

A QUICK GUIDE FOR LANDOWNERS
Managing Old-fields
FOR WILDLIFE



Craig A. Harper, Professor
Department of Forestry, Wildlife and Fisheries
University of Tennessee

For more thorough information on ecological succession, managing early successional communities, and the wildlife species that use and require them in the eastern US, see *Managing Early Successional Plant Communities for Wildlife in the Eastern US*, available through UTIA at <http://bit.ly/earllysuccession>.

Cover photo: A male white-tailed deer browses on blackberry leaves in midsummer.
Photo by Bill Lea.

Photos by C.A. Harper, except where noted.
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Old-fields and other open areas that are not cropped, hayed, or grazed by livestock can be very productive for wildlife. However, many fields are dominated by plants that are not desirable for wildlife, whether for cover or food. By getting rid of undesirable plants and encouraging plants that provide more food and better cover, these areas can be much more attractive and productive for wildlife.

Few fields are managed properly for wildlife. Most are managed by mowing, which is the least desirable method for managing fields. Mowing creates a deep thatch layer that limits movement of small wildlife and can prevent seed occurring naturally in the soil (the seedbank) from germinating. Also, mowing is often completed during summer, which destroys reproductive cover and

often kills animals. Burning, disking, and using selective herbicides are more favorable practices and will be described in the following sections.

Many fields are not the proper size or they are in a location that is not suitable for some wildlife species. A common example is trying to manage fields for northern bobwhite on a property in a landscape that is primarily forested. Regardless of management, the quail population never increases. The problem often is not the property but the landscape. Fields and other openings may be managed properly for quail, but if the surrounding area is predominately forested, or with extensive row crop agriculture that provides no winter escape cover, or with large hayfields and pasture dominated with nonnative grasses, or with suburban encroachment, then the habitat for

quail in the surrounding landscape simply has diminished to the point that it is no longer able to support them. The same is true, and even to a larger extent, with grassland birds, such as eastern meadowlark, grasshopper sparrow, and Henslow's sparrow, which require large grasslands, often up to 100 acres in an open landscape. When you consider the landscape effect on some species, it is easy to understand how these species have declined so much over the past few decades.

Not all wildlife have such specific requirements. Relatively small fields can be managed for white-tailed deer, wild turkey, eastern cottontail, and shrubland songbirds. This publication will describe how to manipulate vegetation composition and structure, and how to manage fields and other open areas properly for various wildlife species.



Old-fields can be managed to provide outstanding food and cover for wildlife. However, you have to know what various wildlife species require, you must realize the benefits of various plants over others, and you must understand the benefits of certain management techniques over others.

DETERMINING OBJECTIVES AND SITE EVALUATION

The first step in managing an old-field (or any other open area) is determining what you want to manage it for. If your primary objective is wildlife, do not say “wildlife” is the objective. Instead, state the species you are managing for. Habitat requirements of different wildlife vary greatly and those requirements will dictate your management approach. If your primary objective is not wildlife, but perhaps aesthetics (how the field looks), say so. Maybe you just want to “keep the field open and prevent it from growing up in trees.” That’s fine, but state that as the objective. You can manage the field in such a way that is aesthetically pleasing to you and still provide something

for various species rather than specifically for one species or group of species. Regardless, you need to be honest with yourself when setting your objectives because they will dictate your management approach, and your management approach should govern your expectations.

The next thing you have to do is evaluate the site and determine what is good, what is not good, and what needs to change. However, before you can do that, you must know the habitat requirements of the wildlife species you are managing. You might consider having a Certified Wildlife Biologist® from your state wildlife agency visit the property with you. A biologist will help you evaluate the site, describe what is needed for various

wildlife species, and help you with a management plan that also will consider property composition. That is, how are fields and other open areas located across your property, and how does that arrangement fit the needs of the wildlife species you are managing? Do not overlook creating additional fields where woods may be now, and some existing fields may suit your objectives better if they were planted in trees or allowed to “grow up.” For example, trying to maintain fields can be difficult in low-lying bottomlands that are more ecologically suited for bottomland forest. Or, maintaining an open field for deer adjacent to a road could encourage poaching. Allowing that field to fill in with shrubs and trees might be a better strategy.



Evaluating the site and discussing your objectives with a wildlife biologist can save you time and money and help you determine your best course of action.

CHECK YOUR PERSPECTIVES!

