat connectivity and corridor creation: Turkey co-ops facilitate the creation of habitat corridors and connectivity networks across neighboring properties. By coordinating habitat management practices such as prescribed burning, TSI, and invasive species control, landowners can establish contiguous patches of high-quality turkey habitat. These connected landscapes provide turkeys with vital nesting, roosting, and foraging habitat while promoting genetic exchange and population resilience.

Landscape-scale conservation: Cooperative landowner initiatives enable landscape-scale conservation efforts that transcend individual property boundaries. By pooling resources and collaborating on habitat management projects, landowners can address broader conservation challenges, such as habitat fragmentation and degradation. Through coordinated actions, turkey co-ops contribute to the conservation and restoration of large, contiguous habitats essential for maintaining healthy turkey populations.

Shared knowledge and expertise: Turkey co-ops facilitate the exchange of knowledge, experience, and expertise among participating landowners. By sharing insights into effective habitat management techniques, conservation practices, and turkey behavior, co-op members can enhance their collective understanding of turkey ecology and management strategies. This shared knowledge empowers landowners to make informed decisions and implement science-based conservation practices on their properties.

Cost-effective conservation: Pooling resources through turkey co-ops enables cost-effective conservation initiatives that benefit both landowners and turkeys. By sharing equipment, labor, and expenses associated with habitat management activities, co-op members can achieve economies of scale and reduce individual financial burdens. This collaborative approach to conservation maximizes the effect of limited resources and fosters long-term sustainability in turkey habitat management.

Social and community benefits: Turkey co-ops foster social cohesion and community engagement among neighboring landowners with shared conservation interests. By working together towards common conservation goals, co-op members build relationships, trust, and camaraderie within their local communities. These collaborative efforts strengthen community ties, promote environmental stewardship, and instill a sense of pride in conserving wildlife habitats for future generations.

Turkey co-ops offer a strategic framework for landowners to collaborate on habitat conservation and turkey management initiatives. By harnessing the collective power of cooperative landowner efforts, co-ops can significantly enhance habitat quality, connectivity, and sustainability for turkey populations across landscapes; there are several advantages to managing property on a rotational basis:

Enhanced habitat diversity: Habitat management allows landowners to diversify the habitats available on their properties, thereby meeting the specific seasonal requirements of turkeys. For instance, during the spring nesting season, establishing dense understory vegetation and native shrub thickets can provide ideal nesting cover for hens, protecting their nests and eggs from predators and adverse weather conditions. In contrast, maintaining open grasslands or fields during the summer months offers prime foraging opportunities for turkeys as they search for insects, seeds, and other food to support their growth and development.

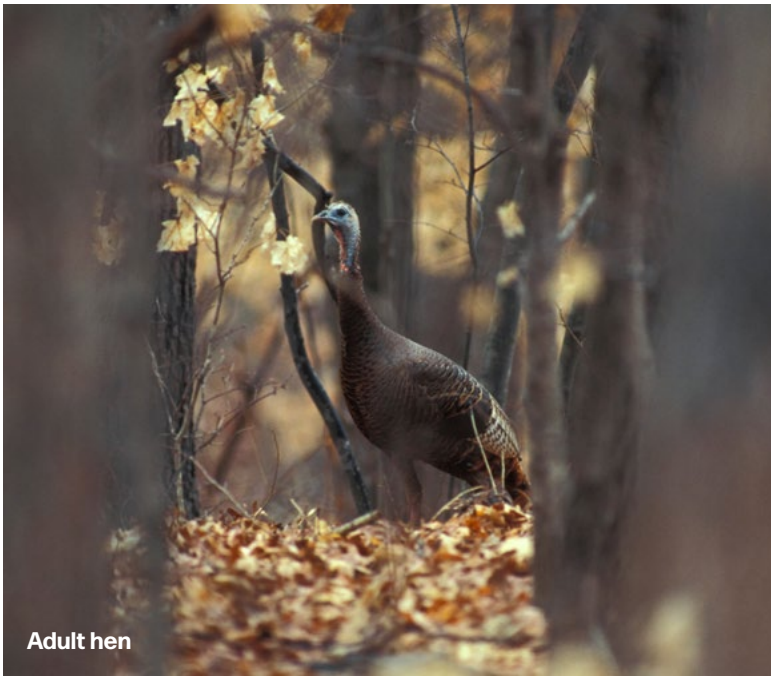
Minimized workload: Rotating management activities across different sections of the properties help spread out the workload for landowners, making habitat management more manageable and sustainable in the long term. Rather than attempting to address all habitat needs at once, landowners can focus their efforts on a designated portion of their property each year. For example, in one year, they may prioritize prescribed burning in a specific area to rejuvenate vegetation and promote new growth, while in the following year, they may focus on TSI or invasive species control in another area. This phased approach allows landowners to allocate resources more efficiently and effectively, maximizing the effect of their management efforts.

Consistent habitat quality: By consistently rotating management activities, landowners can ensure patches of habitat are meeting seasonal needs of adult turkeys and poults. This approach helps maintain a variety of high-quality habitat conditions year-round, promoting the overall health and productivity of turkey populations on the properties. For instance, regularly conducting prescribed burns in one area during the appropriate season can stimulate the growth of desirable vegetation and create optimal brood-rearing habitat for turkeys in subsequent years. Similarly, implementing TSI measures such as selective thinning can enhance habitat structure and diversity, providing turkeys with suitable roosting sites and cover throughout the year.

Long-term sustainability: Implementing habitat management practices fosters a sustainable approach to habitat conservation and wildlife management. By strategically rotating activities such as prescribed burning, TSI, and invasive species control, landowners promote ecological resilience on their properties over time. This not only benefits turkey populations but also enhances overall biodiversity and ecosystem health for a diverse array of native Missouri wildlife such as white-tailed deer, bobwhite quail, squirrels, rabbits, and many songbird species.

Adult hen in a savannah habitat

Forest and Woodland Management


Adult hen

About one third, or 15.5 million acres, of Missouri is wooded. Due to the nature of how we use open land in Missouri – farming, grazing, ranching, etc. –, wooded landscapes offer the best chance for improving turkey populations. Wooded areas exist on a spectrum, from densely packed old growth forest to sparsely timbered savannahs. The best way to think about how valuable a patch of timber is to turkeys is to understand how much light is reaching the forest floor. A savannah will have a sparse canopy and will allow the most sunlight to reach the forest floor. A woodland will have a slightly denser canopy, and a mature forest will have near complete canopy closure. When more sunlight reaches the ground, more herbaceous growth is stimulated, which is often preferable to nesting hens and poults. All the forested landscapes mentioned above were once abundant in Missouri. Modern approaches to forest management and fire suppression have resulted in much of our forest looking the same. Unfortunately, much of this habitat is sub-optimal for nesting or brooding cover due to dense canopy cover.

When confronted with managing a timber stand, it is a good idea to understand the area's existing condition and then approach management with the desired condition in mind. If you know your starting point and goal, you can effectively plan how to get there. Not all stands can or should be intensively managed but knowing the direction you need to go will help to prioritize stands that may be good candidates for management work.

You'll notice in the figure below that each of these areas have use and value. If, however, the focus is on nesting and brooding cover, turkeys tend to find more value in the habitats with a more open canopy. The distinction between the various habitat types is distilled down to percent canopy cover. Canopy cover is an intuitive way of thinking about the amount of sunlight that hits the ground, but most forest management plans will prescribe a reduction in basal area and won't mention canopy cover. For a trained forester, measuring basal

					
Habitat	**Prairie**	**Savannah**	**Woodland**	**Forest**	**Overgrown Forest**
Cover	**0-10% Canopy Cover**	**10-30% Canopy Cover**	**30-60% Canopy Cover**	**60+% Canopy Cover**	
Nesting	Medium quality – largely along the edges or in patches of woody vegetation	Medium quality – mainly in patches of woody vegetation or dense warm season grass	High quality	High quality – depending on density of understory woody vegetation	High quality – especially within 10-15 yards of edge. The center of large patches may go unused
Brooding	High quality	High quality	High quality	Low quality	Low quality
Summer Foraging	High quality	High quality	High quality	Low quality	Low quality
Fall/Winter Foraging	Low quality	Low-Medium quality	Medium to High quality	High quality	Low quality

area is faster and more accurate than measuring sunlight or canopy cover, but a reduction in basal area results in a decrease in canopy cover resulting in the same.

In a forested landscape, the rate of succession is tied directly to the productivity of the soil. Rich sites will need to be disturbed more frequently than poor sites. The year or two immediately after a disturbance, such as a prescribed fire, a stand of timber often provides optimal habitat for poults. Fire stimulates herbaceous growth which creates a major flush of insects. The structure of the herbaceous layer is also largely free of small woody stems due to fire, which would obstruct the hen's view. Three to five years after a fire, woody species start to become thick, essentially making this stand unsuitable for brooding cover. It does, however, become high quality nesting habitat. As soon as five or six years, depending on site quality, the woody growth may become so thick that hens will even avoid it for nesting purposes and work needs to be done to return this stand to a usable state.

When discussing what is optimal canopy cover, note that this is in relation to the lifecycle of the turkey. Turkeys will use prairies and old-growth forest, just not as frequently. When canopy cover relates to nesting and poult rearing, open areas are likely more valuable than densely canopied areas; interspersion of open and forested areas that provide optimal habitat.

1. Low canopy cover (less than 20%)

a. Sparse forest canopy with significant gaps between trees

b. Limited food resource, especially during winter months

c. Enhanced cover and hiding places for poults and nesting hens

d. Roosting sites may become limiting

2. Optimal canopy cover (20-70%)

a. Well-distributed canopy with some opening for understory growth and forage production

b. Sufficient roosting trees

c. Diverse understory vegetation providing abundant food sources for turkeys, including insects and browse

d. Suitable nesting cover with enough concealment for hens and poults

e. High mast crop potential (with the right tree species)

3. High canopy cover (more than 70%)

a. Dense forest canopy with limited sunlight reaching the forest floor

b. Limited nesting and brood-rearing habitat due to the lack of cover and suitable vegetation

c. Mast potential may be stunted due to crowding

Creating Nesting Cover in Forest/Woodland Settings: Attributes and Management Strategies

Nesting cover plays a critical role in providing suitable habitat for hens during the nesting season. In forest and woodland settings in Missouri, certain attributes define ideal nesting cover. Targeted management strategies can help create and enhance desired habitats.

Attributes of Nesting Cover — Desired Future Condition

Dense understory vegetation: Ideal nesting cover is characterized by dense understory vegetation, including shrubs, saplings, and herbaceous plants, providing ample concealment and protection for nesting hens and their eggs.

Vertical structure: Nesting cover should offer a diverse vertical structure with layers of vegetation ranging from ground-level vegetation to mid-story shrubs and overstory trees, creating a multi-layered canopy that maximizes nesting success and minimizes predation risks.

Proximity to resources: Nesting cover ideally should be near essential resources such as food and water, facilitating easy access for nesting hens while minimizing energy expenditure during incubation.

Proximity to brooding cover: Nesting cover needs to be within 400 yards of quality brooding cover, or near a corridor that provides quick access to brooding cover. Poults are on their feet and eating hours after they have hatched; insufficient brooding cover will lead to very low survival rate.

Areas Likely to Serve as Nesting Cover

Thickets and brushy areas: Dense shrub thickets and brushy areas within forested landscapes often serve as preferred nesting sites for y hens, offering ample concealment and protection from predators.

Edges and transition zones: Edges between habitat types often have increased structural and vegetative diversity, which tends to lead to quality nesting habitat.

Management Strategies to Enhance Nesting Cover

TSI: Implementing selective thinning to open the canopy and promote the growth of understory vegetation can create optimal nesting cover within forested areas.

Commercial harvest: If the timber is marketable, and desirable tree regeneration is present, a timber harvest is a great way to remove fewer desirable trees and making profit. Openings in the canopy stimulate vegetative growth, and debris left behind by loggers can create great nesting cover. It is important to follow up a harvest with additional TSI and/or prescribed fire if canopy openings will begin to fill with undesirable species, or the vegetative structure is too thick for nesting hens.

Shrub thinning and planting: Targeted thinning of dense shrub thickets and strategic planting of native shrubs can enhance nesting cover quality and diversity. This practice can provide nesting hens with suitable habitat conditions.

Edge creation and enhancement: Creating or enhancing forest edges through edge feathering, creating transitional zones, can attract nesting turkeys while creating connectivity with adjacent habitat types.

Manipulating Habitat to Meet Nesting Cover Conditions

Identify priority areas: Assess the existing habitat conditions and identify priority areas within forest/woodland settings that have the potential to serve as nesting cover, vegetation structure, and proximity to resources.

Implement habitat manipulation: Apply targeted management practices such as TSI, shrub thinning, and edge creation to manipulate habitat conditions to enhance nesting cover quality in identified priority areas.

Invasive species management: Incorporate invasive species control measures into habitat manipulation efforts to mitigate nonnative vegetation. Identify and target invasive plant species that may outcompete native vegetation and degrade habitat suitability for nesting turkeys. Implement strategies such as herbicide application or manual removal to suppress invasive species and promote native vegetation. Invasive species management is a multi-year to every year process and should never be overlooked.

Turkeys will often put nests in areas that don't make much sense. This can lead folks to conclude that nesting cover isn't a limiting factor, and our attention should be on more pressing issues. However, nest success is affected by site quality, so ensuring there are high quality places to nest will, in turn, improve nest success rates. A successful nest does not necessarily mean a successful brood, so when planning how and when to manage your property, it is key to mix nesting cover in with brooding cover.

Prescribed burn in a woodland habitat

Prescribed Burning in Forest and Woodland Ecosystems: Enhancing Turkey Habitat

Many land managers already use prescribed burning as a tool. The duration between prescribed burns has an impact on nest survival, as fire promotes the growth of non-woody plants and usually does not kill the root systems of woody plants. This dynamic encourages the development of dense understory vegetation and a higher percentage of ground cover (Yeldell et al. 2017). The growing season immediately following a prescribed burn often lacks sufficient nesting cover for hens to conceal themselves; however, it is considered more suitable for brood rearing. In contrast, the second growing season, post-burn, is characterized by excellent cover for nesting and nest concealment. Temporary forest openings create suitable nesting and brood cover. Isolated openings not only support flourishing understory vegetation but also offer cover in the form of debris from fallen trees (Byrne and Chamberlain 2013).

Promoting Habitat Diversity

Understory management: Prescribed burning helps control understory vegetation, such as shrubs and saplings, which can become dense and inhibit the growth of herbaceous plants favored by turkeys. By reducing understory density, burning creates open spaces and promotes the growth of desirable forage species, enhancing habitat diversity and suitability for turkey nesting, foraging, and brood-rearing activities.

Improving edge habitat: Burning edges improves the quality of habitat between two habitat types. Since these edge habitats offer a mix of open areas and dense cover, they provide turkeys with foraging opportunities, roosting sites, and nesting cover in proximity.

Mimicking Natural Fire Regimes

Restoring ecological processes: Historically, fire played a crucial role in shaping forest and woodland ecosystems, influencing vegetation dynamics, nutrient cycling, and wildlife habitat structure. Prescribed burning helps mimic natural fire regimes and restores ecological processes. Promoting the persistence of fire-adapted plant species and maintaining habitat conditions can favor turkey habitat.

Creating mosaic landscapes: By burning in a patchwork pattern, across the landscape, prescribed burns create a mosaic of burned and unburned areas. This mosaic landscape offers turkeys a diverse range of foraging, nesting, and brood-rearing opportunities, supporting healthy populations across different life stages.

Safety and Considerations

Professional expertise: Prescribed burning in forest or woodland ecosystems requires careful planning, coordination, and execution by trained professionals with expertise in fire behavior, ecology, and wildlife management. Working with experienced fire management teams ensures safe and effective burns that achieve management objectives while minimizing risks to human safety and environmental health. It is highly encouraged to actively participate in an MDC prescribed burn class. By learning about fire behavior, safety protocols, and the ecological benefits of prescribed burning, landowners can make informed decisions regarding prescribed burns on their property. Furthermore, joining a wildlife cooperative or prescribed burn association provides landowners with access to valuable resources, expertise, and a great support network. These cooperatives foster collaboration among landowners, conservation agencies, and researchers, facilitating the exchange of knowledge and best practices for sustainable land stewardship. Through participation in prescribed burn classes and involvement in wildlife cooperatives, landowners can contribute to the preservation of healthy ecosystems and biodiversity and provide the cover necessary to see Missouri's turkey population grow for generations to come.

Monitoring and evaluation: Post-burn monitoring is essential for assessing burn effects, evaluating habitat responses, and informing future management decisions. Regular monitoring helps land managers track habitat changes, identify potential issues, and adjust management strategies as needed to ensure the long-term sustainability of turkey populations and forested ecosystems.

Prescribed fire is probably the single best tool for land managers to make a large-scale change on their property. Fire was historically a key agent of disturbance across much of Missouri. Years of suppression has changed the way our forests and open areas look today. Incorporating fire has too many benefits to list here, but when properly executed, via a prescribed fire plan written by a qualified person, it can be a very cost-effective way to improve your property.

Savannah in Camden and Laclede counties

Creating Brooding Cover in Forest and Woodland Habitat Ecosystems: Attributes and Management Strategies

Brooding cover plays a crucial role in providing suitable habitat for poults during the early stages of their development. In forest and woodland ecosystems in Missouri, certain attributes define ideal brooding cover, and targeted management strategies can help create and enhance these habitats.

Attributes of Brooding Cover: Desired Future Condition

Structural diversity: Ideal brooding cover exhibits structural diversity with a mix of understory vegetation, woody debris, and ground cover providing ample concealment and protection for young poults. Densely vegetated areas with overhead canopy cover offer security from predators and adverse weather conditions, creating a safe environment for brooding hens and their broods.

