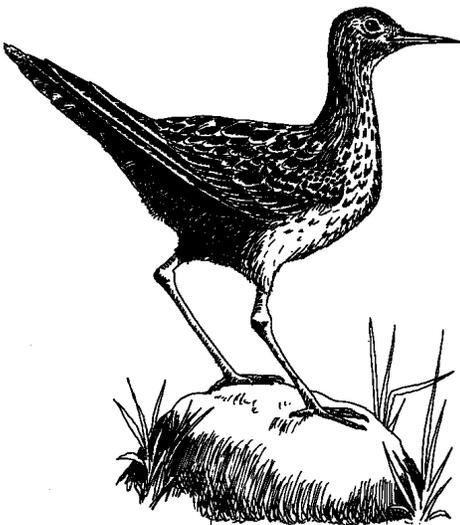




## INTRODUCTION TO GRASSLAND MANAGEMENT

The nearly 7,000 kinds of grasses make up the most widespread plant family in the world. Grasslands in Michigan range from mowed lawns to idle fields to grainfields. Before settlement, grasslands of several types were scattered throughout Michigan, such as wet meadows, oak and pine barrens, dry sand prairies, and tall grass prairies. One grassland that most people think of is the tallgrass prairie, which was primarily a Midwest ecosystem that extended into southwest Lower Michigan. These prairies were unlike anything the settlers had ever seen, and they supported more than 300 species of wildflowers and grasses, some of which grew to a height of nine feet.

Many experts consider North American grasslands to be a fairly recent development in geologic



upland sandpiper

time. Thousands of years ago, huge glaciers covered much of Michigan. About 14,000 years ago, the climate became warmer and the glaciers began to melt and retreat. Prairies, barrens, and wet meadows began to establish themselves on landscapes that were level or gently rolling on sandy or loamy soils. After the glaciers were gone, the climate cooled and the conifer forests of northern Michigan, including the Upper Peninsula, appeared. Vegetation changed over the next several thousand years with warmer, drier periods favoring grasslands in sandy and loamy channels, rolling hills, and flat lakeplains, and the spread of oak and hickory into southern Michigan.

Perhaps as important as climate is the element of fire to establish and maintain Michigan's grasslands. Whether caused by lightning or set purposely by Native Americans, fire helped prairies to grow by stimulating grass and wildflowers to reproduce, reducing competition from weeds, and discouraging the encroachment of shrubs and trees. No one knows exactly how many prairies existed in Michigan before settlement, but researchers have identified 39 known prairie areas, mostly in the southern Lower Peninsula. These prairies ranged in size from less than 100 acres to 25 square miles and may have totaled approximately 2.3 million acres.

least shrew



### Value to Wildlife

Grasslands support a variety of wildlife species. In fact, some kinds of birds cannot live in any other ecosystem. Northern harriers, sharp-tailed grouse, upland sandpipers, bobolinks, and savannah and Henslow's sparrows thrive best in grassland habitats of at least 100 acres. Grasslands smaller than 50 acres will attract bobwhite quail, bluebirds, red-winged blackbirds, American goldfinches, dickcissels, common yellowthroats, and vesper, field, and song sparrows. Other species, such as the Eastern meadowlark, grasshopper sparrow, and sedge wren, can prosper in grasslands from 10 to 20 acres. Mammals also find grasslands valuable, such as the meadow and prairie vole, 13-lined ground squirrel, and badger.

Because grasslands provide nesting, brood rearing, and roosting cover, they are important to quail, pheasants, and wild turkeys. Pheasants in particular also find native grasses such as switchgrass, Indiangrass, and the bluestems suitable for winter shelter because the grasses stand up to snow.

Deer use grasslands for food at birth to their fawns there. Rabbits raise their young and find food and security in grassland edges. They are also home to mice, shrews, voles, some kinds of snakes, and a host of avian and ground predators including hawks, owls, raccoons, skunks, opossums, foxes, and coyotes.