A major limitation when managing old-fields for wildlife is not having an understanding what various wildlife species need and not understanding the value of various plants. What many people think looks good is not good for most wildlife species! You must understand this if you want the field to be productive for wildlife. “Clean, green, and even” is not productive for the vast majority of wildlife species, and certainly not for species such as white-tailed deer, eastern cottontail, northern bobwhite, wild turkey, and shrubland songbirds.

Most people with an agricultural background have spent a lot of time fighting weeds. However, most of these “weeds” actually are desirable for many wildlife species. **Understanding and accepting this is critical to your success!** Plants such as common ragweed, giant ragweed, horseweed, pokeweed, pigweeds, milkweed, common lambsquarters, dogfennel, late boneset, daisy fleabane, beggar’s-lice, sticktight, wildlettuce, tropic croton, sumpweed, oldfield aster, partridge pea, goldenrod, blackberry, broomsedge bluestem, fall panicum, witchgrass, and giant foxtail (as well as many others) provide excellent

cover and/or food for various wildlife. If you are not familiar with these, get a plant ID book and learn to identify them. *A Guide to Wildlife Food Plots and Early Successional Plants* contains color photos and descriptions of more than 250 commonly occurring plants, and it provides information on the wildlife value of each, and if they are not desirable, how to get rid of them. A tremendous benefit of learning these plants and understanding their value for wildlife is that they occur naturally. You don’t have to plant them. **Make no mistake, on the vast majority of sites that you intend to manage for wildlife, you do not need to plant native grasses or forbs to have an attractive and productive field.** In fact, planted fields rarely are as attractive or productive for most wildlife as those fields that have been managed by killing undesirable plants and allowing desirable plants to establish and colonize naturally.

I realize this is a departure from what many biologists have recommended in recent years. It has become tradition to spray all the existing cover, usually with a glyphosate herbicide, then plant a

mixture of native grasses and forbs. However, that approach often leads to frustration and wasted time and money because both desirable and undesirable plants will germinate from the seedbank, and you still have to control the undesirable plants. **I recommend a different approach. Instead of planting what you want, simply continue to get rid of what you don’t want.** In most cases, nature will do the rest. Unless you are trying to establish a grassland for grassland songbirds, which require approximately 50–75 percent coverage of grass, you should not consider planting native grasses and forbs until you have evaluated and worked with the seedbank for at least 3 years. In almost all cases, you will have a field providing excellent cover and food resources for wildlife that use early successional plant communities.

The following set of photos shows examples of old-fields and how they may be managed for wildlife species. Compare your field(s) with these photos to give you an idea of how your fields might look when managed for various wildlife species.



If you think this looks “weedy” or “snakey,” then you might need to check your perspective. This field is providing excellent cover for northern bobwhite, wild turkey, eastern cottontail, and white-tailed deer fawns.

This is a first-year fallow field that previously had been cropped with corn and soybeans. Most people would view this as a field of weeds (common ragweed, giant foxtail, daisy fleabane, Queen Anne's lace, horseweed, goldenrod, pokeweed, wild garlic, smooth pigweed, velvetgrass, common lambsquarter, trumpet creeper, and blackberry are in the field). However, the structure is perfect for wild turkey and northern bobwhite broods, there is excellent forage for white-tailed deer and eastern cottontail, and field sparrows and eastern box turtle are nesting in the field. Do not overlook the value of fallow fields. Undesirable species can be spot-sprayed. The field can be maintained by burning or disking every 1-3 years.



This field was a horse pasture of orchardgrass and tall fescue the previous year. Those grasses were killed in the fall, and by midsummer daisy fleabane, horseweed, pokeweed, common ragweed, wingstem, and giant foxtail are providing excellent cover for northern bobwhite and wild turkey broods, as well as forage for white-tailed deer and eastern cottontail. This plant composition and structure can be maintained by disking every 2-3 years.



This field was covered with tall fescue and bermudagrass. It was sprayed with glyphosate and returning bermudagrass was sprayed with imazapyr. It is maintained by burning every 1-3 years and by spot-spraying to kill undesirable plants. It is a relatively small field (1.5 acre) surrounded by woods, providing nesting and brooding cover for wild turkey, nesting cover for field sparrow and indigo bunting, fawning cover, forage for white-tailed deer and eastern cottontail, and a nesting site for eastern box turtle. This field is a perfect example of how not all such fields need to be planted in food plots to provide benefit to wildlife.