Forb and herbaceous diversity: Brooding cover should include diverse forbs and herbaceous plants which serve as important food sources for the insects that young poults rely on during their early stages of development.

Insect abundance: Brooding cover should harbor abundant insect populations, as they serve as the primary source of energy for poults during their early weeks of life. The dense vegetation and structural complexity of brooding cover create microhabitats that support a rich diversity of insect species, including caterpillars, beetles, and grasshoppers, which are essential for the growth and development of young poults.

Areas Likely to Serve as Brooding Cover

South- or west-facing slopes: Sloped terrain, particularly south- and west-facing slopes, often provide optimal brooding cover due to their drier conditions and reduced soil quality. These sites are less productive for timber growth but are well-suited for brooding cover, as they tend to support dense vegetation and woody debris, offering excellent concealment and protection for turkey broods.

Less productive areas: Areas with poor soil quality or degraded habitat conditions, such as high-graded stands of hardwoods or degraded understory vegetation, may already serve as potential brooding cover due to their dense vegetation and structural complexity. These areas can be targeted for manipulation and enhancement to improve habitat quality and support healthy turkey populations.

Management Strategies for Enhancing Brooding Cover

Seed tree method: Use the seed tree method to select for "breeding stock" trees within the stand, thinning aggressively around these trees to create openings and promote understory growth. This approach encourages the establishment of forbs and oak regeneration, creating a structurally diverse and complex habitat that supports abundant insect populations crucial for poult development.

Regular prescribed burns: Implement regular prescribed burns to maintain and enhance brooding cover conditions within forest and woodland habitats. Burning helps reduce woody debris accumulation and stimulate herbaceous growth, which promotes the abundance of insects, providing essential food resources for poults during their critical early weeks of life.

Manipulating Habitat to Meet Brooding Cover Condition

Identify priority areas: Assess the existing habitat conditions and identify priority areas within forest and woodland settings that have the potential to serve as brooding cover based on topography, vegetation structure, and insect abundance.

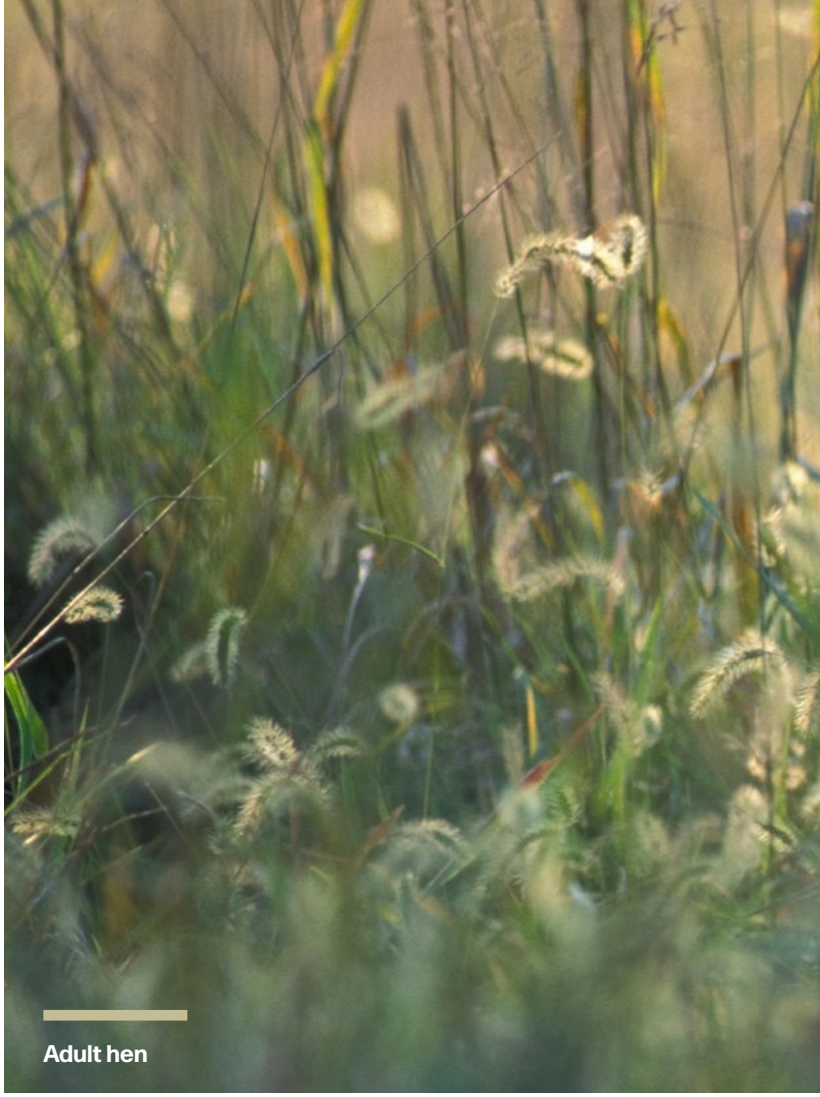
Implement habitat manipulation: Apply targeted management practices such as TSI, shrub thinning, selective timber harvest, and prescribed burns to manipulate habitat conditions and enhance brooding cover quality in identified priority areas.

By focusing on the attributes of brooding cover and incorporating the importance of abundant insect populations as a food source for poults, land managers can effectively support turkey populations and contribute to the conservation of this iconic species in Missouri.

Forest and Woodland Habitat Management

Habitat assessment: Before implementing any management strategies, conduct a thorough habitat assessment to understand the existing forest and woodland conditions on your property. Identify the different forest types, tree species, age classes, and habitat features. Assess the availability of food sources, such as mast-producing trees and shrubs and the presence of diverse ground-level vegetation. Also, note the location of water sources and potential nesting, brood-rearing, and roosting sites.

Prescribed burning: Prescribed burning is a valuable tool in a forest and woodland ecosystem. Prescribed burns can stimulate the growth of native grasses, forbs, and shrubs, providing essential brood-rearing habitat and improving foraging opportunities for poults and hens. Additionally, prescribed burns help manage competing vegetation, open the forest floor, and promote a more diverse and productive understory.



Adult hen

TSI: This practice involves selectively thinning the forest to enhance its structure and diversity. TSI activities target undesirable or over-represented tree species and promote the growth of preferred mast-producing trees, such as oaks. By opening the canopy and allowing more sunlight to reach the forest floor, TSI creates optimal conditions for understory growth and benefits turkeys by providing improved forage and nesting and brood-rearing sites.

Selective harvest in a mature timber stand: Selective timber harvest is a wildlife management tool that involves removing specific trees to improve habitat conditions for various wildlife species, including turkeys.

Mast tree planting: Planting mast-producing trees, such as oaks and hickories, is an effective long-term strategy for enhancing food availability for turkeys. Choose native species that are well-adapted to the local climate and soil conditions. Plant trees in clusters or patches to provide more concentrated food sources for wildlife. Protect newly planted trees from herbivores' browse, such as deer, to ensure a successful establishment.

Nesting and roosting habitat enhancement: Maintain and improve nesting and roosting habitat within the forests and woodland areas by preserving large, mature trees with suitable branches for roosting sites and creating secure nesting structures, such as small brush piles, log piles, or fallen trees.

Invasive species control: Identify and control invasive plant species that can negatively affect forest health and biodiversity. Invasive species can outcompete native vegetation by reducing food availability and habitat quality for all Missouri wildlife, including turkeys. Implement targeted management techniques, such as herbicide application or manual removal.

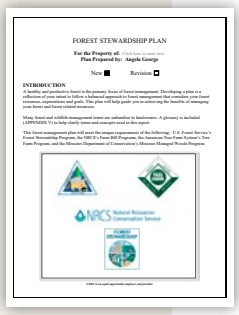
Seasonal considerations: Consider the seasonal needs of turkeys when planning management activities. For the spring and summer, focused on creating and enhancing nesting and brood-rearing habitat by providing abundant insect-rich forage and secure cover for both nesting hens and young poults. For the fall, emphasize providing reliable food sources, such as mast-producing trees, for turkeys to build fat reserves for winter.

Collaboration and professional guidance: Consider working with professionals with the U.S. Department of Agriculture's (USDA) Natural Resource Conservation Service (NRCS), Farm Service Agency (FSA), MDC PLC staff, or other local conservation agencies to develop a comprehensive forest and woodland habitat management plan. Their expertise can help you design a management plan that aligns with your property's goals and benefits not only turkeys but other native wildlife.

Monitoring and adaption: Regularly monitor how your habitat management efforts affect turkey populations and their habitat. Be prepared to adapt your strategies based off monitoring results, changing environmental conditions, and new scientific findings.

Example Forest Management Plan

As noted above, there are many considerations when developing a forest management plan, which may make the process seem overwhelming at first glance. However, a properly prepared plan can alleviate much of the inherent stress of implementation. Sample plans can be found online at **mdc.mo.gov/media/123015.**


FOREST STEWARDSHIP PLAN

For the Property of: (Check boxes for another land)

Plan Prepared by: Angela George

New ■ Revision ■

INTRODUCTION

A healthy and productive forest is the primary focus of forest management. Developing a plan is a collection of your intent to follow a balanced approach to forest management that considers your forest resources, expectations and goals. This plan will help guide you in achieving the benefits of managing your forest and forest related resources.

Many forest and wildlife management terms are unfamiliar to landowners. A glossary is included (APPENDIX V) to help clarify terms and concepts used in this report.

This forest management plan will meet the unique requirements of the following: U.S. Forest Service's Forest Stewardship Program, the NRCS's Farm Bill Programs, the American Tree Farm System's Tree Farm Program, and the Missouri Department of Conservation's Missouri Managed Woods Program.

NRCS Natural Resources Conservation Service

FOREST STEWARDSHIP

Timber Stand Improvement Plan for Turkey Habitat Management

Habitat assessment: Conduct a comprehensive habitat assessment of the forested area where you plan to implement TSI. Identify the existing tree species, age classes, and density. Assess the understory vegetation, including the presence of preferred food sources for turkeys, such as mast producing trees and shrubs. Note the availability of potential nesting, brood-rearing, and roosting sites.

Define objectives: Clearly define your objectives for the TSI plan. Consider the specific needs of turkeys during different seasons, such as nesting and brood rearing in the spring and summer and reliable food sources in the fall and the winter. Determine the desired changes in habitat structure and vegetation to support turkey populations effectively.

Tree selection: Identify undesirable or overrepresented tree species in the forest stand. Target species that compete with mast-producing trees for resources or that do not provide significant benefits to wildlife. Preferably, retain and promote the growth of preferred mast-producing species, such as oaks and hickories.

Thinning and removal: Begin the TSI process by selectively thinning the forest stand. Remove undesirable tree species and create openings in the canopy to allow more sunlight to reach the forest floor. This promotes the growth of understory vegetation and provides a diverse array of food sources for turkeys, such as insects and browse at multiple levels.

Retain snags and mast trees: Keep some snags (standing dead trees) and large, mature mast-producing trees. Snags provide nesting and denning sites for other wildlife, such as bats, woodpeckers, and other species of birds, and some species of ducks. They also provide roosting sites for turkeys. Mature mast trees offer essential fall and winter food sources.

Planting and seeding: Consider planting additional mast-producing trees, particularly oak and other nut-bearing species, to enhance food availability for turkeys. Plant trees in clusters or patches to create concentrated food sources. If suitable, consider seeding the understory with desirable grasses and forbs to provide additional forage for turkeys.

Invasive species control: Identify and control invasive plant species that may negatively affect the forest habitat. Invasive plants can outcompete native vegetation and reduce food availability for wildlife. Implement targeted management techniques to control invasive species effectively.

Monitoring and adaptation: Regularly monitor the effects of your TSI on turkey populations and their habitat. Assess changes in vegetation, wildlife usage, and turkey population dynamics. Be prepared to adapt your management strategies based on monitoring results and new information.

Collaboration and expertise: Seek advice from professional foresters and wildlife biologists when developing and implementing your TSI plan. Collaboration with experts can help ensure that your efforts align with the best practices for turkey habitat management.

Having a well-executed TSI plan for turkey habitat management can significantly improve the quality of the forested habitat and support healthy turkey populations. Remember that the TSI process is an ongoing and adaptive management approach, so regularly assess the habitat and make necessary adjustments to achieve your desired objectives.

Multi-Year Habitat Management Plan for Turkey Management after Timber Stand Improvement

TSI is not a single-year endeavor. It is a multi-year practice that includes monitoring, invasive species control, and evaluation to ensure the management objective is being met.

Selective Harvest in a Mature Timber Stand

This wildlife management strategy involves carefully removing specific trees to improve habitat conditions for various wildlife species, including turkeys. The goal is to create a more diverse forest structure that provides better foraging, nesting, and brood-rearing opportunities for turkeys and other wildlife in Missouri. Below is an example of a multi-year post-TSI plan.

Year 1: Post-TSI Monitoring and Evaluation

Conduct post-TSI monitoring to assess the implemented management practices on the forest stand and wildlife populations. Evaluate changes in basal area, understory growth, and food availability for turkeys and other native wildlife. Based on monitoring results, adjust management strategies if necessary. For example, if certain tree species did not regenerate as expected, consider planting additional mast-producing trees to ensure a sustainable food source for turkeys.

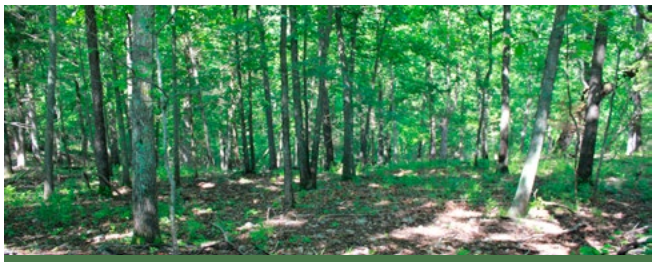
Years 2-5: Forest Regeneration and Enhancement

Continue to monitor and encourage natural regeneration of preferred mast-producing tree species. Promote the growth of young trees through adequate sunlight and limited competition from undesirable vegetation.

Supplemental planting may need to occur if natural regeneration is insufficient. Consider supplemental planting of mast-producing trees. Planting trees in clusters or patches can create more concentrated food sources for wildlife and improve foraging efficiency.

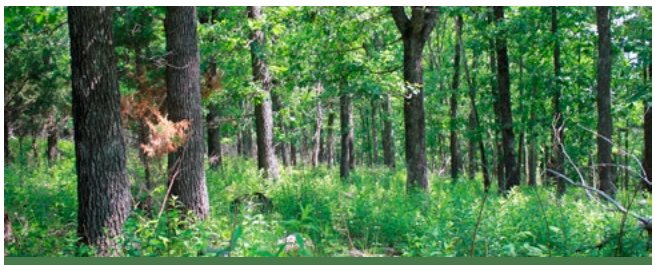
Monitor for invasive plant species and implement control measures as needed to prevent their negative impact on forest health and biodiversity.

An unmanaged timber stand with a closed canopy and limited understory growth provides little habitat value for wildlife.



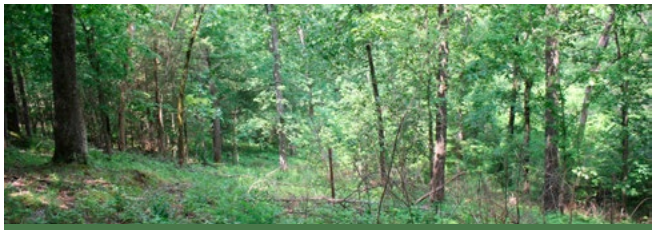
A timber stand after a prescribed burn shows improved ground cover but still lacks structural diversity due to the absence of timber stand improvement.

A timber stand after timber stand improvement (TSI) features increased sunlight reaching the forest floor but lacks the benefits of follow-up prescribed burns for enhanced habitat quality.



Timber stand improved in 2012, with prescribed burns in 2018, 2021, 2023, and 2025. Cedar slash from 2022 adds structural diversity and enhances wildlife habitat.

A timber stand lightly harvested in 2013-2014, burned in March 2022, and thinned in winter 2022-2023 promotes improved habitat structure and regeneration.



A comparison of thinned (right) vs. unthinned (left) timber stand highlights the benefits of thinning for increased sunlight penetration and improved understory growth.

Years 6-10: Promoting Diversity and Structure

Conduct intermediate thinning to maintain an optimal basal area and to promote a diverse forest structure. Retain mature mast-producing trees and remove suppressed or declining trees to open the canopy and encourage understory growth.

Consider incorporating prescribed burning into the management plan to stimulate the growth of native grasses and forbs. Prescribed burns can benefit turkeys by providing essential brood-rearing habitat and improve foraging opportunities.

Maintain and enhance nesting and roosting habitat within the timber stand. Preserve large, mature trees with suitable branches for roosting sites and create nesting structures like small brush piles to offer secure nesting locations for hens.

Year 11 and Beyond: Sustainable Management

Continue monitoring the forest habitat and turkey populations to assess the long-term impact of management practices and adapt as needed.

When stand conditions allow, consider implementing regeneration harvests to create new early successional habitats within the forest stand. These temporary openings can benefit turkeys by providing additional brood-rearing areas, foraging opportunities, and nesting locations.

Engage with professional foresters, wildlife biologists, and other professionals, such as those from MDC, NRCS, FSA, National Turkey Federation (NWTF), and Quail Forever (QF) to seek advice and guidance in maintaining a sustainable forest management approach. As wildlife habitat management is continually evolving, it is crucial to consult with professionals to ensure that implementation of best practices. Their expertise can provide valuable insights into ecosystem dynamics, species interactions, and habitat restoration strategies contributing to the long-term health and biodiversity of forested landscapes.