## Taking Inventory

When you evaluated your land, as explained in the **Habitat Planning** section of this manual, what grasslands, if any, did you find? If you own a native grassland, consider yourself lucky. You may be able to restore the grassland to full productivity by eliminating as much competition as possible and then interseeding desirable plant species. Or you may own an old field that was once in crop production and is now left idle. Field borders, old fencerows, farm lanes and other corridors, and odd areas that can not be plowed or disked offer further opportunities for grassland establishment. Your active hayfields are a type of grassland, too. They can be managed for livestock forage and wildlife. The current quality of your grasslands will depend on soil and water conditions, and plant composition. Each combination may attract different wildlife species.

This **Grassland Management** section has chapters on warm season and cool season grasses, grass planting, converting old fields to grasslands, restoring a prairie, and prescribed burning. What follows is an overview of each.

## Warm Season Grasses

There are two basic kinds of grasses--warm season and cool

season. Wildlife thrive in both. Warm season grasses are usually referred to as prairie grasses and include Indiangrass, big bluestem,



switchgrass

little bluestem, switchgrass, and prairie cordgrass. Native to Michigan, they grow best under the heat of a summer sun followed by warm nights. You can see them mixed with colorful native wildflowers at public and private prairie areas and sometimes along roadsides and railroad rights-of-way. Besides their value to wildlife, warm season grasses can provide forage for livestock and add beauty to the landscape.

They are four reasons why wildlife biologists usually prefer warm season grasses for wildlife cover: (1) they hold up to the elements, (2) they are native to Michigan, (3) they can be planted along with wildflowers, and (4) they live a long time. Often called bunch grasses because they grow in clumps, these plants do not break down easily under heavy winds or deep snow. Their disadvantages are that they are initially more costly to plant than other types of grass and typically take up to three years to establish. Patience is the key to success. Once native grasses take hold, however, they need little attention and will live many years through proper maintenance. Maintaining them through prescribed burning every few years will keep them healthy and productive for wildlife. Other management options include light grazing by livestock, periodic mowing, or the spot application of a selective herbicide.

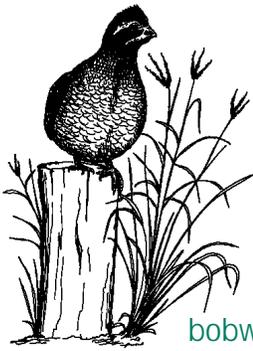
## Cool Season Grasses

Most of the grasses you see in Michigan are cool season grasses not native to the state. These include brome grass, timothy, and orchardgrass. Native cool season species include Canada wildrye, redtop, and June grass. Alfalfa and clover are cool season legumes that are planted with cool season grasses because the legumes fix nitrogen for themselves and other plants, provide food for many kinds of insects, and offer habitat diversity for wildlife. Cool season grasses and legumes grow best when the daytime temperatures on spring and fall days reach 65 to 75 degrees Fahrenheit followed by cool nights.



redtop

Cool season stands are valuable to wildlife because they provide nesting and cover in spring and summer and sometimes roosting cover in summer and fall. Most landowners are familiar with these grasses. Advice on planting and equipment are easy to come by, and the stands are easy and more affordable than warmseason grasses to establish. Annual mowing will keep them productive although the stands lose vigor over time and may need to be replanted. They also tend to break down under wind and snow.



bobwhite quail

## What to Plant and Where

What should you plant, and where should you plant it? Consult your overall Management Plan before deciding to plant cool season or warm season grasses. Many landowners whose goal is to provide year-round habitat for pheasants, quail, and grassland songbirds plant both types side by side, along with a nearby food plot containing corn, buckwheat, millet, and sunflowers or a similar mixture of preferred wildlife foods. However, warm season grasses should be planted before cool season grasses to ensure full stand development. If your property is small and you are able to provide only one component of habitat, consider working with neighbors who might be willing to furnish other needs.

Planting more than one kind of grass will provide the variety of grass heights and density for good nesting habitat, especially for waterfowl, pheasants, and songbirds. Mixing in legumes in cool season plantings and wildflowers in warm season stands will encourage insects, which in turn provide food for wildlife. Stiff-stemmed legumes and wildflowers provide perching sites for meadowlarks, sparrows, and other birds. The wildflowers offer a source of nectar for hummingbirds and bee species.