This field is dominated by naturally occurring native grasses, forbs, and brambles, specifically little bluestem, beaked panicum, purpletop, goldenrod, slender lespedeza, rabbittobacco, hyssopleaf thoroughwort, blazingstar, and blackberry. It is burned every 1–2 years. The structure of the field is near perfect for grassland birds, such as grasshopper sparrow and eastern meadowlark, but the landscape is predominately forested and does not support grassland birds. Northern bobwhite would nest in the field, but shrub cover is lacking and the landscape does not support bobwhite. The structure is relatively poor for white-tailed deer fawns, eastern cottontail, or nesting wild turkey. There is some forage for white-tailed deer, but it is not great. More forbs and woody structure are needed for most species. Light disking following prescribed fire in late summer/early fall would encourage more forb cover, and extending the fire–return interval to 3–5 years would encourage more woody cover.



This field was created by clearing a section of woods. It is maintained by burning every 3–4 years and by spot-spraying undesirable plants. By extending the disking or fire–return interval, more perennial herbaceous and woody plants establish. This structure provides more bedding cover for white-tailed deer; more escape cover for eastern cottontail or northern bobwhite; and nesting cover for wild turkey, northern bobwhite, blue grosbeak, indigo bunting, and yellow-breasted chat.



Don't be alarmed! The woody cover is OK! If you want to hold deer on your property, want more rabbits, or want to increase quail on your property, you need cover such as this. Succession can be set back with fire every 4–5 years, by spot-spraying undesirable stems as they come up, and by occasionally cutting a tree or two as needed that made it through the fire without being top-killed. If this type of cover alarms you, or doesn't look good to you, then you might have just identified why you are not seeing more of these species on your property.

RENOVATING OLD HAYFIELDS AND PASTURES FOR WILDLIFE

Virtually all the old hayfields and pastures in the eastern US are covered with nonnative, perennial, sod-forming grasses. Common cool-season grasses include tall fescue, orchardgrass, timothy, bluegrasses, velvetgrass, and brome-grasses. Common warm-season grasses include bermudagrass, dallisgrass, and bahiagrass. The dense structure of these sod-forming grasses limits mobility for many wildlife species, such as northern bobwhite, wild turkey poults, and ground-feeding songbirds. Food availability is reduced by these grasses as they outcompete more desirable food plants and make finding seed or invertebrates in the dense thatch virtually impossible. Thus, habitat quality for most wildlife species is greatly reduced in fields dominated by these grasses. Grassland songbirds are an exception as some species nest as successfully in nonnative grasslands as in native grasslands. Area requirements, grassland management, and vegetation structure are more influential to grassland songbirds than grass species.

Herbicide applications are recommended to kill perennial nonnative grasses. However, if you are in a situation where herbicide applications are not possible, continued soil disturbance (disking or tillage) following burning will greatly improve plant composition, even though some coverage of nonnative grasses will persist.

Nonnative perennial cool-season grasses are killed most effectively by spraying a glyphosate herbicide that contains at least 41 percent glyphosate (2 quarts per acre) in the fall after a couple frosts, but before they go dormant in winter. You can spray them in spring, but the root systems are not as easily killed and resprouting will require spot-spraying later. By waiting until after a couple frosts in the fall before spraying, desirable warm-season plants in the field should be dormant, and glyphosate can be used to selectively kill the cool-season grasses without harming most of the desirable warm-season plants. If desirable cool-season plants are present, a broad-spectrum selective herbicide, such as imazapic,

may be a better option. Herbicides containing imazapic (such as Plateau) also may be used to control tall fescue and timothy, but imazapic does not control orchardgrass, bluegrass, or smooth brome.

Preparing the field for spraying is an important consideration, especially if the field has not been hayed or grazed in a few years and has a mixture of forbs, grasses, brambles, and shrubs scattered across the field. Optimally, you want to spray green, growing grass, not dead stems and thatch from previous years. Haying, repeated mowing, or burning in late summer prior to spraying in late fall (or preparation in late winter prior to spraying in spring) will “clean” the field and stimulate fresh growing grass. If the field is not prepared, and dead stems and thatch are mixed with the grass you intend to spray, you can increase the volume of total spray solution from 15 to 25 gallons per acre to apply a larger volume and droplet size and help ensure the herbicide gets to the growing grass underneath the dead stems. The rate of herbicide per acre should remain the same.