Educate others, such as neighboring landowners or hunters, about the importance of sustainable forest management for supporting healthy turkey populations and maintaining diverse wildlife habitats. Encouraging neighboring landowners to become actively involved in habitat management not only enhances local biodiversity, but also contributes to the establishment of interconnected habitat corridors across larger landscapes. This collaborative approach ensures that there is adequate habitat for turkeys and other wildlife at a broader scale, promoting ecological resilience and enhancing the overall sustainability of forest ecosystems.

A well-structured, multi-year habitat management plan ensures the continued health and productivity of the forested habitat for turkeys. Implementing sustainable management practices, fostering habitat diversity, and promoting food availability contribute to a thriving turkey

population and support a broader range of wildlife species in the region. Regular monitoring, being flexible in how landowners take care of their properties, habitat and the wildlife, and ongoing collaboration with experts and stakeholders are essential components of a successful habitat management plan over the long term.

Timber Harvest for Forest/Woodland Management in Missouri: A Step-By-Step Guide

Timber harvest is a valuable management tool for maintaining healthy forest ecosystems and promoting sustainable timber production in Missouri. Landowners can play an active role in managing their forested properties through carefully planned and executed timber harvests. Below is a step-by-step guide outlining the timber harvest process for Missouri landowners.

Assessing Timber Resources

Inventory: Begin by conducting a comprehensive inventory of timber resources on the property. Identify tree species, age classes, size distribution, and stand density to assess the overall health and productivity of the forest. Contact your local MDC forester, NRCS or FSA office to start this inventory process.

Consultation: Seek guidance from forestry professionals, such as certified foresters or extension agents, to help assess timber resources and develop a management plan tailored to the property's objectives and ecological conditions.

Setting Objectives

Define goals: Clearly define management objectives, such as timber production, wildlife habitat enhancement, or ecosystem restoration, to guide the timber harvest process. Consider the long-term sustainability of forest resources and the desired outcomes for the property.

Select Harvest Methods

Harvest prescription: Based on management objectives and ecological considerations, select appropriate harvest methods, such as clearcutting, shelterwood, or selective cutting. Each method affects the forest structure, biodiversity, and regeneration potential differently. Aim to mimic natural disturbance regimes and promote forest resilience and regeneration.

Contracting and Permitting

Contract negotiation: Solicit bids from reputable logging companies and negotiate contract terms, including harvest boundaries, cutting techniques, environmental safeguards, and financial compensation.

Permitting: Obtain necessary regulatory approvals from local, state, and federal agencies, ensuring compliance with forestry laws, environmental regulations, and land use restrictions.

Implementing Harvest Operations

Marking boundaries: Clearly mark harvest boundaries and designated cutting areas to guide logging operations and minimize impacts on adjacent land uses, sensitive habitats, and water resources.

Monitoring compliance: Oversee harvest operations to ensure compliance with contract specifications, environmental regulations, and safety protocols. Conduct regular inspections and promptly address any issues or concerns.

Post-Harvest Activities

Reforestation: Implement reforestation measures or promote natural regeneration, to restore forest cover and regenerate harvested areas. Follow silvicultural prescriptions to enhance biodiversity and promote long-term forest health. Post-harvest activities could include TSI or burning, at most, to promote natural regeneration.

Monitoring and evaluation: Monitor post-harvest regeneration, assess the effectiveness of management practices, and adjust future management strategies as needed to achieve desired outcomes and sustain forest resources.

Long-Term Management Planning

Adaptive approach to management: Adopt an adaptive approach to management by continually assessing forest conditions, monitoring ecosystem responses, and adapting management strategies based on new information and changing objectives.

Stewardship: Commit to responsible forest stewardship practices, promoting sustainable timber production, biodiversity conservation, and ecosystem resilience for the benefit of current and future generations.

By following this step-by-step guide, Missouri landowners can effectively plan, execute, and monitor timber harvests on their forested properties, contributing to the sustainable management of forest resources and the conservation of biodiversity in the region.

Bottomland forest at Locust Creek in Pershing State Park

Challenges in Managing Bottomland Forest Stands

Bottomland forest stands present unique challenges for habitat management because the primary strategies of thinning and prescribed burning used on upland forests are not as effective due to the differences in soils, hydrology, and natural disturbance processes. Bottomland forests and the wetland habitats within them have distinct characteristics that make certain management practices less effective.

Thinning Challenges

Sensitive ecosystem: Bottomlands are ecologically sensitive environments characterized by high levels of biodiversity and complex hydrological dynamics. Attempting to thin these stands can disrupt delicate ecological balances and have unintended consequences for both plant and animal species reliant on these habitats.

Risk of habitat degradation: Thinning activities in bottomlands can lead to habitat fragmentation, loss of canopy cover, and increased exposure to invasive species. These changes can degrade habitat quality for wildlife species, including turkeys, which depend on the dense vegetation and structural complexity provided by intact bottomland forests.

Prescribed Burning Challenges

Differences across floodplain positions: While floodplains may not have as much elevational relief as the adjacent uplands, a few inches or feet can greatly influence the forest community because soils, landforms, and hydrology that interact with the plants and their potential fire frequency. Forests located on higher landforms such as terraces or sandy ridges are more likely to be drier and have species better adapted to fire and more frequent burns. Lower locations in abandoned channels and swales are less likely to dry out and have a different suite of bottomland trees that could be more sensitive to fire. These conditions make it challenging to conduct prescribed burns effectively, as the excess moisture inhibits the ignition and spread of fire. For certain locations, during dryer years, prescribed burning can be conducted and may be useful for controlling some invasive species. Knowing and understanding that bottomland forest communities may vary in their hydrology and fire tolerance is important. Ask your private land forester what the best approach is to your specific habitat management needs.

Fire coverage difficulty: Even if ignition is successful, maintaining a prescribed burn in bottomland stands can be difficult due to the presence of standing water, wet soils, and dense vegetation that resist combustion. Fire may not spread uniformly. Sporadic coverage of leaf-litter

can be beneficial to wetland dependent species that are less mobile like amphibians and invertebrates who rely on this cover across the forest floor for refugia during certain parts of their life history.

Management Considerations

Alternative management approaches: Given the challenges associated with thinning and prescribed burning in bottomlands, land managers should explore alternative management approaches that prioritize habitat conservation and ecosystem integrity. Strategies such as selective harvesting, invasive species control, and riparian buffer establishment may be more suitable for maintaining habitat quality in these sensitive environments.

Conservation Priorities

Recognizing the ecological significance of bottomland stands, conservation efforts should prioritize the protection and restoration of these valuable habitats. Conservation easements, land acquisition initiatives, and partnerships with private landowners can help safeguard bottomland forests and ensure their continued contribution to biodiversity conservation and ecosystem health.

By acknowledging the challenges inherent in managing bottomlands and adopting a thoughtful, ecosystem-based approach to habitat management, land managers can effectively balance conservation priorities with the needs of wildlife species, including turkeys, in these critical habitats.

Forest and Woodland Management: Considerations on Invasive Species Control

Invasive species represent a significant ecological threat to forest and woodland ecosystems in Missouri, outcompeting native vegetation, altering habitat structure, and disrupting ecosystem processes. Effective management strategies are essential for controlling invasive species and preserving the integrity and biodiversity of forested habitats. Controlling and eradicating invasive plant populations usually requires repeated management activities over the course of several growing seasons. Below are key considerations for invasive species control in forest and woodland management:

Identifying Invasive Species

Species assessment: Conduct a thorough assessment of invasive species presence and distribution within forested areas. Identify common invasive plants, such as bush honeysuckle *(Lonicera spp.),* garlic mustard *(Alliaria petiolata),* and Japanese stiltgrass *(Microstegium vimineum),* as well as invasive insects and pathogens that may threaten forest health. Please keep in mind that there are several invasive species not listed here, and not all listed above will be found in every habitat. Contact a local PLC, county extension office, or go to the website **moinvasives.org/lists/** to learn more about invasive species in Missouri.

Garlic Mustard

Bush honeysuckle with fruit

Mapping: Use mapping tools and GIS technology to map the extent of invasive species infestations and prioritize areas for management interventions based on ecological significance and resource constraints. These tools may be done with the help of a professional forester. There are also apps that can be used as a mapping tool; many are free to the user. Some apps require a monthly or yearly subscription. Most are easy to use.

Management Strategies

Prevention: Implement measures to prevent the introduction and spread of invasive species, such as promoting awareness among neighboring landowners and recreational users, practicing good sanitation practices, and monitoring for early detection of new infestations.

Mechanical control: Use mechanical methods, such as hand-pulling, mowing, or cutting, to manually remove invasive plants and reduce their population density. Mechanical control is particularly effective for small-scale infestations and sensitive habitats where herbicide use may not be feasible. Be cautious to minimize activities and control methods that cause soil disturbance, which can become a prime location for new invasives to establish.

Chemical control: Use herbicides judiciously and according to label instructions to target invasive plant species while minimizing impacts on non-target vegetation and wildlife. Herbicide application methods, such as foliar spraying, basal bark treatment, or cut stump application, can be tailored to specific invasive species and site conditions.

Monitoring and Evaluation

Assessment: Monitor the effectiveness of invasive species control efforts through regular surveys and assessments of treated areas. Evaluate changes in invasive species abundance, vegetation composition, and habitat quality to gauge management success and identify areas for improvement.

Adaptation: Adopt alternative management strategies based on monitoring results and evolving invasive species threats. Adjust management priorities, techniques, and resource allocations as needed to address emerging challenges and optimize long-term management outcomes.

Collaboration and Outreach

Partnerships: Foster collaboration among landowners, government agencies, conservation organizations, and community stakeholders to coordinate invasive species management efforts and leverage collective resources and expertise.

By integrating invasive species control considerations into forest and woodland management practices, land managers can help safeguard native biodiversity, protect ecosystem functions, and promote the resilience and sustainability of forested habitats in Missouri.

Gray-headed coneflowers (yellow) and prairie blazing stars (purple) at Dunn Ranch in north Missouri

Open Habitat Management

Open habitats encompass a variety of ecosystem types, including grasslands, savannas, old fields, and early successional vegetation which support diverse wildlife communities and provide essential habitat for numerous species, including turkeys. Effective management of open habitats is essential for maintaining biodiversity, promoting ecosystem resilience, and supporting healthy wildlife populations. Below, we outline the desired future condition of open habitats and key management strategies for achieving conservation goals.

Desired Future Condition

Habitat structure: The desired future condition of open habitats involves a mosaic of vegetation types, including grasslands, shrublands, and scattered trees, creating a diverse and structurally complex landscape. Open habitats should exhibit a mix of short and tall vegetation, providing cover for ground-nesting birds, small mammals, and other wildlife species.

Species diversity: Open habitats should support a rich diversity of plant and animal species adapted to open sunlit environments. Native grasses, forbs, and wildflowers should dominate the vegetation composition, creating a diverse and resilient plant community that supports all levels of the food chain, from pollinators up to carnivores.

Wildlife habitat: Open habitats should provide essential habitat components for a variety of wildlife species, including nesting sites, brood-rearing areas, foraging opportunities, and escape cover. Structural diversity, such as patches of dense vegetation interspersed with open grasslands, enhances habitat suitability for a wide range of wildlife, including turkeys, quail, deer, and songbirds.

Ecosystem function: Open habitats play a crucial role in supporting ecosystem functions, such as nutrient cycling, soil formation, and water filtration. Maintaining healthy open habitats contributes to soil health, water quality, and overall ecosystem resilience, benefiting both wildlife and human communities.

Management Strategies

Invasive species control: Implement invasive species control measures to manage encroachment of nonnative vegetation and maintain the integrity of open habitats. Target invasive plants that threaten native biodiversity and ecosystem function, utilizing a combination of mechanical, chemical, and biological control methods as appropriate.

Wild turkey in open field

Prescribed burning: Use prescribed burning to maintain open habitats and promote early successional vegetation dynamics. Prescribed burns help reduce accumulated thatch and woody debris, stimulate seed germination, and promote the growth of native grasses and forbs that create ideal habitat conditions for turkeys and other wildlife.

Edge feathering: Implement edge feathering techniques along woodland edges for transitional zones between open habitats and adjacent forested areas. Edge feathering promotes habitat and wildlife diversity and provides valuable foraging and nesting opportunities for turkeys and other species.

Old field renovations: Restore degraded old fields and abandoned agricultural lands to native grasslands and wildflower meadows through targeted restoration efforts. Old field renovations involve removing invasive species, planting native grasses and forbs, and implementing habitat enhancements to create high-quality wildlife habitat.

Native warm season grass establishment: Establish native warm-season grasses, such as little blue stem *(Schizachyrium scoparium)* and side-oats grama *(Bouteloua curtipendula)* , in open habitats to enhance habitat diversity and support grassland-dependent wildlife species. Native warm-season grasses provide valuable nesting cover, brood-rearing habitat, and food resources for turkeys and other ground-nesting birds.

By promoting the desired future condition of open habitats and implementing targeted management strategies, land managers can enhance wildlife habitat, conserve biodiversity, and promote the ecological integrity of open landscapes in Missouri.

Nesting Cover in Open Habitat Management: Areas and Manipulation

In open habitats, certain areas are naturally more likely to serve as nesting cover for ground-nesting bird species like turkeys. However, proactive management strategies can enhance nesting cover where needed. Understanding these areas and implementing targeted manipulation techniques are essential for promoting successful nesting and brood-rearing habitats. Below are some key considerations for identifying nesting cover areas and strategies for manipulation to meet nesting habitat requirements.

Areas Likely to Serve as Nesting Cover

Grasslands and meadows: Open grasslands and meadows with dense vegetation cover, including native grasses, forbs, and shrubs, often provide suitable nesting habitat for ground-nesting bird species like turkeys. These areas offer concealment and protection for nesting hens and their broods and minimize the risk of predation and nest abandonment. Keep in mind that these areas also need to have open spaces between each plant but provide ample concealment overhead.

Field margins and edges: Transitional zones along field margins and woodland edges are prime locations for nesting cover within open habitats. These areas typically feature a mix of grasses, forbs, and shrubs, providing nesting hens with suitable habitat adjacent to open areas while maintaining visibility for brooding hens.

Areas for Manipulation to Enhance Nesting Cover

Thick native grass stands: Super thick stands of native grasses, such as big bluestem or switchgrass may require manipulation to maintain open nesting cover conditions. These dense grass stands can become overly thick and accumulate thatch over time, limiting nesting habitat quality and accessibility for all ground nesting bird species, including turkeys.

Prescribed burning: Implement prescribed burning as a management tool to manipulate thick native grass stands and maintain open nesting cover conditions. Prescribed burns help reduce thatch accumulation, stimulate new growth, and create patchy vegetation patterns that benefit nesting hens and broods. Burning also promotes the growth of native forbs and native warm and cool season grasses, enhancing habitat diversity and food resources for wildlife.

Herbicide Application for Enhancing Nesting and Brood-Rearing Cover: In addition to prescribed burning, herbicide application can serve as a valuable tool for quickly reverting native warm-season grass fields for better nesting and brood-rearing cover. When dense stands of native grasses, such as big bluestem or switchgrass, become overly thick and accumulate thatch, herbicide treatments can help restore open nesting cover conditions and improve habitat quality for ground-nesting bird species like turkeys.

Benefits of Herbicide Application

Thatch reduction: Herbicide application can effectively reduce thatch accumulation in dense native grass stands, facilitating better access to the ground for nesting hens and broods. By breaking down excess thatch layers, herbicides promote the establishment of a more open and accessible nesting environment.

Vegetation management: Targeted herbicide treatments can selectively control dominant grass species and encourage the growth of desirable forbs and grasses. This vegetation management approach creates a more diverse habitat structure providing a greater variety of nesting cover and food resources for wildlife.

Rapid Results: Compared to natural processes like prescribed burning, herbicide application can yield relatively rapid results in terms of vegetation management. Land managers can efficiently target specific areas for treatment, accelerating the transition from grass stands to improved nesting and brood-rearing habitat.

Implementation Considerations

Landowners should consider the below notes items when considering herbicide application for enhancing nesting and brood-rearing cover.

Consult experts: Seek guidance from experienced land managers, conservation professionals, or agricultural extension agents to determine the most appropriate herbicide treatments for targeted grass species and habitat objectives.

Turkey eggs in nest

Follow best practices: Adhere to recommended herbicide application rates, timing, and application methods to minimize unintended effects and ensure effective vegetation management. Consider factors such as weather conditions, soil characteristics, and sensitive nontarget species.

Monitor and evaluate: Monitor vegetation response and wildlife use following herbicide treatments to assess the effectiveness of management efforts. Evaluate habitat improvements over time and adjust management strategies as needed to achieve desired conservation outcomes.

By incorporating herbicide application into habitat management plans, landowners can efficiently enhance nesting and brood-rearing cover for turkeys and other ground-nesting bird species. This proactive approach to vegetation management complements other habitat manipulation techniques, contributing to the overall ecological health and biodiversity of grassland ecosystems in Missouri.