What species of grasses, legumes, and wildflowers you establish depend on soil type, depth, texture, and fertility. Certain grasses and legumes grow better on dry sites, and other types thrive on wet sites. Warm season grasses, for example, tend to grow well on sandy, droughty, or excessively drained sites. Most cool season grasses perform better on well-drained soils of sandy loam.

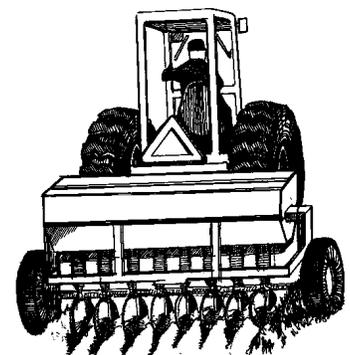
Besides soil considerations, other site conditions include drainage and erosion concerns and potential weed problems. Check with your Conservation District office for a Soil Survey map, which will identify erosion potential as well as soil types on your property. Identify plants already growing on the site you are considering for grass planting. Also learn what you can about the history of cropping or other land use. This information will help you to know what to plant and how much effort will be needed to maintain the grassland once it is established.

To increase the value of grasslands to wildlife, especially smaller sites of five to 20 acres place them next to or near other suitable grassland habitat. Examples are hayfields, pastures, and wetlands. Your grassland will help wildlife the most if the landscape around your property is also in grasslands or associated habitats. The best defense against predation is to plant a large grassland area rather than a small one. Ten acres is better than five acres, and 20 acres is better than 10 acres. If a larger planting is not possible or practical, you can help protect nesting birds from predation by edge-loving raccoons, hawks, opossums, and skunks, and parasitism by brown-

headed cowbirds by placing the grassland at least 50 yards from hedgerows, woodlots, and dead trees. The buffer between these habitat types can be planted to shrubs. The shape of the grassland planting is also important, especially small grasslands. To reduce predation, plant in circles or squares rather than in linear strips.

## Old Fields

Idled farm fields, borders and corridors can often be converted to grasslands if the site and soil conditions are favorable. After those determinations are made, you will need to identify what stage of natural succession the field is in. What is currently growing there? Are the plants annuals or perennials? Have shrubby plants like dogwood, blackberry, and sumac already begun to invade? Are there any trees? If so, what kind? Before converting an old farm field to a grassland, you must eliminate the existing vegetation. Burning, mowing, disking and the application of selective herbicides are all methods used to return an old field to bare-soil conditions. Old fields may not be as beneficial to some grassland species as planted prairies; however, they, too, provide food, shelter, and security for many species.



# INTRODUCTION

## Prairie Restorations

Pure prairies are ecosystems that are relatively free from the invasion of shrubs and trees. They occur where sites are too wet or too dry for woody vegetation to grow, or where plant succession has been checked through fire. If you have a prairie on your property, chances are it will be a prairie remnant that is degraded, but that might be restored. Doing some detective work at the local library and the county Conservation District office may turn up clues such as historical photos. Talking to neighbors and former owners may yield more information. Armed with a good identification guide of native grasses and wildflowers, you might be able to identify remnant prairie plants. Or perhaps a local expert will walk your property with you and help with identification.

If you have a former prairie and want to restore it, you may need to remove shrubs and trees, by mowing, burning or herbicide use. In some cases you may be able to interseed the site, preferably with seed from native plants from the immediate area or begin a new planting altogether.

Excessive weed growth is the biggest hurdle to establishing a lush grassland that has maximum benefit to wildlife. Native grass plantings in particular may take three to five years to dominate the site, especially if weeds were not controlled during the first year after

planting. During that first year of life, native grasses grow mostly below the ground as their root systems develop. Because little growth appears above ground where weeds are likely rampant, many landowners become needlessly discouraged. Once the stand is established, though, periodic burning will keep it healthy. Other methods to maintaining grasslands include strip mowing in alternating years, light grazing by livestock, and spot treatment of problem weeds or invading shrubs with a selective herbicide.