Perennial cool-season grasses should be sprayed in the fall for best control. Photo credit John Gruchy.



Old pastures and hayfields often contain a mixture of plant species, but still have a “carpet” of undesirable grass growing underneath, such as tall fescue. Preparing the site prior to spraying by repeated mowing, haying, or burning clears debris that would block the herbicide from contacting the grass.

Nonnative perennial warm-season grasses should be sprayed about the time they begin to flower but before seedheads form. As with cool-season grasses, field preparation prior to spraying is important to ensure good herbicide contact with fresh growing grass. Glyphosate herbicides can be used to kill these grasses, but the rate must be increased to 4–5 quarts per acre with bahiagrass and bermudagrass, and at least 3 quarts per acre with dallisgrass. Imazapyr (such as 32 ounces of Chopper per acre) is more effective at killing bermudagrass than glyphosate. Metsulfuron methyl (such as 2 ounces of Escort per acre) also is effective at killing bahiagrass, and imazapic (such as 12 ounces of Plateau per acre) also is effective at killing dallisgrass. **Do not expect to eradicate any of these grasses with a single herbicide application.** Spot-spraying will

be necessary the following season, especially with bermudagrass, and it sometimes is possible to spray twice in one growing season. For example, after spraying bermudagrass with imazapyr in May or June, there likely will be enough regrowth to warrant spot-spraying with a glyphosate herbicide in August. It is not uncommon to spot-spray returning patches of bermudagrass for at least 3 years, highlighting why you should not plant native grasses and forbs after an initial herbicide application. Returning bermudagrass or bahiagrass can be spot-sprayed as needed with a glyphosate herbicide, whereas returning dallisgrass can be spot-sprayed with glyphosate or imazapic.

Planted native grasses, especially big bluestem, indiagrass, and switchgrass, usually become so dense that they shade out desirable forbs and provide poor structure with no food for most wildlife species. Density of

native grasses can be reduced with a broadcast application of imazapyr (such as 24 ounces of Arsenal AC per acre) or glyphosate (2 quarts per acre of a glyphosate herbicide that contains at least 41 percent glyphosate) in late May or early June when the grasses are about 18–24 inches tall. By late July, the grasses will be browned out and the area can be burned when conditions permit. Burning at this time will reduce accumulated dead fuel, improve conditions at ground level, and increase plant diversity, especially by increasing the forb component. These applications should reduce native grass density to approximately 10–30 percent coverage. Grass density should be no more than 30–50 percent when managing old-fields for most wildlife species; the exception being grassland songbirds, which select fields with more than 50 percent grass coverage.



Planted native grasses often are either planted too dense or they become too dense over time to provide suitable structure for most wildlife species.

CONVERTING FALLOW CROPFIELDS

Fallow cropfields do not have sod cover, so an initial broad-spectrum herbicide application is not necessary unless there is extensive coverage of a noxious weed or you intend to plant native grasses and forbs. In most cases, it is not necessary to plant native grasses and forbs to provide excellent early successional cover for wildlife. However, the seedbank in fields that have been cropped for many years usually is compromised, especially those fields where soil-active herbicides were commonly used for weed control. But even in those fields, weeds that arise may offer value for many wildlife species. For example, pigweeds, horseweed, dogfennel, cocklebur, and fall panicum are commonly occurring annual plants that provide cover for northern bobwhite, wild turkey broods, white-tailed deer fawns, and several ground-feeding songbirds. The seeds of pigweeds and fall panicum are eaten by mourning

dove, bobwhite, and many songbirds. Thus, the habitat value of a fallow field with these “weeds” is actually greater for many species than a field of planted native grasses and forbs, especially dense, tall native grasses. There are exceptions. Many agricultural weeds provide little or no wildlife value. Horsenettle and other nightshades, curly and broadleaf dock, common burdock, spurge, balloonvine, henbit, and groundcherry are examples of plants that provide little if any food or cover value for any wildlife species. Other plants, such as sicklepod and jimsonweed, can provide excellent cover for bobwhite broods, and johnsongrass provides cover similar to switchgrass, and its seed is eaten by many birds, including northern bobwhite and mourning dove. However, the invasive nature of these plants and the associated toxicity of some of them causes me to recommend spraying them in favor of other plants.