Importance of Prescribed Burning for Nesting Cover

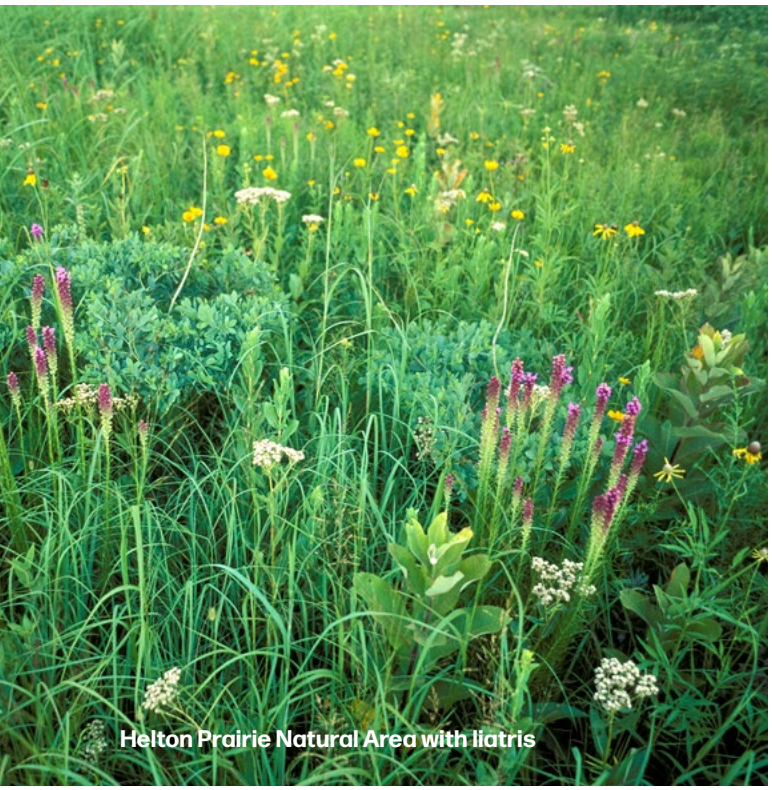
Thinning and maintenance: Prescribed burning is particularly effective for thinning thick native grass stands and maintaining open nesting cover conditions. Regular burns help prevent grass stands from becoming overly dense and impenetrable, creating a more diverse and structurally complex habitat that supports healthy turkey populations. Without a proper prescribed burn schedule, native grass stands can be over-run with nonnative or highly invasive species of plants, and in turn eventually become more closed and inaccessible for wildlife.

Habitat heterogeneity: Prescribed burns create habitat heterogeneity within open habitats, promoting a mosaic of vegetation types and structural diversity that benefits a wide range of wildlife species. Patchy vegetation patterns provide nesting hens with a variety of habitat options, from open grasslands to shrub-dominated areas, enhancing nesting success and brood survival rates.

By identifying areas likely to serve as nesting cover and implementing manipulation techniques such as prescribed burning, land managers can enhance nesting habitat quality and support healthy turkey populations within open habitats in Missouri.

Brooding Cover in Open Habitat Management

Brooding cover plays a critical role in the survival and growth of poults, providing them with essential shelter, concealment, and protection during their vulnerable early stages of development. Effective management of open habitats should include provisions for brooding cover to support healthy turkey populations. Below, we discuss the attributes of brooding cover, areas conducive to brooding cover, and management strategies for enhancing brooding habitat within open habitats.



Helton Prairie Natural Area with liatris

Attributes of Brooding Cover

Concealment: Brooding cover should offer adequate concealment and protection for poults, shielding them from predators and adverse weather conditions. Dense vegetation, such as grasses, forbs, and low shrubs, provide effective concealment and security, minimizing predation risk and promoting poult survival. Remember, this cover should be "umbrella" like in appearance, with a thick, overhead canopy but ample bare dirt at ground level for chicks to easily maneuver within.

Accessibility: Brooding cover should be easily accessible to poults, located within proximity to nesting sites and foraging areas. Suitable brooding habitat should offer a mix of open areas for foraging and dense vegetative cover for shelter allowing poults to move freely while remaining protected from predators.

Microhabitat diversity: Brooding cover should exhibit microhabitat diversity, comprising a variety of vegetation heights, densities, and structural features. Variability in vegetation structure creates microclimates that accommodate poult behavioral needs, including thermoregulation, feeding, and resting.

Areas Conducive to Brooding Cover

Grasslands and old fields: Open grasslands, old fields, and early successional habitats are prime locations for brooding cover within open landscapes. These areas typically feature a mix of grasses, forbs, and low shrubs, providing ample concealment and protection for poults during their early development stages.

Field edges and margins: Transitional zones along field edges, woodland edges, and water bodies serve as important brooding cover areas within open habitats. These edge habitats offer a combination of open spaces for foraging, dense vegetative cover for shelter, and creating ideal brooding habitat conditions for poults.

Areas for Manipulation to Enhance Brooding Cover

Forb/pollinator plots: Establish forb and pollinator plots within open habitats to enhance brooding cover and food resources for poults. These types of plots feature a diverse array of native warm and cool season grasses and forbs, providing valuable nectar and pollen sources for pollinators and insects, which in turn attract insectivorous (insect eating) birds, including poults.

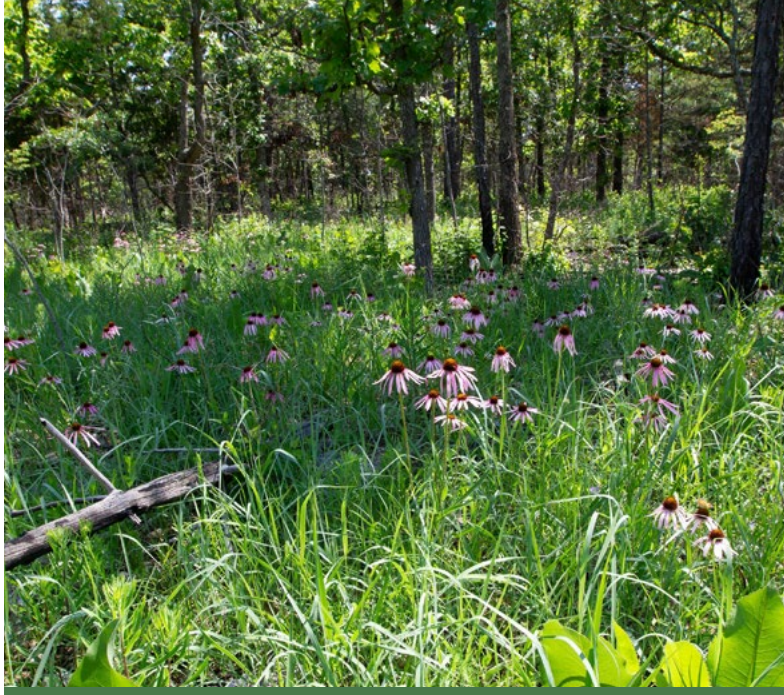
Old field renovations: Restore degraded or abandoned old fields to native grasslands and pollinator plots through targeted restoration efforts. Old field renovations involve removing invasive species, planting native grasses and forbs, and implementing habitat enhancements to create high-quality brooding habitat.

Nesting Structures

Install nesting structures within open habitats to provide additional shelter and protection for poults. These artificial structures mimic natural cover features, such as fallen logs or dense vegetation, and offer safe refuge for poults during their vulnerable early stages of development.

By identifying areas likely to serve as brooding cover and implementing manipulation techniques such as forb/pollinator plots, old field renovations, and the installation of nesting structures, land managers can enhance brooding habitat quality and support healthy turkey populations within open habitats in Missouri.

The native prairie at Dunn Ranch showcases vibrant prairie flowers and diverse vegetation that support a variety of wildlife species.



A savannah at Dunn Ranch features purple coneflower and illustrates the mix of grasses and wildflowers that support both open and wooded habitat types.

Prairie and Savannah Restoration

Historically, Missouri was part of the vast prairie and grassland ecosystem that extended across much of the central United States. Native grasslands, along with savannas and open woodlands, were prevalent ecosystems in Missouri. However, over the centuries, human activities such as urbanization and fire suppression, have dramatically reduced the extent of native grasslands in Missouri. Today only a fraction of the original prairie remains.

Native grasslands in Missouri play a crucial role in maintaining biodiversity, supporting wildlife populations, and providing numerous ecological benefits. These grasslands are adapted to the region's climate and soils, making them resilient and valuable components of the state's natural heritage. Native grasslands support a diverse array of plant and animal species, many of which are adapted to the unique conditions of these ecosystems. Grasslands provide essential habitat for numerous wildlife species, including grassland birds, insects, small mammals, and reptiles.

Native grasses have deep root systems that help improve soil health, reduce erosion, and enhance water infiltration. Their extensive root network also sequesters carbon, contributing to climate change mitigation. Native grasslands act as natural filters, trapping and absorbing nutrients and pollutants, thereby improving water quality in streams and rivers. They also offer crucial habitat for ground-nesting birds, including turkeys. The grasses and forbs provide nesting cover and protection for hens and their broods, especially during the critical brood-rearing period. Native grasslands also provide valuable forage for wildlife, including poults, during the summer months. These native grasses and forbs provide a multi-layer system that allows for a poult to forage at multiple layers for the many insects that they require for growth and development.

Native grasslands can benefit turkeys in many ways. They offer excellent brood-rearing habitat for poults. The dense cover and diverse plant structure provide a secure environment for young turkeys to hide from predators while foraging for insects. Hens often nest in native vegetation due to the dense cover and concealment provided. These nesting sites protect the eggs and hen from predators and disturbances. Native grasslands provide an abundance of insects and seeds, which are essential components of turkey diets, especially during the summer months when poults are growing.

Establishing and managing native grasslands in proximity to other habitats, such as woodlands or crop fields, creates valuable connectivity for turkeys. This allows turkeys to move between different habitat types, accessing various resources throughout the year. Restoring and conserving native grasslands contributes to overall biodiversity in Missouri and benefits a wide range of wildlife species, including those that share the grassland ecosystem with turkeys. By prioritizing the restoration and management of native grasslands in Missouri, landowners can play a crucial role in supporting healthy turkey populations and conserving a unique and essential ecological landscape for future generations.

Prescribed burn at Wah'Kon-Tah Prairie Conservation Area

Prescribed Burning in Prairie and Savannah Restoration: Benefits and Rotation Cycle

Prescribed burning is a key management tool used in prairie and savannah restoration to maintain and enhance habitat conditions for wildlife species, including turkeys. Prescribed burns help promote the growth of native vegetation, control invasive species, and create optimal habitat conditions for nesting and brood rearing. Below, we discuss the benefits of prescribed burning and outline a rotation cycle for implementing burns in both prairie and savannah ecosystems.

Benefits of Prescribed Burning

Promotes native vegetation: Prescribed burning stimulates the germination of native grasses and forbs, promoting the growth of diverse plant community's characteristics of prairie and savannah ecosystems. Native vegetation provides essential habitat components for turkeys including nesting cover, brood-rearing habitat, and foraging opportunities.

Controls invasive species: Prescribed burns help suppress the growth of invasive species and nonnative vegetation that compete with native plants for resources. By reducing the abundance of invasive species, prescribed burning helps maintain the integrity of prairie and savannah ecosystems and enhances habitat suitability for wildlife species.

Creates a variety of habitat conditions: Prescribed burns create a mosaic of vegetation patches with varying ages and structural features, enhancing habitat heterogeneity within prairie and savannah landscapes. Heterogeneous habitats offer a range of microhabitats for nesting, brood rearing, and foraging, supporting diverse wildlife populations, including turkeys.

Reduces fuel loads: Prescribed burning reduces accumulated thatch, woody debris, and excess vegetation, decreasing the risk of uncontrolled wildfires and promoting ecosystem health. By managing fuel loads, prescribed burns help prevent catastrophic wildfires and maintain open habitats conducive to native plant and animal species.

Rotation Cycle for Prescribed Burning

Frequency: Implement prescribed burns on a rotational basis to achieve desired habitat conditions and maintain ecosystem health in prairie and savannah ecosystems. The frequency of burns will vary depending on vegetation composition, fuel loads, and management objectives, but a typical rotation cycle may involve burning a portion of the habitat every 1 to 5 years.

Seasonality: Conduct prescribed burns during the dormant season or early growing season to minimize impacts on nesting birds and other wildlife species. Spring burns are often preferred for promoting the growth of warm-season grasses and wildflowers, while fall burns can be used to control woody encroachment and stimulate new growth.

Patchiness: Implement patchy burns to create a mosaic of burned and unburned areas within prairie and savannah landscapes. Patchy burns help maintain habitat heterogeneity and support a diversity of plant and animal species adapted to different fire regimes and habitat conditions.

By incorporating prescribed burning into prairie and savannah restoration efforts and following a rotation cycle tailored to habitat needs and management objectives, land managers can enhance nesting and brood-rearing habitat for turkeys and support the conservation of native biodiversity in Missouri.

Edge Feathering for Turkeys in Missouri

Edge feathering is a practice that involves selectively thinning and feathering wooded edges, creating a transitional zone between open areas and wooded acreage. Edge feathering provides a variety of benefits for turkeys, enhancing their habitat and overall population dynamics. This practice benefits not only turkeys but quail and other small game. Edge feathering is a strategic habitat management practice that focuses on manipulating the transition zone between open areas, such as fields, meadows, or pastures, and mature forests, fencerows, and wooded draws.

Advantages of Edge Feathering for Turkeys

Edge feathering expands the amount of edge habitat on a given property, which turkeys find attractive for various reasons. The diverse edge provides a mixture of open spaces, dense cover, and abundant food resources, meeting a range of turkey habitat requirements.

Brood-rearing habitat: Edge feathering creates prime brood-rearing habitat for poults. The transitional zones offer a combination of open areas for foraging and dense vegetation for cover, which promotes poult survival and growth.

Forage availability: The open areas created by edge feathering support the growth of native grasses, forbs, and other vegetation, providing an array of food sources for turkeys. Insects attracted to these areas also serve as crucial protein-rich food for poults.

Improved nesting sites: The increased edge habitat diversifies nesting opportunities for hens. The transition between dense forest and open areas provides nesting hens with greater concealment and access to both forest and field resources.

Turkey travel corridors: Edge feathering can create travel corridors and transition zones for turkeys moving between different habitat types, facilitating their movement throughout the landscape.

Implementation of Edge Feathering

Site selection: Choose appropriate locations for edge feathering where the forest, wooded draws, or woody fence rows border open fields. Focus on areas that would benefit from increased diversity and transition. Ideal edge feathering locations are adjacent to brood or nesting cover.

Selective thinning: To feather the edge, selectively cut and fall trees along wooded edges. In edge feathering locations, cut and fall all trees 30 ft into the wooded edge in at least 50-foot lengths along field edges (30-foot by 50-foot blocks). This should be considered the minimum size with locations 30 feet by 100 feet or more seeming more beneficial. Cedar *(Juniperus virginiana),* pin oak *(Quercus palustris)* and shingle oak *(Quercus imbricaria),* Osage orange *(Maclura pomifera),* and other pioneer tree species are excellent candidates to cut in edge feathering locations. Maintain a variety of tree sizes and species to create a diverse canopy structure. Do not treat stumps of native shrubs, such as plum *(Prunus spp.)* or dogwood *(Cornus spp.),* with herbicide so they will resprout from the roots. Make sure to fall trees outwards and into the field, not horizontally along the field or forest edge. Doing this ensures a diverse, multi-layered field edge border. Treat the stumps of fallen trees (except native shrubs) with herbicide to ensure the stumps do not re-sprout.

Feathering effect: Gradually transition from the wooded acreage to the open area by implementing a feathering effect. This involves gradually reducing the tree density and allowing more sunlight to penetrate the forest edge, stimulating understory growth.

Maintaining structure: Leave fallen trees along the edge to provide nesting sites for turkeys and other wildlife.

Monitoring and adaption: Monitor the impact of edge feathering on turkey populations and their habitat. Be prepared to adapt management strategies based on turkeys' response to the created edge habitat. The lifespan of edge feathering is often short-lived and generally converts to low-quality turkey habitat in 5-10 years. Consider completing edge feathering projects on rotation, just as you would with prescribed fire. Edge feathering may be necessary every 2-5 years to maintain positive habitat management effects.

Edge feathering is a valuable habitat management tool for enhancing turkey habitat in Missouri. By strategically creating diverse habitats along wooded edges, edge feathering provides turkeys with essential resources, including forage, cover, nesting sites, and travel corridors. Implementing edge feathering as part of a comprehensive habitat management plan supports healthy turkey populations and contributes to the overall biodiversity and ecological health of Missouri's landscapes.

Stands of native grasses provide turkey with nesting and brood-rearing cover.

Native Grass and Forb Establishment

Planting a native warm and cool season grass and forb mix in Missouri can significantly benefit native wildlife and turkeys by providing nesting and brood-rearing cover, habitat, and forage. Native grasses and forbs are well-adapted to the region's climate and soils, making them an ideal choice for supporting local wildlife. Planting a native mix is a multi-year approach, but once established will provide years of beneficial wildlife habitat. A native grass and forb mix can be included into a plan with edge feathering techniques also, creating a mosaic of various habitat types and structures for nesting and brood-rearing hens and their poults.

Steps to Planting a Native Grass and Forb Mix in Missouri

Site selection: Choose a suitable location for the planting site. Ideally, select an area with well-drained soils and ample sunlight. Native warm-season grasses prefer full sun for optimal growth and establishment. Get a soil test done for the area that you wish to plant. Knowing what soil types are on your property will help you pick a mix that is best suited for that location.

Seed selection: Select a diverse mix of native warm-season grasses and forbs that are well-suited to Missouri's climate and soil conditions. Some common native species include big bluestem, little bluestem *(Schizachyrium scoparium),* and Indian grass. Complement the grasses with native forbs such as purple coneflower *(Echinacea purpurea),* black-eyed Susan *(Rudbeckia hirta),* and common milkweed *(Asclepias syriaca),* just to name a few.

Site preparation: Prepare the site by removing any existing vegetation and debris. This usually means using an herbicide treatment at least twice to remove the existing nonnative vegetation. This is done during the spring, summer, and early fall. Following up with a prescribed burn in mid to late fall is recommended to ensure bare ground for proper seed to soil contact. Try to avoid soil disturbance, such as using a tiller or a disc; doing so can promote the growth of invasive species.