## Prescribed Burning

A prescribed burn is a fire purposely set to achieve a predetermined objective. Prescribed burns are often used today to kill or set back the growth of undesirable vegetation such as woody plants or noxious weeds and to promote the regrowth of warm season plants such as switchgrass. Most burns take place in the spring, however depending on what you hope to accomplish a fall burn may be in order.

These fires need to be conducted by individuals who are trained and experienced in fire management. Before prescribed burns take place a burn plan has to be developed and burning permits secured from the local fire authorities. Safety from personnel injury and damage to property is always the first concern when planning a fire.

In summary, grasslands in Michigan are important ecosystems for many species of birds and mammals. Whether you restore former grasslands, convert old fields, or create new grasslands, patience is one key to success. Another key is regular maintenance, to control natural succession. The benefits, however, include providing valuable wildlife habitat, livestock forage, and landscape diversity that is pleasing to behold.

### FOR ADDITIONAL CHAPTERS CONTACT:

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**Private Land Partnerships:** This partnership was formed between both private and public organizations in order to address private lands wildlife issues. Individuals share resources, information, and expertise. This landowner's guide has been a combined effort between these groups working towards one goal: Natural Resources Education. We hope this manual provides you with the knowledge and the motivation to make positive changes for our environment.

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## COOL SEASON GRASSES



Grasslands are areas often referred to as prairies or meadows, consisting primarily of grasses with associated wildflowers. These areas provide essential habitat for many species of wildlife. Presently, Michigan has only small remnant prairies scattered across the state. At the time of Michigan's settlement, there were approximately 2.35 million acres of grasslands. Historically ranging from several to thousands of acres, grasslands have drastically declined because they have been converted to agricultural fields or lost because of fire suppression.

Although we have lost almost all of our native prairies, Michigan still has some grassland areas. Non-native cool season grasses have been planted along roadsides, as hayfields and pastures, and often establish themselves in the fields retired from farming. These fields can provide important wildlife food and cover.

Within grasslands, a variety of wildlife such as pheasants, wild turkeys, songbirds, foxes, hawks, raccoons, and sandhill cranes eat abundant insects, seeds, and small rodents that grasslands produce. Also, mice, voles, shrews, woodchucks, and many kinds of ground-nesting birds raise their young there. The size of the grassland plays a significant role in attracting certain species of wildlife. Small grasslands one to five acres in size are activity zones for deer and rab-

bits. Other wildlife species, such as bobolinks and meadowlarks, may require 20 or more acres of grassland to survive.

There are two types of grasses to consider planting: cool season and warm season. For more information about warm season grasses, please refer to the chapter on **Warm Season Grasses**. Cool season grasses develop most rapidly during spring and early summer



Canada wildrye

when cool nights follow warm days. They begin to grow again in late summer and early fall when these same conditions apply. Growing best in temperatures of 55 to 75 degrees Fahrenheit, cool season grasses go dormant when temperatures reach 90 to 95. These grasses include timothy, orchard grass, and brome grass--all introduced species--and native Canada wildrye, redtop, and June grass, which is also called blue grass. Legumes such as alfalfa and the clovers--ladino, sweet, white, red, and others--are often included in plantings of cool season grasses.



redtop

Most wildlife managers in Michigan prefer that warm season grasses and cool season grasses be incorporated into wildlife plans that contain grasses because they provide excellent wildlife habitat. However, for the novice, cool season grasses are easier and less expensive to establish. Normally, cool season grasses are established in one growing season, whereas warm season grasses take three to five years. However, warm and cool season grasses planted in separate side by side stands will provide more diversity and are extremely valuable for wildlife.

### Stand Composition

Soil type will determine what kinds of cool season grasses to plant. The Natural Resource Conservation Service can supply, free of charge, a soil survey of your property, which identifies the type of soils you have and where they are located. For a small fee you can purchase a soil test kit from your county Michigan State University Extension office. The test determines if lime or fertilizers need to be applied to the soil for the particular grass that you choose to plant.