The majority of agricultural weeds that can be so problematic in row crops is annual species. Thus, they are short-lived in fallow fields. They decline considerably in the second year of fallow growth and by year 3, they usually are almost gone as perennial plants begin to dominate the site. Thus, most people see these “weeds” coming up in the fallow field, believe that is all they are going to have, spray the entire field, and plant native grasses and forbs. Then, they begin the weed war as the weeds compete with the planted grasses and forbs. Frustration, along with wasted time and money, is the result when trying to get rid of a legume weed, such as sicklepod, in a field that has been planted with native legumes! There is no herbicide that will kill sicklepod that will not kill planted forbs. **It is time to think about managing succession rather than managing a planting!**



Every site is different. However, planting native grasses and forbs is not necessary on a majority of sites to ensure high-quality early successional vegetation. Managing naturally occurring species usually is much more effective and efficient. On the left, daisy fleabane, pokeweed, horseweed, common ragweed, common lambsquarters, giant foxtail, blackberry, horsenettle, nodding spurge, wild onion, curly dock, and ailanthus are growing in a first-year fallow field that previously was in Roundup Ready soybeans and corn (you can see volunteer corn plants in picture) for many years. Selective spot-spraying will remove undesirable species and allow desirable species to spread. The picture on the right is the same field 3 years later. Perennial species—especially broomsedge bluestem, goldenrod, blackberry, and beggar’s-lice—now are prominent. Planting native grasses and forbs would have been a waste of time and money.

MANAGING OLD-FIELDS FOR WILDLIFE

Average precipitation in the eastern US exceeds 30 inches per year. Without disturbance, fields become dominated by young trees on most sites within 6–8 years. Wildlife managers commonly set back or manage plant succession with fire, mechanical treatment, and herbicide applications. Different management practices, frequency of management, and the season (or timing) of management have different effects on plant composition (plant species present) and structure (height and density).

Prescribed fire is the most effective and efficient method to manage old-fields and other early successional plant communities. Fire sets back succession by controlling woody species and stimulates the seedbank. Fire influences vegetation structure by consuming leaf litter and other debris, which increases visibility and provides more open structure at ground level. Burning every 1–2 years will maintain a field of grasses and forbs. Burning every 3–4 years will allow scattered shrubs and trees to persist in the field, which is good for many wildlife species. Burning every 5–6 years will allow considerable woody encroachment on most sites, which is good for various wildlife



A heavy offset disk can set back succession even where small trees have colonized.

species. Of course, this average range of frequency can vary by site, and you should never plan to burn on an exact frequency, but rather let the plant response in the field be your guide. Season of burning can influence plant composition. In general, burning during winter or early spring encourages more grass growth and only top-kills small trees. Burning later in summer and early fall generally encourages more forb response and fewer trees tend to resprout, but response varies by tree species.

Disking also sets back succession, facilitates decomposition of dead plant material, stimulates the seedbank, and provides an open structure at ground level. Of course, it is more difficult to maintain a field by disking if scattered shrubs and trees are desired, which is needed by many wildlife species. Disking tends to stimulate more forb coverage than burning. Disking in fall/winter generally stimulates more desirable plants than disking in spring or early summer, which tends to favor nonnative warm-season grasses, such as crabgrasses and johnsongrass if they are present. Intensity of disking influences vegetation response. Light, shallow disking does not set back succession as much as heavy, deeper disking. Light disking facilitates decomposition of dead plant material, but it does not disrupt root systems of some perennial plants, especially perennial bunchgrasses, as much as more intensive disking. If you want to reduce coverage of perennial grasses and forbs and increase annual species, heavier disking may be required. For example, multiple passes of a heavy offset disk will reduce density of native warm-season grasses that were planted too thick or have become too dense over time.

Mowing is the most common method of managing old-fields.



Prescribed fire sets back succession and stimulates the seedbank to germinate.

Landowners commonly mow fields to keep them from “growing up,” “getting away from them” or “getting snakey.” Mowing during spring and summer especially is a pervasive problem that destroys cover and food resources at a time of year when those resources are most critical (such as nesting or raising young). Mowing at any time facilitates thatch buildup, clutters space at ground level, and limits germination of the seedbank. And, ironically, annual mowing does not limit the primary reason most people mow—to control woody encroachment. If there is no alternative to mowing, then at least do so in late winter, just prior to spring green-up. Mowing at that time does not disrupt nesting, brood-rearing, or fawning, and allows cover to persist in the field during winter, which is equally important to the many birds and mammals using the field for winter cover.