Seeding: Plant the native mix in winter. Native forbs require a freeze-thaw cycle to break open their tough exterior seed coatings. The best time to plant is when there is a small amount of snow on the ground. Ensure even seed distribution by broadcast seeding, using a spreader agent such as lime or pot ash, to assist the fluffy seeds with even distribution. Using a mechanical seed spreader or hand-broadcasting (for smaller areas) is best.

Seed-to-soil contact: To improve seed germination rates, use a cultipacker or roller to press the seeds into the soil surface. If no roller or cultipacker is available, driving over the area with a vehicle is another way to ensure good seed-to-soil contact.

Weed control: Monitor the planting site for weed growth and address any invasive species that may compete with the native planting. Hand-pull or spot-treat weeds as necessary to prevent them from out-competing the desired native vegetation.

Maintenance: In the first growing season, the plants will be expanding much of their energy into root growth. Very little growth will occur on the surface. When the vegetation gets above 12 inches, it is important to mow it back. During this first growing season, mowing the planting site in summer or early fall back to a height of 6-8 inches is essential. This promotes strong root growth and allows sunlight to reach the growing seedlings under the blanket of annual vegetation.

Long-term management: Once established, a native planting typically requires minimal maintenance. Regularly monitor the area for invasive species and the growth and development of the native vegetation. Prescribed burning will be necessary on a 2- 3year rotation, depending on the layer of thatch that collects along the surface.

Having a management plan in place is recommended as well as having a seed mix prepared. Local state agencies have biologists available to assist. Planting a diverse native warm-season grass and forb mix in Missouri can enhance the habitat for turkeys by providing brood-rearing habitat, forage, and cover. By creating suitable habitats with native vegetation, landowners contribute to the conservation of local wildlife and support a sustainable population of turkeys within their region.

Native Warm Season Grass and Forb Establishment Example Management Plan

Landowner: *Landowner Name* | Field Acres: # Acres

Field Objective: Improve site for wildlife, provide season long foraging for bees, monarch butterflies and numerous native pollinators, and make the site aesthetically pleasing.

Strategy: Eradicate existing fescue and plant high diversity native forbs and grasses beneficial for native wildlife, pollinators and bobwhite quail.

Management Schedule

Year 1 (Fiscal Year 2021)

Management Practice	Fiscal Year	Acres	Target Dates	Objectives	Cost Share *will vary each FY*
Grassland Conversion-First Spraying	FY##	##	When Fescue is 4-8" tall. Likely April or May of 2020	Let the fescue grow to 4-8" tall. Spray Fescue (entire 4.19 acres) with Glyphosate when it is actively growing (4-8" tall). Goal is to have a >90% kill.	This will vary per each fiscal year.
			When Fescue is 6-10" tall, likely October 2020 until November 2020. If weather is warm and Fescue is actively growing it can be sprayed into early December.	Spray Fescue with Glyphosate when it is actively growing (6-10" tall). Goal is to have a 100% kill of all remaining vegetation.	This will vary per each fiscal year.
				Total Year 1=	**Total will Vary**

Year 2 (Fiscal Year 2022)

Management Practice	Fiscal Year	Acres	Target Dates	Objectives	Cost Share
Firebreak-Grassland	FY##	##	October to November. ***prior to conducting prescribed burn***	Establish a 10' wide firebreak around the field. Firebreak can be either disked or low mowed to assist in the prescribed fire operations. I suggest using a disked line for better fire containment.	This will vary per each fiscal year.
Grassland Burn-15 acres or less.	FY##	##	Late Fall to Early Winter (November-December) ENTER YEAR	Get rid of previous duff from herbicide application and to prepare site for seed planting.	This will vary per each fiscal year.
Grasses and/or Forb Establishment - Seed	FY##	##	January ENTER YEAR	Dormant seeding of mix of at least 20 species (totaling 3.0 lbs/acre) with at least 3 species of wildflowers blooming in each season. With no more than 3.0 lbs/acre of native grasses. Incentive to use Missouri Ecotype seed (added $50/acre) Incentive to provide Monarch beneficial milkweed seeds (added $50/acre).	This will vary per each fiscal year.
Seeding of forb/grass seeds (broadcast during dormant season)	FY##	##	January ENTER YEAR	See above	This will vary per each fiscal year.
Ground prep-Cultipacking or rolling	FY##	##	January ENTER YEAR	Directly after seeding—to ensure good "seed-to soil" contact for best germination.	This will vary per each fiscal year.
				Total Year 2=	**This will vary.**
				Summary	
				Year 1=	$$$$
				Year 2=	$$$$
				All Years=	**$$$$**

All cost share estimates are from the 2019 allocations…prices/acre may change for each contract period.

Prices in regards to native seeds are always changing and the prices listed here are just an estimate

Landowner: *Landowner Name* | Field Acres: ##

Field Objective: **Improve site for wildlife, provide season long foraging for bees, monarch butterflies and numerous native pollinators, and make the site aesthetically pleasing. During the spring and summer following a planting it is important to reduce vegetation competition to help the native forbs and grasses establish roots and grow.**

Strategy: The spring and summer directly following the planting and into the next spring, it is important to ensure that adequate sunlight gets to the seedlings that are spending most of their first year establishing roots. Frequent mowing helps with the removal of competing vegetation.

Competing vegetation should be cut to a height of 6-8" whenever competing vegetation starts to shade the ground (usually about 10-12"). Frequent mowing the first year is not a problem, as most native forbs and grasses are focusing on developing a root system. Flail-type mowers are the best for mowing. Mow frequently when you notice that the competing vegetation is over 10-12" tall and is shading out the native planting.

During the second growing season, mowing should only be completed between March 15th and May 1st, always making certain that you are mowing above the height of the native forb seedlings. DO NOT MOW AFTER THESE DATES DURING THE SECOND GROWING SEASON!

Third growing season this area should be burned. A prescribed burn plan can be written once the landowner has attend the MDC burn workshop.

No till/drill food plot planting

Food Plots for Turkey Management

Providing multispecies cover crop and food plot plantings are also an adequate way to provide winter nutrition to turkeys as well as other wildlife. Cover crops offer a landowner the ability to increase soil health and reduce erosion from both rain and wind. Generally, food plots seem to consist of single species plantings, but planting a multispecies food plot provides wintering flocks of birds with a varied diet. Plots should be well distributed and placed right along or within woodlands. A plot can vary in size, but Missouri's healthy deer population makes plots of one acre or larger preferable. Food plots should not replace existing, quality vegetation cover for nesting or brood-rearing habitat but can serve as an alternate food source on areas that historically have had low production or have a high load of invasive vegetation.

When possible, use no-till planting methods for these plots. The residue left by no-till planting will harbor insects that are beneficial to wildlife. Creating linear, long plots or even strips to help divide fields is recommended. Block plantings can be done where strips are not desired. Plant onto the contour of the land to limit soil loss or erosion. Food plots can be in various shapes and sizes to minimize the distance a hunter, especially a bow hunter, needs for shooting and to provide escape cover at a shorter distance for turkeys.

Establish and practice good field rotations. Leaving half of the food plots fallow each year allows native food (annual broadleaves and grasses) to establish. Replant the fallow area the next year and repeat this cycle. Including a legume (annual lespedeza or alfalfa) in the rotation every 3-5 years will help to build and maintain soil fertility.

While food plots have a role in wildlife management, the habitat management practices described previously have a more significant and lasting effect on wildlife populations. Implementing rotational habitat management, prescribed burning, TSI, and invasive species control creates large-scale changes that benefit turkey populations and enhance overall biodiversity and ecosystem health. Food plots should not replace existing, quality vegetation cover for nesting or brood-rearing habitat. Instead, they can serve as an additional food source in areas with historically low production or high invasive vegetation.

Adult wild turkey hen

Fall Food Plot Establishment

Understanding the process by which to create multi-species food plots is important to ensure they become well-established.

Selecting the right location: Choose a food plot location that receives sunlight and has well-drained soil. Consider areas near known turkey travel routes or between roosting sites and feeding areas for optimal attraction.

Soil preparation: Before planting, perform a soil test to determine the soil's pH and nutrient levels. Adjust the soil's pH as necessary to ensure proper nutrient uptake by the plants. Clear the areas of any debris and use a disc or a tiller to break up the soil surface to facilitate seed-to-soil contact.

Seed selection: Choose a mix of plants that provide food and cover for wildlife throughout the fall and winter seasons. A diverse, multispecies food plot mix is recommended for turkeys and other wildlife. Plot mixes with corn, chufa, soybeans, or other grain sorghums can be planted extensively to help supplement turkeys in the fall and the winter. Another option is to plant vetch, rye, oats, wheat, and clover to provide a winter grazing for turkeys. Some information is below for a variety of vegetation information.

Cold-season grasses

- ***Winter wheat*** provides early-season forage and is highly attractive to turkeys.
- ***Rye*** is cold-tolerant and offers nutritious forage during the late fall and winter.
- ***Oats*** quickly establish and provide food for turkeys and other wildlife.
- ***Triticale*** is a hybrid of wheat and rye, offering excellent cold tolerance and forage.

Legumes and Brassicas

- ***Crimson clover*** is an excellent nitrogen-fixing legume that provides nutritious forage for deer and turkeys.
- ***Austrian winter peas*** are high in protein and an excellent food source during the fall and winter.
- ***Forage radish*** helps break up compacted soil and provides forage for deer and turkey.

Planting: Follow the recommended planting rate for each seed type in the mix. Broadcast the seeds evenly over the prepared soil surface and use a cultipacker or roller to lightly press the seeds into the soil. If these are not available, dragging a small tree over the planting will also work.

Maintenance: Keep the food plot well-watered after planting until the seeds have been established. As the seeded plants grow, monitor for invasive or unwanted weed growth and address any issues promptly. Mowing the plot before winter can promote growth and provide additional food sources for wildlife. Depending on the seed mix, many plants could be annual, which would require re-planting the following season. Consider leaving this dead/dying vegetation until you are ready to plant a new food plot. Allowing this vegetation to stay ensures soil erosion control, cover for wildlife, and helps maintain soil health.

By creating a thoughtful and diverse fall and winter multispecies food plot, you can attract turkeys and a variety of other wildlife, providing essential forage and cover during the colder months. This contributes to the overall health and well-being of wildlife populations on your property, making it more attractive and sustainable habitat for all species.

Wildlife food plot with milo and sunflowers

Summer Green Browse Wildlife Food Plot

A summer green browse food plot that benefits turkeys and other wildlife should consist of plants that offer nutritious forage during the warmer months when poults are growing and developing. This browse creates a multilevel variety of plants that house insects that poults require while providing tender shoots, leaves, and vegetation that wildlife actively consume during the summer. There are several considerations when creating a summer green browse food plot.

Location selection: Choose a location for your food plot that receives adequate sunlight; most green browse plants thrive in sunny conditions. Ensure the area is easily accessible to all wildlife.

A monoculture corn field managed with no-till farming practices highlights soil conservation techniques but lacks biodiversity in crop production for the benefit of wildlife habitat.

Soil preparation: Conduct a soil test to determine the soil's pH and nutrient levels. Adjust the soil's pH if needed to optimize nutrient availability for the chosen mix. Clear the area of any debris and weeds and use a disc or a tiller to break up the soil surface for good seed-to-soil contact.

Seed selection: Select a mixture of plants that offer high-quality green browse and that are attractive to wildlife, including turkeys. These can include legumes, forbs, and grains.

Legumes

- ***Soybeans*** are high in protein and a favorite of turkeys and other wildlife.
- ***Cowpeas*** are highly nutritious and heat tolerant.
- ***Lablab*** provides abundant forage for wildlife.

Forbs

- ***Chicory*** is drought-tolerant and nutrient-rich, providing valuable forage for wildlife during hot summer months.
- ***Alyceclover*** is a heat-tolerant legume with nutritious forage.
- ***Buckwheat*** is fast-growing and provides succulent forage for wildlife.

Grains

- ***Corn*** is preferred by a variety of wildlife, offering a valuable carbohydrate source, but it has very little protein value.
- ***Millet*** is quick to establish and provides food for birds and turkeys.

Planting: It is always important to follow the recommended planting rates for each seed type in the mix. Broadcast the seeds evenly over the prepared soil surface and use a cultipacker or a roller to lightly press the seeds into the soil.

By creating a well-planned summer green browse wildlife foot plot, you can attract a wide variety of wildlife to your property, including turkeys. This green browse food plot provides valuable forage and nutrition during the hot summer months. This supports the health and growth of wildlife populations on your property and contributes to a thriving and sustainable habitat for all species.

Land can be managed for both turkey habitat and cattle grazing.

Creating and Managing Turkey Habitat for Working Lands in Missouri

In Missouri, turkeys can thrive on working lands when thoughtful habitat management practices are implemented. These practices can be integrated with cattle grazing, row crop farming, and conservation programs to support turkey populations while maintaining productive agricultural operations. This section outlines steps for creating and managing turkey habitat on working lands, including grazing with cattle, farming and row crops, Conservation Reserve Program (CRP) practices, Environmental Quality Incentives Program (EQIP) practices, and Missouri Landowner and Community Assistance Programs.

Delayed Mowing and Haying

Delaying mowing and haying until after July 15th is an important management practice that benefits wildlife and the environment. This practice aligns with the nesting and brood-rearing seasons of many bird species, including ground nesting birds like turkeys. It should not just be done in hay fields, but along fence lines, road ditches, idle areas, and any other places that a nesting turkey may use.

Wildlife nesting and brood rearing — Many bird species, including turkeys and grassland birds, begin their nesting activities from late spring to early summer. Delayed mowing and haying can provide sufficient time for nesting and brood rearing, to allow for young birds to mature and fledge successfully.

Nesting cover protection — By delaying mowing and haying, landowners preserve the nesting cover and habitat needed by ground-nesting birds. This practice ensures that nests and young birds are not inadvertently destroyed during the active nesting season.

Biodiversity — Many wildflowers, grasses, and other plant species bloom and set seed during the late spring and early summer. Delayed mowing and haying can allow plants to complete their life cycles, supporting biodiversity and promoting healthy ecosystems.

Pollinator habitat support — Bees, butterflies, and other pollinators play a vital role in ecosystem health and agricultural productivity. Allowing wildflowers and other flowering plants to complete bloom cycles through delayed mowing benefits pollinators by providing essential food sources.

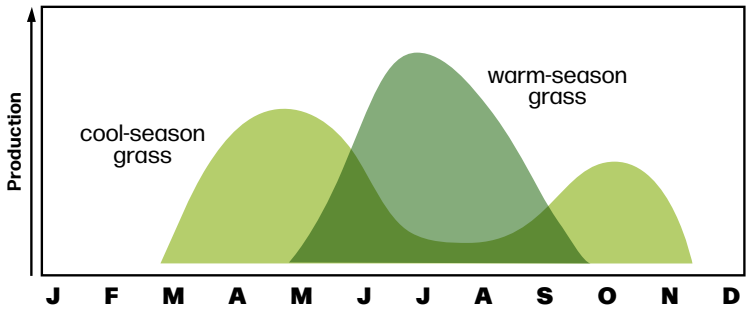
An adult wild turkey hen forages in a grassy field, using open habitat for feeding.

Soil health and erosion control — Vegetation in grasslands and meadows helps prevent soil erosion by stabilizing the soil with root systems. Delayed mowing preserves the vegetation's protective function, reducing the risk of soil erosion and loss of topsoil.

Recreation and aesthetics — Delayed mowing allows landowners and visitors to enjoy the natural beauty of wildflowers and blooming vegetation during the early summer months. Preserving these natural areas enhances recreational opportunities and aesthetic values on the property.

Conservation compliance — Adhering to the July 15th deadline for mowing and haying is required for many state and federal cost-share programs to ensure most nesting is completed by ground nesting birds.

Delayed mowing and haying are wildlife-friendly and environmentally responsible practices. By allowing nesting birds, including turkeys, sufficient time to complete their breeding activities and supporting pollinators and biodiversity, landowners can play a significant role in conserving



and enhancing natural habitats and ecosystems on their properties. This practice promotes sustainable land management while contributing to the health and well-being of Missouri's wildlife and natural resources.

Cattle Grazing and Turkey Management

Cattle farming is a top agricultural practice in Missouri. Having a rotational grazing system for nonnative cool-season and native warm-season pastures can be a beneficial and sustainable management practice for both livestock production and wildlife habitat improvement. Proper grazing management can promote the growth and persistence of native warm grasses while providing valuable forage for cattle during the "summer slump" in fescue growth. Grazing of warm season grasses provides additional summer nutrition and takes the stress off fescue during the hot summer months. Below is a guide on how to effectively use cattle in grazing native warm-season grasses.

Grazing system selection: Choose a suitable rotational grazing system to manage cattle on native warm-season grasslands. Rotational grazing involves dividing the pasture into smaller paddocks and rotating cattle through them systematically. Rotate cattle between paddocks to allow adequate rest and recovery periods for the native grasses. This practice promotes plant vigor, encourages tillering, and improves overall plant health.

Grazing timing and duration: Practicing deferred grazing, or late-season grazing, on native warm-season grasses allows the grasses and forbs to grow to sufficient height before the introduction of cattle. Limit the duration of grazing in each paddock to prevent overgrazing and ensure that enough plant material is left for regrowth.

Stocking rates and density: Maintain appropriate stocking rates to avoid overgrazing and maintain the integrity of native grass stands. In Missouri, the stocking rate for a native warm-season grass stand is one animal unit (one cow/calf pair) per 5 acres. Adjust stocking rates based on seasonal conditions and forage availability. During dry periods, reduce stocking rates to prevent excessive stress on the plants.

Rest periods: Implement an adequate rest period between grazing to allow native warm season grasses to recover and regrow. This practice promotes sustainable production and wildlife habitat.

Water points: Provide access to clean water throughout the pasture to encourage even distribution of cattle grazing.

Winter grazing: By providing native warm-season grass forage during the summer, stress is reduced for the cool season fescue, allowing the grass to grow and maintain its structure during the hottest parts of the season. Once summer grazing has ended and fall has arrived, moving cattle back into a cool-season grazing allows native warm-season grass fields to restore before going into winter dormancy.

Wildlife habitat enhancement: Designate areas within the native warm-season grass pasture for wildlife habitat enhancement. Allow portions of the pasture to grow taller and provide nesting and brood-rearing habitat for turkeys and other wildlife. Avoid grazing during sensitive periods, such as nesting and brood-rearing seasons.

Monitoring and adaptation: Regularly monitor the condition of native warm-season grass stands, forage availability, for wildlife usage. Be prepared to adapt grazing management practices based on the condition of the pasture and the needs of both cattle and wildlife.

Using cattle in grazing of native-warm season grasses can be a win-win approach for landowners. By implementing proper rotational grazing and management practices, landowners can promote the health of native grasslands, enhance cattle production, and support wildlife habitat, including benefits for turkey populations. Properly managed grazing can be a valuable tool for sustaining both agricultural production and biodiversity on Missouri's working lands.

Patch-Burn Grazing in Missouri and its Benefits for Turkeys

Patch-burn graze is a land management technique that combines prescribed burns and rotational grazing to improve the health of grasslands, enhance biodiversity, and provide valuable habitat for wildlife, including turkeys. This approach creates a mosaic of different habitat patches across the landscape, with each patch experiencing vary-

Patch-burn graze improves grassland health, enhances biodiversity, and provides valuable wildlife habitat.

ing levels of grazing pressure and vegetation structure. In Missouri, patch-burn grazing has gained popularity as a sustainable and wildlife-friendly method benefitting both cattle farming and native wildlife. Several steps can aid in implementing patch-burn grazing for turkey management.

Divide the landscape into patches: Cattle farmers can divide their grazing land into discrete patches or pastures, each with different vegetation structure and grazing history. These patches can vary in size and are typically managed with different prescribed burning schedules. There are no permanent fencing structures in this patch burn unit. For ease of implementation, dividing the pasture into thirds can be helpful for a management plan.

Prescribed burns: The patch-burn graze system involves conducting prescribed burns on a rotational basis. Each year, one or more patches are burned, creating a fresh, nutrient-rich flush of vegetation. The burned patch then become the focus of grazing activity for the year.

Grazing rotation: After the prescribed burn, cattle are directed to graze in the recently burned areas. Cattle are naturally attracted to the fresh, tender vegetation that emerge after the fire, leading them to concentrate their grazing in this area.

Adjacent patches: While one patch is actively grazed, adjacent patches are left unburned and allowed to mature and accumulate vegetation. Unburned patches provide important nesting and brood-rearing cover for turkeys and other ground-nesting birds.

Turkey benefits: The patch-burn graze system benefits turkeys in several ways. The unburned patches provide critical nesting cover, protecting turkey nests from disturbance and predation. Additionally, the diverse habitat structure created by the patch burn system offers a variety of food sources for turkeys throughout the year. This patchwork of burned and unburned vegetation offers a hen with newly hatched poults to move from the thicker cover of nesting vegetation to the more open vegetation for poults to move and forage.

Rotational grazing: In an open patch-burn graze system, cattle have access to all areas of the burned and unburned areas. Their initial focus is on the freshly burned areas with the newly emerging vegetation, but they will also focus and explore other areas of the stand that did not experience a burn. It is advised to have an area of freshly burned, one year non-burned, and two years non-burned in a rotation for the most diverse landscape.

Long-term benefits: Over time, the patch-burn graze system enhances biodiversity, supports healthy native plant communities, and benefits a range of wildlife species. This management approach allows cattle farmers to take advantage of the summer slump that is created in the warmer months of summer while fescue lies dormant and allows forage for their cattle.

Monitoring and adaptation: Cattle farmers should regularly monitor the condition of their pastures and assess the response of both cattle and wildlife to the patch-burn graze system. Adaptation and adjustments can be made based on the outcomes observed in terms of vegetation health and wildlife use.

In conclusion, patch-burn graze system is a dynamic and ecologically beneficial land management strategy that Missouri cattle farmers can use to enhance their grazing

operations while providing valuable habitat for turkeys and other wildlife. By integrating prescribed burning and rotational grazing, cattle farmers can support native grassland ecosystems and foster healthy populations of turkey on working lands. This approach shows how sustainable land management practices can harmoniously balance agricultural production with wildlife conservation.

Keeping Cattle Out of a Forest and Woodland Setting

Maintaining healthy and productive forest and woodland settings is crucial for the ecological balance and overall well-being of ecosystems in Missouri. One of the key practices to ensure the health of these natural areas is by keeping cattle out of forested environments.

Preserving native plant diversity: Forests and woodlands are home to a diverse array of native plant species. These plants play vital roles in supporting various wildlife, including birds, insects, and mammals. Allowing cattle to graze within a forest or woodland area can lead to the destruction of native plants communities. Overgrazing can disrupt the delicate balance of the ecosystem and result in the loss of important food sources and cover for wildlife.

Preventing soil erosion: Forest and woodland soils are rich in organic matter and have complex root systems that help hold soil in place and prevent erosion. Cattle grazing in these sensitive areas can lead to soil compaction, compromise soil structure, and increase erosion risks resulting in negatively affecting water quality in nearby streams and rivers.

Protecting water quality: Forests and woodlands act as natural filters for rainwater and runoff, helping to purify water and maintain water quality. Allowing cattle access to water bodies in forested settings can lead to water contamination through the deposition of feces and the disturbance of streambanks leading to disrupting or eliminating vital habitat for aquatic or semiaquatic species.

Conserving wildlife habitat: Forests and woodlands provide crucial habitat for a wide range of wildlife species, including turkeys, by offering nesting sites, brood-rearing cover, and food sources. Cattle grazing in these areas can disrupt the natural habitats, leading to a decline in wildlife populations and biodiversity.

Preventing the spread of invasive species: Forests and woodlands are susceptible to invasive plant species that can outcompete native vegetation. Allowing cattle access to these areas may facilitate the spread of invasive plants through seed dispersal or disturbance of the forest floor.

Promoting forest regeneration: Young trees and saplings require protection from browsing to establish and regenerate forested areas. Grazing cattle can consume young trees, hampering forest regeneration and inhibiting the growth of new vegetation.

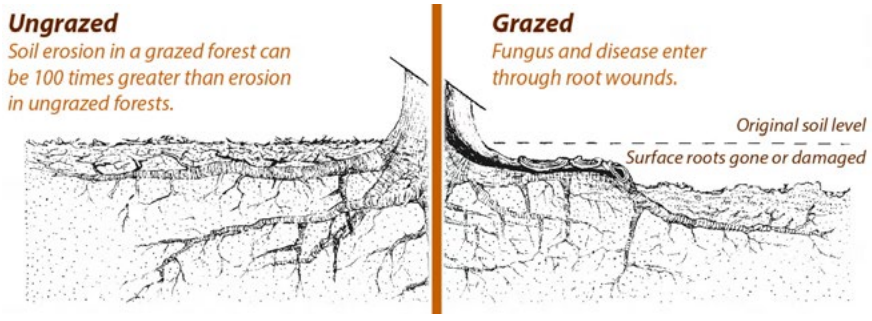
Maintaining aesthetics and recreational value: Forest and woodland settings provide important recreational opportunities for outdoor enthusiasts, hikers, birdwatchers, nature lovers, and hunters alike. The presence of cattle in these areas can negatively impact the aesthetics and recreational value of these natural spaces.

Keeping cattle out of forest and woodlands settings is crucial for conserving native plant diversity, preventing soil erosion, protecting water quality, and promoting wildlife habitat. By respecting the delicate balance of these ecosystems and implementing proper grazing management practices, landowners can preserve the natural beauty and ecological integrity of these valuable natural areas for current and future generations.

Turkey Habitat Management on Row Crop Farms

Row crop farms in Missouri are extremely valuable – economically, culturally, and societally –, so it's unlikely that productive agricultural land will be taken out of service in large quantities for the sake of turkeys. The good news is that small improvements can be made to working agriculture land to benefit turkeys.

Agricultural producers, when comparing crop yield maps to input costs, can identify areas that aren't as profitable



Ungrazed vs. grazed forest system

Grazed (left) and ungrazed (right) woodland habitats.

or even return a net loss. Those areas are ideal locations to increase turkey habitat. Namely, landowners can implement native forb and grass plantings in those areas. USDA partners such as NRCS and FSA often have cost-share programs to offset the costs of establishing plantings. Programs such as EQIP, CSP, and CRP have practices tailored to address wildlife habitat concerns with built-in cost-share to offset foregone income when taking the ground out of crop production.

Field border establishment: Leave unharvested field borders or buffer strips around the edges of crop fields. These border areas can be planted with native warm-season grasses, wildflowers, and shrubs to provide valuable nesting cover and foraging opportunities for turkeys. Field borders can also connect habitat patches and serve as travel corridors, promoting movement and dispersal of turkeys and other wildlife across the landscape.

Winter food plots: Designate portions of the farm as winter food plots, planting crops like winter wheat, rye, or brassicas. These plots can be strategically located to provide supplemental forage for turkeys during the winter months when natural food sources may be limited. Winter food plots also attract other wildlife species, contributing to overall biodiversity on the farm.

Alternate row cropping: Consider adopting alternate row crop planting or strip cropping techniques. This involves alternating rows of different crops, cover crops or grass strips within the crop fields. The alternating rows provide diversity and cover, offering nesting and foraging opportunities for turkeys within the agricultural landscape.

Cover crops: Integrate cover crops into crop rotation schedules during fallow periods. Cover crops, like clover, oats, or brassicas provide valuable forage and cover for turkeys. Allow cover crops to grow to sufficient height before terminations, providing quality forage and cover for turkeys and other wildlife.

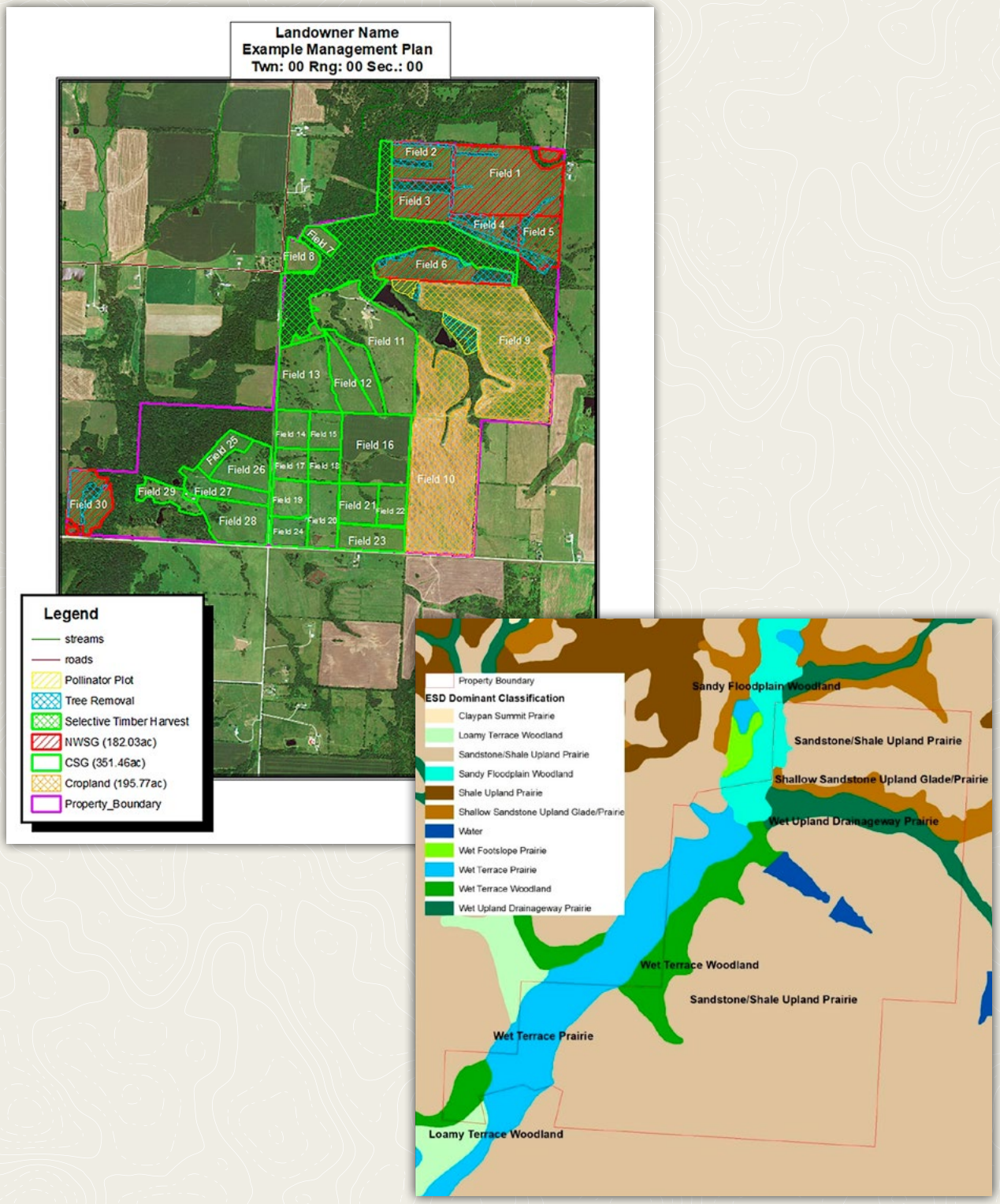
CRP and pollinator strips: Consider enrolling marginal or less productive areas of the farms into CRP, focusing on establishing native warm-season grasses and wildflowers. Create pollinator strips within the CRP fields, planting a diverse mix of native wildflowers to support pollinators and offer additional forage sources for turkeys.

Prescribed burns and patch-burn graze: Collaborate with wildlife professionals to plan prescribed burns in selected areas of the farm. Prescribed burns promote the growth of native grasses, stimulate new vegetation growth, and attract insects that serve as essential food sources for poults. If feasible, consider implementing patch-burn graze systems on certain areas of the farm. This rotational grazing system creates diverse habitats, with some patches being burned, while others remain unburned to provide nesting cover.

By adopting these turkey habitat management practices, row crop farmers in Missouri can create a landscape that supports both agricultural productivity and the thriving populations of turkeys. Supporting turkey habitat on row crop farms contributes to biodiversity, ecosystem health, and sustainable wildlife management. These practices will showcase the benefits of integrating conservation practices with traditional agricultural operations.

CRP1 PhesantsForever Field Border

Working Lands Habitat Management Example



Please note, this habitat management guide is for an actual, working farm in Missouri

Year	Field(s)	Practice
2019	1	Mechanical brush removal on 3 acres
	2	Mechanical brush removal on 2 acres
	3	Mechanical brush removal on 5 acres
	4	Mechanical brush removal on 8 acres
	5	Mechanical brush removal on 5 acres
	6	Mechanical brush removal on 6 acres
	30	Mechanical brush removal on 3.5 acres
	Between 9 & 10	Mechanical brush removal on 6.5 acres

Year	Field(s)	Practice
2020	4 & 5	Serecia & smooth and winged sumac control
	3	Prescribed burn between 10/1-3/15/2021; monitor burned patch for fescue encroachment and treat as needed. Repeat burn rotation every third year
	1	Initiate PBG; burn 1/3 of acres annually by May 1. Stock at 1 AU/4 acres 4/15 – 8/31
	30	Prescribed burn between 8/15-3/15/2021; monitor burned patch for fescue encroachment and treat as needed. Repeat burn rotation every third year
	4	Install perimeter fencing; prescribed burn between 10/1-1/15/2021 to prep for dormant seeding
	5	Install perimeter fencing; prescribed burn to remove woody vegetation encroachment, repeat in winter of 2021 to prep for dormant seeding, repeat burn rotation every third year.
	3	Install perimeter fencing
	2 & 3	Install cross fencing
	6 & 3	Install heaving use crossing
	16	Initiate cool-season annual cover-crop grazing rotation in north 40 acres of field 10
	Between 9 & 10	Prescribed burn in non-marked area between fields 9 & 10 between 10/1-1/15/2021 to prep for dormant seeding, repeat burn rotation every third year

Year	Field(s)	Practice
2021	10 & 9	Initiate cool-season annual cover-crop grazing rotation
	9	Initiate cool-season annual cover-crop grazing rotation
	4	No-till to a NWSG/Forb mix to increase diversity
	5	Burn again to prep for dormant seeding, No-till to a NWSG/Forb mix to increase diversity
	3	No-till to a NWSG/Forb mix to increase diversity
	Between 9 & 10	No-till to a NWSG/Forb mix
	6	Serecia and sumac control
	30	No-till to a NWSG/Forb Mix
	2	Prescribed burn between 8/15-12/31, no-till to a NWSG/forb mix to increase diversity

Year	Field(s)	Practices
2022	30, 4, 5 & 6	Spot spray for Serecia, sumac & fescue
	6	Prescribed burn 1
	Field Between 9 & 10	Spot spray for Serecia, sumac and fescue