Mulching machines are sometimes used to consume trees that have grown too large for a tractor-mounted rotary mower, too tall to spray with a tractor-mounted sprayer, or too large in diameter to effectively kill with low-intensity prescribed fire. Mulching machines effectively reduce small trees to wood chips and enable further management. Trees chopped

up typically resprout and additional treatment, such as an herbicide application, may be required after the trees resprout. Accumulated wood chips can smother the seedbank and reduce ground cover and vegetation diversity until they ultimately decompose, which may be 2 or more years. Wood chips retain moisture and can be difficult to burn and lead to increased smoldering. Thus, mulching machines can be effective in reducing the size of trees for further treatment, but they should not be considered a primary technique for managing succession.

Herbicide applications are effective in managing plant composition, structure, and setting back succession. Spot-spraying is particularly effective when managing old-fields. Spot-spraying can be conducted with a spray gun attached to a tractor- or ATV-mounted sprayer, or with a backpack sprayer. The most effective method when spot-spraying is to go over the area methodically and relatively slowly, similar to a pattern used when mowing. Undesirable trees and shrubs can be spot-sprayed if not too tall. Glyphosate, triclopyr, and imazapyr are commonly used. If trees are too tall for foliar applications, a cut-stump treatment will prevent stumps from sprouting. Spot-spraying

is efficient for controlling undesirable grasses and forbs if they are not too widespread. Some of the more common species include sericea lespedeza, common teasel, spotted knapweed, chickweeds, cocklebur, henbit, curly dock, jimsonweed, poison hemlock, morningglories, wild mustard, narrowleaf and broadleaf plantain, sicklepod, velvetleaf, tall fescue, orchardgrass, bluegrasses, bromegrasses, bermudagrass, johnsongrass, crabgrasses, sandburs, ryegrass, japangrass, and yellow nutsedge. Spot-spraying normally involves postemergence applications (spraying foliage of growing plants). Glyphosate, dicamba, imazapic, imazapyr, imazethapyr, triclopyr, triclopyr+flouroxypyr, sulfosulfuron, and 2,4-DB all are excellent choices for various applications. However, preemergence applications also are effective, especially if applied after burning or disking and just prior to seed germination. **Remember, your spot-spray applications are to kill what you don't want, leave what you do want, and let desirable species fill in.** A benefit of spot-spraying is that it is relatively noninvasive with regard to disturbing wildlife, can be completed during any season of the year (depending on target plant), and does not destroy existing cover. Midsummer is a great time to survey fields and spot-spray problem vegetation. Of course, it is best if you can survey the field and spot-spray a couple of times as needed through the year. However, huge improvements in plant composition can be made by spot-spraying only once per year during summer.



Mowing is the least desirable method to maintain an early successional community. Mowing builds up thatch, which inhibits the seedbank from germinating and limits mobility of small wildlife at the ground level. Photo by John Gruchy.

CONSIDERATIONS FOR VARIOUS SPECIES AND SPECIES GUILDS WHEN MANAGING OLD-FIELDS

GRASSLAND BIRDS

Prescribed fire and mowing every 1–2 years can maintain habitat for grassland birds, including eastern meadowlark, grasshopper sparrow, Henslow’s sparrow, LeConte’s sparrow, and dickcissel. Disturbance during the nesting season (late April to mid-August) should be avoided. If woody encroachment is problematic, burn during the late growing season (late August through October) or spot-spray with a selective herbicide, such as triclopyr. Light disking may be completed after burning to stimulate additional forb cover (20–30 percent) if lacking. Grazing also can be used, but grazing intensity must be moderated to provide sufficient structure for nesting (maintain vegetation height at least 15 inches). An exception is patch-burn grazing, which promotes burning approximately $\frac{1}{4}$ to $\frac{1}{5}$ of the pasture each year. Cattle intensively graze the recently burned portion of the pasture while birds concentrate nesting in the unburned portions.



Large fields dominated by medium-height grasses, such as broomsedge bluestem, and little bluestem, in open landscapes provide habitat for grassland birds.