Grazing Plan

Farm# & Tract #	Field #	Acres	Cover Type	Grazing system	Total Stocking
F6036 T10887	1	64	Native Prairie	Patch Burn Graze (PBG) @ 1 AU/4 acres Burn approx. 21 acres in rotation. Patch Burn Graze from 5/15 to 8/31 Move to cover crop cropland at the end of the PBG cycle	16 AU (16,000 lbs.) Stockers
F6036 T10887	2	24	Degraded native grassland	Patch Burn Graze (PBG) @ 1 AU/4 acres Burn approx. 24 acres in rotation. Patch Burn Graze from 5/15 to 8/31 Move to cover crop cropland at the end of the PBG cycle	6 AU (6,000 lbs.) Stockers
F6036 T10887	3	25	Degraded native grassland	Patch Burn Graze (PBG) @ 1 AU/4 acres Burn approx. 25 acres in rotation. Patch Burn Graze from 5/15 to 8/31 Move to cover crop cropland at the end of the PBG cycle	6.25 AU (6,250 lbs.) Stockers
F6036 T10887	4	15	Degraded native grassland	Patch Burn Graze (PBG) @ 1 AU/4 acres Burn approx. 15 acres in rotation. Patch Burn Graze from 5/15 to 8/31 Move to cover crop cropland at the end of the PBG cycle	3.75 AU (3,750 lbs.) Stockers
F6036 T10887	5	17	Degraded native grassland	Patch Burn Graze (PBG) @ 1 AU/4 acres Burn approx. 17 acres in rotation. Patch Burn Graze from 5/15 to 8/31 Move to cover crop cropland at the end of the PBG cycle	4.25 AU (4,250 lbs.) Stockers
F6036 T10887	6	28	Degraded native grassland	Patch Burn Graze (PBG) @ 1 AU/4 acres Burn approx. 28 acres in rotation. Patch Burn Graze from 5/15 to 8/31 Move to cover crop cropland at the end of the PBG cycle	7 AU (7,000 lbs.) Stockers
F6036 T10887	1, 2, 3, 4, 5 & 6	173	Native Prairie (Field 1) and degraded native grassland (Fields 2, 3, 4, 5 & 6)	Patch Burn Graze (PBG) @ 1 AU/4 acres Move to cover crop cropland at the end of the PBG cycle	43.25 AU (43,250 lbs.) Stockers
F5634 T10499	11, 12 & 13	118.2	Cool season grass pasture	Year-round grazing @ 1 AU/5 acres	23.64 AU
F5636 T10498	14, 15, 17, 18, 19, 20, 21, 22, 23 & 24	115.7	Cool season grass pasture	Year-round grazing @ 1 AU/5 acres	23.14 AU
F5770 T10647	25, 26, 27, 28 & 29	69.5	Cool-season grass pasture	Supplemental forage production. These fields may be hayed or grazed between 9/1 and 5/15 annually. 1AU/5 acres	13.9 AU

Eastern Wild Turkey Hen

Cost-share Assistance Programs in Missouri

Preserving and managing wildlife habitat is a critical endeavor, vital to safeguarding the ecological balance and biodiversity of our natural landscapes. Recognizing the significance of this task, numerous federal and state cost-share programs have been established to support landowners, conservationists, and wildlife enthusiasts in their efforts to enhance and protect wildlife habitats across Missouri. These programs offer valuable cost-share assistance, enabling participants to implement effective wildlife management practices while promoting sustainable land stewardship.

In this comprehensive exploration, we delve into the diverse array of federal and state cost-share programs that help with wildlife management initiatives. These programs, administered by various agencies and organizations, are designed to address specific conservation objectives, whether it be restoring endangered species' habitats, promoting sustainable agriculture practices, or enhancing recreational opportunities. By understanding the intricacies and benefits of these initiatives, landowners and conservation partners can harness the power of collaboration to make a positive and lasting impact on Missouri's wildlife and natural heritage. From innovative conservation practices to the preservation of imperiled species, federal, state, and non-profit cost-share programs stand as testament to Missouri's commitment for safeguarding its natural treasures for generations to come.

Cost-share availability and requirements can vary from year to year; landowners and conservationists interested in participating in these programs should regularly seek updated information from relevant agencies and organizations. For the most up-to-date information on cost-share assistance programs in Missouri, visit the websites of agencies such as MDC, NRCS, and other relevant organizations. See when their regular office hours are posted and visit in person to go over programs offered. These platforms provide comprehensive guidance on program eligibility, application procedures, and available funding opportunities.

CRP 420 planting features restored native vegetation, enhancing wildlife habitat and soil conservation.

Environmental Quality Incentives Program (EQIP)

The Environmental Quality Incentives Program (EQIP) is a voluntary conservation program administered by the USDA's Natural Resources Conservation Service (NRCS). EQIP provides financial and technical assistance to farmers, ranchers, and private landowners to implement conservation practices that improve natural resource management and enhance environmental quality on agricultural lands. EQIP is a valuable resource for Missouri landowners seeking to implement conservation practices that benefit the environment, enhance wildlife habitat, and promote sustainable agricultural practices.

Key EQIP Objectives

Promoting soil health: EQIP aims to improve soil health through the adoption of conservation practices that enhance soil structure, reduce erosion, and increase organic matter content.

Enhancing water quality: EQIP supports measures that protect and improve water quality by reducing nutrient runoff, sedimentation, and pollution in streams, rivers, and other water bodies.

Wildlife habitat improvement: EQIP encourages the establishment of wildlife habitat, including practices that benefit species like turkeys, by providing nesting, brood-rearing, and foraging opportunities.

Air quality improvements: EQIP assists landowners in implementing practices that reduce greenhouse gas emissions and improve air quality, such as cover cropping and improved manure management.

Eligibility and Enrollment

Agricultural producers and private landowners with an adjusted gross income less than $900,000/year are eligible to participate in EQIP. Eligible lands include cropland, pastureland, non-industrial private forestland, and other agricultural areas. Participants must develop a conservation plan with NRCS that identifies the conservation practices they intend to implement.

EQIP Funding and Contracts

EQIP operates through contracts. Each contract typically has a duration of one to 10 years. During the contract period, participants agree to implement and maintain the conservation practices outlined in their conservation plan. In return, they receive financial assistance to offset a portion of the costs associated with implementing these practices.

Payment Structure

EQIP provides financial assistance in the form of cost-share payments and incentives. The payment rates for each conservation practice vary, and participants may receive higher payment rates for practices that have greater environmental benefits.

Conservation Practices for Turkey Management

For Missouri landowners interested in improving turkey habitat, EQIP offers a range of conservation practices.

Habitat planting: Native warm-season grasses and other wildlife-friendly vegetation can enhance nesting, brood-rearing, and foraging areas for turkeys.

Cover crops and crop rotation: Using cover crops and diverse crop rotations to improve soil health and reduce erosion can provide additional forage for turkeys.

Prescribed grazing: Implementing rotational grazing systems can maintain diverse grasslands and provide ample forage for wildlife.

Streambank stabilization: Protecting and restoring riparian areas along water bodies can improve water quality and create essential wildlife habitat.

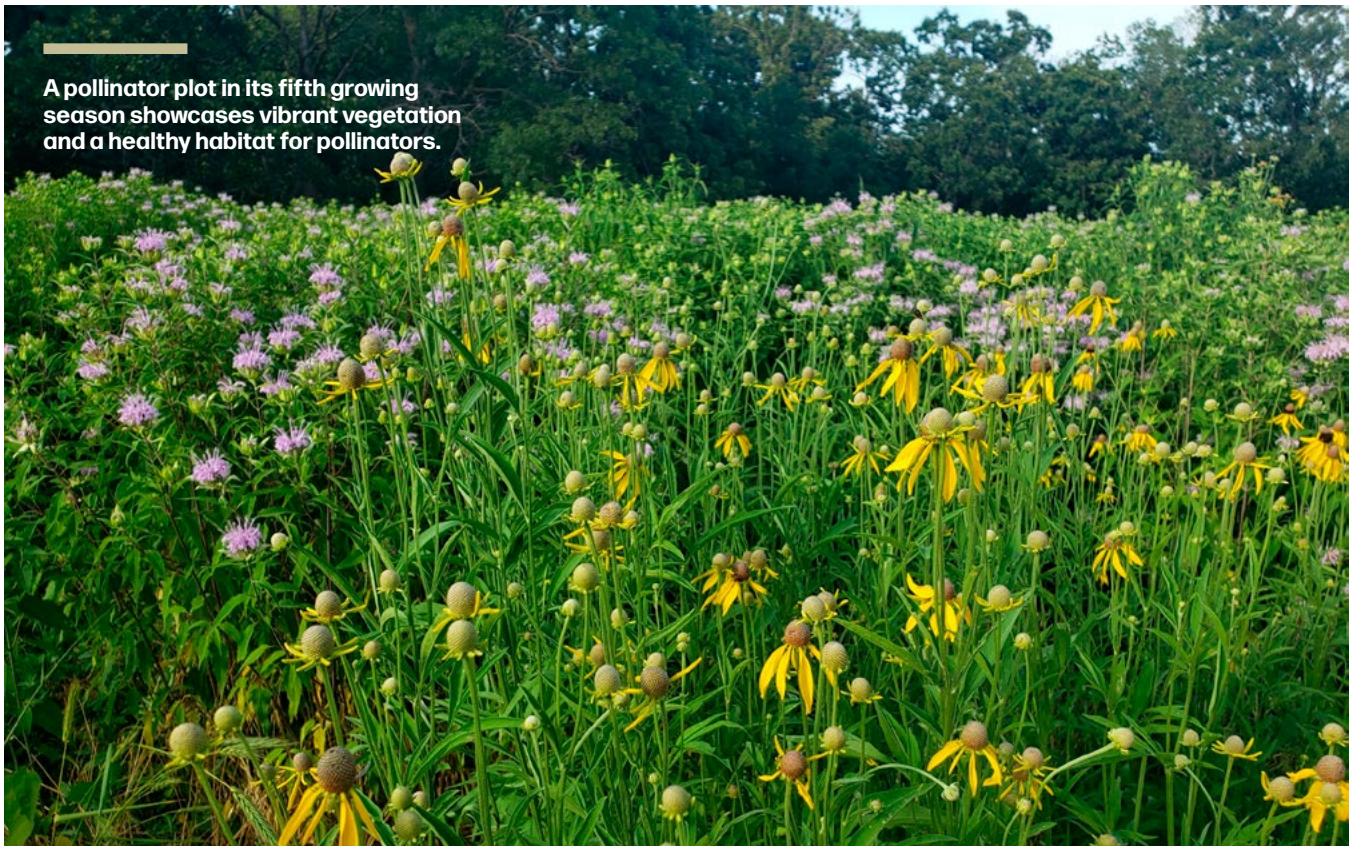
TSI: TSI plays a crucial role in enhancing turkey nesting and brood-rearing habitat. TSI activities such as thinning and pruning can improve forest structure and understory vegetation, creating ideal conditions for nesting hens and providing cover for broods. By enhancing forest health and reducing competition from undesirable vegetation, TSI promotes the growth of native grasses, forbs, and shrubs that serve as valuable nesting and foraging habitat for turkeys. Through EQIP, landowners can implement TSI practices to improve forest habitat quality for turkey populations.

Prescribed burning: Prescribed burning offers significant benefits for turkey nesting and brood-rearing habitat management. Burns conducted under prescribed conditions can remove accumulated thatch, stimulate the growth of native grasses and forbs, and create open understory conditions favored by nesting hens. Prescribed burns also control woody encroachment and invasive species by restoring habitat diversity and promoting the regeneration of preferred turkey forage species. By incorporating prescribed burning into their management plans, landowners can enhance nesting success, improve brood-rearing habitat quality, and support healthy turkey populations.

Invasive species eradication (brush management): Invasive species eradication is essential for managing turkey nesting and brood-rearing habitat effectively. Invasive plants such as eastern red cedar and multiflora rose *(Rose multiflora)* can degrade native habitat quality, reducing nesting cover and foraging opportunities for turkeys. Through brush management activities supported by EQIP, landowners can control and remove invasive species, restoring native vegetation communities essential for turkey reproduction. By eradicating invasive brush and promoting the growth of native grasses and forbs, landowners can create high-quality nesting and brood-rearing habitat conducive to turkey populations' persistence.

Edge feathering: Edge feathering benefits turkey nesting and brood-rearing habitat by creating transitional zones between different habitat types. These edge habitats provide valuable nesting cover, foraging opportunities, and shelter for turkey broods, especially in landscapes with diverse habitat patches. Edge feathering projects supported by EQIP enhance habitat connectivity, promote wildlife movement, and increase edge habitat complexity, benefiting turkey populations across managed landscapes. By implementing edge feathering practices, landowners can improve nesting success rates and enhance brood-rearing habitat quality for turkeys.

A pollinator plot in its fourth growing season shows established vegetation supporting diverse, native pollinator species.



A pollinator plot in its fifth growing season showcases vibrant vegetation and a healthy habitat for pollinators.

Conservation Stewardship Program (CSP)

The Conservation Stewardship Program (CSP) is a voluntary conservation program offered by the NRCS. The program aims to encourage and support agricultural producers in implementing and enhancing conservation practices that promote sustainable land management and environmental stewardship. For Missouri landowners, CSP offers an opportunity to improve their operations while simultaneously benefiting natural resources and wildlife.

Key CSP Objectives

Enhancing conservation practices: CSP focuses on the adoption of conservation practices that improve soil health, water quality, and wildlife habitat while promoting energy efficiency and addressing climate change concerns.

Rewarding existing efforts: CSP recognizes the conservation efforts that landowners have already implemented on their properties and provides incentives for expanding and building upon those efforts.

Conservation tier structure: The program operates through a tiered system, with higher levels of conservation performance earning greater financial and technical assistance.

Eligibility and Enrollment

To participate in CSP, landowners must meet eligibility requirements, including being actively engaged in agricultural production and having control of the eligible land for the contract duration. Land enrolled in the program must also meet specific conservation criteria based on existing resource concerns.

CSP Contract Duration and Renewals

CSP contracts typically have a five-year duration; participants agree to implement and maintain selected conservation practices for the contract interval. Upon contract expiration, landowners may have the option to renew their CSP contract, subject to program availability and any updates to conservation priorities.

Conservation Performance and Payment

CSP operates through a competitive ranking process based on conservation potential. Landowners develop a conservation plan with NRCS that includes a list of enhancement activities. The plan is then evaluated and ranked based on its potential environmental benefits.

Payment Structure

CSP participants receive payments for the conservation

activities they agree to implement, maintain, or improve during the contract period. The payment structure includes both annual payments for maintaining existing conservation activities and additional one-time payments for implementing new enhancements. Higher conservation performance leads to higher payment rates, encouraging landowners to adopt more extensive and impactful conservation practices.

Conservation Practices for Turkey Management

For Missouri landowners interested in turkey management, CSP offers various conservation practices that benefit turkey habitat. Below are just a few of the many that are available to enhance habitat for turkeys.

Prescribed graze practice/system: Implementing prescribed graze system practices can create diverse habitats that support turkey foraging and nesting needs.

Riparian buffer strips: Establishing riparian buffer strips along streams and waterways help to protect water quality and provides valuable habitat for turkeys.

Cover crops and crop rotation: Utilizing cover crops and practicing crop rotation diversifies agricultural landscapes and can provide forage and cover for turkeys.

Native grassland planting: Establishing native warm-season grasses can benefit turkeys by offering nesting cover and brood-rearing areas.

CSP is a valuable resource for Missouri landowners seeking to enhance their land management practices while supporting wildlife habitat, including turkeys. Through financial and technical assistance, CSP empowers landowners to be stewards of the land, promoting sustainability, environmental conservation, and biodiversity for the benefit of both agricultural production and natural resources.

Conservation Reserve Program (CRP)

The Conservation Reserve Program (CRP) is a voluntary land conservation program administered by FSA. CRP provides financial incentives to agricultural landowners in Missouri and across the country to remove environmentally sensitive land from agricultural production and establish long-term conservation practices. The program aims to improve soil and water quality, create wildlife habitat, and promote environmental stewardship.

Key CRP Objectives

Erosion control: CRP helps prevent soil erosion by establishing protective cover on highly erodible land, reducing soil loss and sedimentation in water bodies.

Water quality improvement: By establishing buffer strips and other conservation practices, CRP reduces nutrient runoff and pollution in streams, rivers, and wetlands, leading to improved water quality.

Wildlife habitat enhancement: CRP creates diverse and permanent wildlife habitat, benefiting a wide range of wildlife species, including turkeys, by providing nesting cover, foraging areas, and brood-rearing sites.

Carbon sequestration: CRP helps mitigate climate change by promoting carbon sequestration in the soil and vegetation.

Eligibility and Enrollment

Agricultural landowners and operators with eligible land can participate in CRP. Land must meet environmental criteria, such as being prone to erosion, at risk of water quality degradation, or suitable for wildlife habitat improvement. Enrollment in CRP is subject to periodic sign-up periods announced by FSA.

CRP Contract Duration and Payments

CRP contracts typically have durations of 10 to 15 years. During the contract period, participants agree to implement conservation practices outlined in their CRP plan. In return, they receive annual rental payments and cost-share assistance for implementing these practices.

Conservation Practices for Turkey Management

CRP offers various conservation practices that directly benefit turkey habitat in Missouri.

Grassland establishment: Planting native warm-season grasses and other wildlife-friendly vegetation creates valuable nesting, brood-rearing, and foraging areas for turkeys.

Riparian buffer strips: Establishing vegetative buffers along streams and water bodies protects water quality and creates essential wildlife corridors for turkeys.

Pollinator habitat: Establishing pollinator-friendly plantings in CRP areas, provides additional food sources for turkeys, and supports other pollinator species.

CRP Sign-Up and Conservation Success

CRP has been highly successful in Missouri, supporting millions of acres of environmentally sensitive land and promoting sustainable land management practices. Through the establishment of diverse conservation

practices, CRP contributes significantly to soil conservation, water quality improvement, and wildlife habitat enhancement.

CRP is a crucial conservation initiative in Missouri, helping landowners protect natural resources, enhance wildlife habitat, and support the overall ecological health of the land. By enrolling eligible land in CRP, landowners can actively contribute to the preservation of Missouri's natural heritage, while also benefiting agricultural sustainability and wildlife, including the turkey population.

Missouri Landowner Cost-share Assistance Program (LCAP)

The Missouri Landowner Cost-share Assistance Program (LCAP) is a state-level initiative aimed at encouraging private landowners to implement conservation practices on their properties. Managed by MDC in collaboration with other conservation organizations, LCAP provides financial assistance and technical expertise to support landowners in their efforts to enhance wildlife habitat, protect natural resources, and promote sustainable land management.

Key LCAP Objectives

Wildlife habitat enhancement: LCAP seeks to improve wildlife habitat on private lands, benefiting a wide range of species, including turkeys. By creating nesting cover, brood-rearing areas, and diverse food sources, landowners contribute to the overall health and vitality of wildlife populations.

Soil and water conservation: This program aims to implement practices that protect soil health, reduce erosion, and enhance water quality. By supporting initiatives like riparian buffer establishment and cover cropping, LCAP helps landowners play a crucial role in environmental stewardship.

Promoting sustainable land management: LCAP encourages sustainable agricultural practices, such as rotational grazing, crop rotation diversity, and native grassland planting. These practices not only benefit wildlife but also support the long-term productivity of agricultural operations.

Eligibility and Enrollment

Missouri landowners who own or manage private lands are eligible to participate in LCAP. Eligible lands include farmlands, woodlands, grasslands, and other properties. Enrollment in LCAP typically involves contacting local MDC offices or conservation organizations to discuss conservation goals and potential practices. There are no minimum acre requirements or minimum cost-share practice requirement, but there is a limit in funding amount per property per fiscal year.

Cost-share Assistance and Technical Support

LCAP provides financial assistance to landowners to offset a portion of the costs associated with implementing conservation practices. The program may cover a percentage of the expenses, making conservation efforts more affordable and accessible to landowners. In addition to financial assistance, LCAP offers technical support and expertise. Conservation specialists work closely with landowners to develop conservation plans tailored to their specific property and objectives. These experts provide guidance on the best practices to effectively achieve conservation goals. Site visits, guidance, and plans are always free of charge.

Conservation Practices Supported by LCAP for Turkey Management

LCAP supports a wide range of conservation practices beneficial for turkey management, a few of many are listed below.

Habitat planting: Establishing native warm-season grasses, wildflowers, and shrubs enhances nesting cover and foraging areas for turkeys.

Prescribed grazing: Implementing rotational grazing systems maintains diverse grasslands and provides quality forage for wildlife.

Riparian buffer strips: Creating vegetative buffers along streams and water bodies protects water quality and creates vital wildlife corridors.

TSI: Enhancing the health and productivity of a forest stand by selectively removing, pruning, or thinning trees promotes the growth of higher quality trees and improves the overall forest structure, leading to increased timber value, wildlife habitat, and ecological resilience.

LCAP is a valuable resource for private landowners seeking to contribute to wildlife conservation, soil and water quality improvement, and sustainable land management. By providing financial assistance and technical support, LCAP empowers landowners to take active steps in preserving Missouri's natural heritage and to ensure a thriving future for wildlife, including the iconic turkey. Through collaborative efforts between landowners, conservation organizations, and state agencies, LCAP serves as a catalyst for positive change in the landscape fostering a harmonious balance between agricultural productivity and environmental conservation.

Mast-bearing trees, such as oaks and hickories, help turkey survive the winter.

Final Considerations

Seasonal Variation

Land managers managing for both nesting and brood-rearing cover should also consider the changing needs of turkey broods and turkeys in general throughout the season.

Spring/Summer

The season leading up to spring nesting and summer poult rearing are important for a hen. A healthier and heavier hen going into the breeding season generally equals higher hatching and brood-rearing success. Quality turkey habitat is a mosaic of needs throughout the year. Nest predator trapping can be more effective when there is quality turkey habitat available, but nest predator trapping alone, without providing quality habitat will not affect production at a statewide scale.

Providing adequate habitat for a turkey's needs during all seasons are crucial for their survival. At larger spatial scales, mixed forest and agricultural landscapes provide heterogeneity and a variety of resources for turkey throughout the year, but especially during spring and summer (Pollentier et. al. 2014). Understanding turkey movement, habitat selection by season, and nutritional necessities can help land managers create more turkey friendly properties. Quality turkey habitat not only benefits Missouri's turkey population, but in turn benefits the health of our fish, forests, and wildlife.

Fall/Winter

In the eastern United States, oak trees have been a major forest component, and, with American chestnuts, were a significant seed crop for wildlife. The loss of the American chestnut has placed an increased importance on oaks (McShea et. al. 2015). Missouri is home to 19 species of oaks, all with various mast sizes and nutritional value to wildlife. A commonality for turkey is their dependence on sufficient tree seed and nut crops. The primary hard seeds consumed by turkeys are oaks and American beech (McShea et. al. 2015). Reliance on mast-producing trees can be simplified as a reliance on maintaining a significant component of mature oaks (McShea et. al. 2015).

Ensuring that Missouri's forests and woodlands have adequate mast producing trees, both young and mature, are important to ensure a future for turkeys. As the summer fades, so does the insect population that provided nutritional value to growing brood and adults. A focal shift occurs, and turkeys and other wildlife must depend on mast producing trees to get them through the winter. Having a variety of species of mast producing trees will ensure that if a single species is unable to produce mast, there are others to fill in this gap.

Food plots offer an alternative source of nutrition for turkey flocks, supporting them through winter when natural food availability may be limited.

Another important food source for turkeys during the fall and winter months are standing crops and cover crops. These resources can provide supplemental food sources, especially when winter arrives. In many situations the outside rows of a crop field are stunted in growth and produce much lower yields. Allowing these rows to remain standing throughout the fall and winter can provide more food resources during times when it may be hard for turkeys to find hard mast. In some studies, turkeys responded to mast failures by moving to agriculture and open landscapes and often concentrated in small areas with abundant food sources (McShea et. al. 2015).

Cover Crops and Food Plots

Providing multispecies cover crop or food plot plantings are also an adequate way to provide winter nutrition to turkeys, as well as other wildlife. These plots typically seem to be a single species planting, but planting a multispecies food plot will provide a variety to the diet of wintering flocks of birds. Plots should be well distributed and placed right along or within woodlands. Plot sizes can vary in range, but with

Missouri's abundant deer population, one acre or lager plots are recommended. Plot mixes with corn, chufa, soybeans, and other grain can be planted extensively to help supplement turkeys in the fall and winter. Another option is to plant vetch, rye, clover, oats, and wheat to provide a winter grazing for turkeys.

No-till Planting

When possible, remember to use no-till planting methods for these plots. The residue left by no-till planting methods will harbor insects that are beneficial to wildlife. Creating linear, long plots or even strips to help divide fields is recommended. Block plantings can be done where strips are not desired. Plant onto the contour to limit soil loss; establishing and practicing good field rotations is recommended. Leave half of the grain food plots fallow each year to allow native food (annual broadleaves and grasses) to establish. Replant the fallow area the next year and repeat this cycle. Include a legume (annual lespedeza or alfalfa) in the rotation every 3-5 years to help build and maintain soil fertility.

Small Acres: Making a Difference for Turkey Management in Missouri

In Missouri, even small acres of land can play a significant role in supporting and conserving turkey populations. Small acres can vary depending on the context. In agricultural or rural contexts, small acres may refer to properties ranging from a few acres to several dozen acres. In urban or suburban areas, small acres could refer to residential lots or parcels of land that are typically less than an acre. The exact definition may also depend on local zoning regulations, land use planning, or other factors specific to the area.

By implementing habitat management practices, landowners with limited acreage can create valuable habitats that benefit turkeys and other wildlife species. This section will outline the importance of small acres for turkey management and the steps that landowners can take to manage and create suitable habitat.

Habitat Connectivity

Small-acre properties can act as vital links between larger,

Small-acreage habitats can serve as a "stepping stone" between larger habitats.

more extensive habitats, creating valuable connectivity for wildlife movement. These "stepping-stone" properties provide corridors that enable turkeys to access different resources, such as nesting, brood rearing, forage, and cover.

Local Population Support

Concentrations of turkeys can be found in various habitats, including small-acre properties. By managing these areas to provide essential resources, such as nesting cover, brood-rearing habitat, and food sources, landowners can support local turkey populations.

Education and Awareness

Small-acre properties often exist in residential or semi-rural areas where human-wildlife interactions are more common. By managing these lands for turkeys, landowners can raise awareness among local communities about the importance of wildlife conservation and foster a sense of stewardship.

Steps for Managing Small Acres for Turkeys

Habitat assessment: Begin with a thorough assessment of the property to understand the existing habitat features and potential for supporting turkeys. Identify suitable areas for nesting, brood rearing, and foraging.

Native vegetation: Establishing native vegetation (native warm-season grasses and forbs), including shrubs, can be done to provide essential cover and food sources for wildlife. Planting native species helps create a diverse habitat and supports the local ecosystem. Native species breakup the monoculture of typical urban and semi-rural landscapes and provides more foraging and cover opportunities for turkey and other wildlife.

Selective habitat enhancement: Optimize available habitat by creating edge feathering, which offers a mix of forest and open areas. Enhance existing vegetation by providing small water sources and installing nesting structures, such as small brush piles.

Food plots: If space permits, create small food plots with a mix of preferred crops for turkeys and other wildlife. Food plots can be especially valuable during the winter when natural food sources may be scarce.

Nesting and brood-rearing cover: Preserve or create thickets, shrubby areas, or early successional habitats that provide secure nesting and brood-rearing cover for turkeys.

Water sources: If possible, establish small water sources, such as shallow ponds, to provide a reliable water source.

Invasive species control: Regularly monitor for and manage invasive plant species that can outcompete native vegetation and reduce habitat quality for wildlife.

Minimize disturbance: Avoid unnecessary disturbances, especially during the nesting and brood-rearing seasons, especially human disturbances. Limiting disturbance can help turkeys feel secure and reduce the likelihood of nest abandonment.

Cooperate with neighbors: Collaborate with neighboring landowners to create a network of wildlife-friendly habitats that benefit turkey movements and populations.

Even on small acres, Missouri landowners can make a meaningful impact on turkey management by implementing habitat-enhancing practices. By providing essential resources and creating suitable habitats, landowners contribute to the conservation of turkey populations and support the broader goals of wildlife conservation and biodiversity in the region. Small properties can make a difference.

Avoiding Disturbances

During the nesting season, is it essential to minimize human disturbances in known nesting areas. Frequent disturbances can lead to nest abandonment and reduced nesting success. Turkeys are highly sensitive to human presence, and disturbances can disrupt their nesting behavior. Educate all individuals accessing your property about the importance of avoiding nesting areas during the spring and early summer.

Implications of Habitat Management on Weather and Predation

Weather's Impact on Nesting Hens

Excessive rainfall during the nesting period can saturate nesting substrates, leading to wet nests. Wet nests may be more susceptible to predation, abandonment, and chilling. Increased moisture can also promote mold growth and microbial contamination, further jeopardizing nest success. Since high quality nesting cover often occurs in the highly productive soils in flood plains, prolonged heavy rainfall can cause flooding in many areas. If the best nesting cover on your property is often flooded, planning to create nesting cover on higher ground is good insurance.

It has been hypothesized that a wet hen creates more scent, and therefore a wet hen is more likely to be predated. More recent work hasn't supported this hypothesis, but the fact remains that one of the most vulnerable times for a hen is when she is incubating eggs. If there is an increased risk to predation due to weather, having more or higher quality nesting cover will make it more difficult for a predator to find a hen.

Impact on Poults

Extreme weather, both wet and dry, will affect food availability for poults. With dry weather, vegetation growth may be delayed or less robust, and negatively affect the local insect populations. In other areas, a dry spring likely reduces vegetation density to a point where poults can use areas that they

otherwise wouldn't. Wet springs have similar impacts. Having brooding cover in multiple locations on a property, ideally spanning different vegetation types, is the best way to reduce the impact of an unusually wet or dry spring.

Saturated ground conditions and dense vegetation resulting from wet weather may impede poult mobility and foraging activities. Poults may encounter difficulties navigating through wet vegetation and accessing food, leading to reduced foraging efficiency and nutritional intake.

Prolonged exposure to damp and cold conditions can increase the risk of hypothermia among poults. Wet feathers and low ambient temperatures can exacerbate heat loss, particularly in young, vulnerable poults, compromising their thermoregulatory capabilities and survival prospects.

To mitigate the adverse effects of wet springs on nesting hens and poults, landowners can implement management practices that enhance nesting habitat resilience and provide alternative food sources for poults. Strategies such as maintaining diverse vegetation structure can help mitigate the impacts of adverse weather conditions on turkey reproduction. By understanding the implications of weather variability and implementing adaptive management strategies, landowners can support the reproductive success and survival of turkey populations, contributing to their long-term conservation and sustainability.

Predator Management: Implications of Habitat Management on Predation

In most studies that investigate cause-specific mortality, predation accounts for most hen and poult mortality, as well as nest failures. This leads many to conclude that predation is the biggest problem for turkey production, and that removal of predators will return turkey production to a level seen decades ago. Predation, however, is a symptom of a larger problem. The decline in the quantity and quality of nesting and brooding cover is a more likely cause for declining turkey populations. Studies have shown that enhancing nesting habitat by providing sufficient cover and concealment can significantly improve hens' chances of successfully incubating and hatching their broods (Byrne & Chamberlain 2015). Addressing the habitat side of the equation will cause much of the concern about predation to diminish. Further, many species prey on turkey eggs, poults, and adults, and not all are legal to trap or hunt. Snakes, for example, certainly eat turkey eggs, and raptors predate poults and, in some cases, adults. So, even the most aggressive mammal trapping effort will not reduce predation to zero. A complementary predator management program may increase production at the very local scale if the methods are focused and timed correctly.

Predator management approach

Focus trapping efforts in areas where turkeys are expected to nest and raise their broods. Spending time and resources trapping where turkeys are not present is unlikely to have the desired effect on turkey production.

Time trapping efforts to occur a month or two before nesting and brooding season, a good time to start would be February, and continue trapping until the start of turkey season. Often, when an animal is removed from their territory a younger dispersing individual will quickly fill that void, often referred to as backfilling. Trapping after turkey nesting and brooding season would not be effective at increasing turkey production; the territories that were vacated through predator removal will be occupied by the time it matters again the following spring.

Trapping is an annual commitment. Many mesocarnivore species will exhibit a birth pulse following a year of harvest, often resulting in more nest and poult predators the year after trapping if the effort is not maintained.

Reduce or eliminate bait on your property. Using bait to get a census of deer and turkey on your property is both informative and fun, but once you run your camera survey, it is best to stop adding food to the landscape as this may artificially increase the predator density on the property.

Effective habitat management for turkeys diminishes the effect that predation may have on turkey production by giving hens the tools they need to successfully evade predation. Some habitat management practices have the effect of decreasing predator density through exclusion. After a prescribed fire, for example, a study done in Florida found that occurrence of feral hogs, nine-banded armadillo, raccoon, and opossum decreased significantly (Boone et al. 2024). Trapping, however, does have the potential to increase production at a very localized level if appropriate habitat is in place and a few best management practices are considered when developing a predator management plan. While trapping itself is unlikely to have a large effect, it is a rewarding outdoor pastime for those who choose to pursue it.

A wild turkey hen moves through a wooded habitat, using forested cover for protection and foraging.

Summary

Effective habitat management plays a pivotal role in sustaining and enhancing turkey populations in Missouri. By adopting responsible practices and taking advantage of available programs, landowners can significantly affect turkey conservation while promoting sustainable land management.

Managing woodland and forested areas for turkeys involves selective timber harvests, creating early successional habitats, and maintaining ground-level vegetation structure. By preserving nesting and brood-rearing cover, landowners provide essential resources for successful turkey reproduction and population growth.

Native grassland management is vital for turkeys as it offers diverse foraging and nesting opportunities. By establishing warm-season grasses and using cover crops, landowners create ideal habitats for turkeys and other wildlife, fostering biodiversity and healthy ecosystems.

Working lands can also be managed to benefit turkey populations. Techniques like rotational grazing, crop rotation diversity, and cover cropping not only improve agricultural productivity but also create favorable conditions for turkey habitat. By integrating conservation practices into working lands, landowners can strike a harmonious balance between agricultural needs and wildlife conservation.

Landowners in Missouri have access to valuable cost-share programs like the Conservation Stewardship Program (CSP), the Environmental Quality Incentives Program (EQIP), the Conservation Reserve Program (CRP) and the Missouri Landowner Cost-share Assistance Program (LCAP). These initiatives offer financial and technical assistance, incentivizing landowners to implement conservation practices that enhance wildlife habitat, protect natural resources, and promote environmental stewardship.

The Missouri Turkey Habitat Initiative (THI) was developed to help educate public and private land managers about the characteristics of high-quality habitat and demonstrate how to achieve the desired result. Without private landowner participation, it will be difficult to affect enough acres on public land alone to substantially impact turkeys in Missouri.

When landowners prioritize and actively engage in habitat management, Missouri's turkey populations flourish. By providing nesting cover, brood-rearing habitats, diverse food sources, and protected waterways, landowners create an environment conducive to the success of turkeys. These efforts contribute not only to the conservation of this iconic species but also to the overall health and resilience of Missouri's natural landscapes. Through the collaborative efforts of landowners, conservation programs, and responsible land management practices, we can secure a thriving future for both turkeys and the rich biodiversity that characterizes Missouri's natural heritage.

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