SHRUBLAND SONGBIRDS

Species such as indigo bunting, blue grosbeak, field sparrow, golden-winged warbler, blue-winged warbler, dickcissel, common yellowthroat, and prairie warbler are found in old-fields with scattered shrub or small tree cover. A fire-return interval of 3–5 years usually is sufficient to maintain the structure and composition desired by these species. If woody composition begins to get too expansive or dense, the fire-return interval can be shortened, burning could be conducted during late growing season, or selective herbicides may be applied via spot-spraying or cut-stump application. Periodic disking outside of the nesting season may be used to maintain an early successional community, but scattered shrub cover must be retained. Yellow-breasted chat, brown thrasher, gray catbird, white-eyed vireo, and chestnut-sided warbler use openings with relatively dense shrub cover. A fire-return interval of 5–7 years will maintain suitable structure for these birds on most sites.



Open areas with scattered shrub cover can be maintained for various songbirds, such as indigo bunting and field sparrow, with fire every few years.

UPLAND GAMEBIRDS

Northern bobwhite require vegetation with an open structure at ground level and lots of shrub cover. Shrub cover should be well-interspersed amongst forbs and grasses, with the average distance to shrub cover not more than 50–100 yards. A fire-return interval of 1–4 years is suitable for most sites. Disking every 1–3 years can be used to maintain annual forbs important for brood cover and seed production. Disking and herbicide applications may be used to reduce grass coverage when it exceeds 30–50 percent. Selective herbicides may be used to decrease coverage of undesirable herbaceous plants and encourage more desirable plants, or to kill encroaching trees or reduce shrub cover. Size of opening is not critical, but the area managed must be in a relatively open landscape (not a forested landscape) to realize a positive population response. Disked areas 3–5 acres are optimal for brood cover. Mowing should not be used to maintain early successional stages for northern bobwhite because mowing creates a deep thatch layer that limits mobility of bobwhite chicks and limits germination of the seedbank.

Wild turkeys use old-fields dominated by forbs for brooding and foraging and areas with shrub cover for nesting, but shrub cover is not required for nesting. A fire-return interval of 3–5 years will maintain an old-field attractive for wild turkeys on most sites, but burning more frequently will be necessary on some sites. Relatively small fields (less than 5 acres) may be managed by burning or disking annually or every two years to maintain desirable forb cover for broods. Spot-spraying can be used to reduce coverage of undesirable plants and encourage more desirable plants. Mowing should not be used to maintain early successional stages for wild turkeys because mowing creates a deep thatch layer that limits mobility of wild turkey poults and limits the seedbank from germinating.



Open areas with forbs, some grass, and scattered shrubs provide excellent nesting, brooding, and escape cover for bobwhite. Shrub cover is requisite and limiting on many properties.



This field was a pasture of tall fescue and other grasses the year before the photo was taken. The pasture was sprayed in the fall with a glyphosate herbicide. Now, the following June, common ragweed, daisy fleabane, horseweed, pokeweed, late flowering thoroughwort, and 3-seeded mercury provide outstanding brooding cover. Nothing was planted.

EASTERN COTTONTAIL

Management for eastern cottontail is similar to northern bobwhite with the exception that the management unit size may be smaller because rabbits have a smaller average home range (25 acres) than bobwhite (90 acres), and the fire-return interval should be a little longer because rabbits require more dense shrubby cover (thickets) than bobwhite. Blocks of cover up to 5 acres will allow management of $\frac{1}{5}$ the average size of a rabbit's home range each year with a 5-year fire-return interval, maintaining fresh growth for forage as well as protective cover. Alternatively, some areas may be burned every 1–3 years as foraging areas, whereas thick escape cover may be burned every 5–7 years to maintain brushy cover and prevent young trees from shading out desirable groundcover.



Eastern cottontails require thick, shrubby cover that is well intermixed with forbs and grasses.

WHITE-TAILED DEER

Deer use early successional communities for foraging, fawning cover, and bedding cover. Disking on a 1- to 3-year return interval maintains annual forbs that are selected as forage. Prescribed fire can be used on a 3- to 7-year fire-return interval to maintain an early successional stage with forbs and scattered brambles and shrub cover. Spot-spraying can be completed to reduce coverage of undesirable plants.



White-tailed deer use fields in various stages of succession. Recently disturbed fields, such as first- and second-year fallow fields typically provide excellent forage and fawning cover. Fields with more woody structure provide excellent bedding cover, as well as some forage. This field was covered in orchardgrass and smooth brome. Young trees had pioneered into the field. The grass was sprayed in fall with a glyphosate herbicide, then burned. The seedbank responded with excellent forage. Most of the trees were top-killed, but not all. Thus, scattered shade for summer bedding is outstanding.

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