**Canada wildrye** is a native tall erect bunch grass that does not grow into dense stands. Found most often in sandy or marshy shores, it may also grow within sand dunes, and in forests along. Usually reaches a height of two to six feet. A palatable grain, it also

provides good nesting and roosting cover.

**Redtop**, also native, grows to four feet tall, has delicate leaves and stems, and also provides good nesting and roosting cover, even into winter if snowfalls are scarce.

**June grass** is a short, nearly prostrate variety that is usually mixed with common white clover or alsike clover, and planted in large meadows for browse. The mixture is tolerant of partial shade and will grow well on the north edge of a woodland.

**Timothy** and **orchard grass** are both about 30 inches high, ideal for nesting and brood-rearing cover. Timothy grass grows well on sandy loam soils that are fairly well drained, and orchard grass does better on mostly loam soils. Orchard grass is a clump grass, which permits pheasant chicks to easily walk through it. A large variety of protein-rich insects eat its soft, succulent leaves, but it produces poor-quality hay. The stiff, erect stems of timothy create good fall roosts for pheasants as well as good nesting cover for some songbirds. Mixed with ladino clover and red clover, timothy produces an excellent hay crop in early July. When the legumes die back after five or six years, timothy will form a useful pure stand.

Although hated by farmers and gardeners, **quack grass** has high value to wildlife, mostly because its seed head provides food. You may wish to avoid planting fescue and brome grass for wildlife. These sod-forming grasses tend to become too thick to allow easy movement by some wildlife and provide little food value.



orchard grass



timothy



red clover



alsike clover



quack grass



birdsfoot trefoil



smooth brome - A sod-forming grass that tends to become too thick for wildlife to move through.

Clover, alfalfa, and the other legumes remove nitrogen from the air and add it to the soil where it becomes available as fertilizer for other plants. Grasslands do not need to be fertilized as long as legumes are actively growing. Adding legumes to cool season grasses improves the variety of the stand by increasing the mix of structure and palatability of plants to plant eaters from insects to deer.

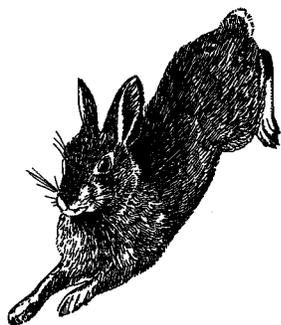
**Common white clover** is a short creeping clover, very persistent and well suited to wet soils with poor drainage. It also grows well in partial shade and is often selected for woodland trails, forest openings, and logging roads where ruffed grouse, wild turkeys, deer, and rabbits eat it. **Medium red clover** lives three to six years, reaches a height of 12 to 16 inches, and grows on soils ranging from poorly drained to dry, sandy types. It does best, though, on well-drained sandy loams and clay loam soils. Mixed with orchard grass or timothy, it helps provide cover and food, called browse.

**Alsike clover** lives only two or three years but is well suited to wet, poorly drained sites. An excellent companion to birdsfoot trefoil, orchard grass, and redtop, alsike provides browse and brood habitat in wet meadows.

**Ladino clover** lives six to ten years and thrives on soils that are well drained or fairly well drained. Planted with orchard grass and timothy, ladino attracts deer, turkeys, grouse, and rabbits in spring and summer.

Both white and yellow blossom **sweet clovers** make high-quality spring browse, excellent fall seed,

# COOL SEASON GRASSES



eastern cottontail rabbit

and good winter roosting cover for pheasants, quail, and rabbits. The white blossom variety is taller (to six feet), better tolerates droughty soils, and stands more erect during the winter to provide better cover than yellow.

**Birdsfoot trefoil** looks much like alfalfa but will tolerate more soil types than does alfalfa. Although it grows on a variety of soils from well-drained loams to wet clays and mucks, birdsfoot trefoil is harder to establish than clovers. In addition, birdsfoot trefoil is extremely aggressive after it becomes established and is not always highly recommended.

**Alfalfa** tolerates only well-drained sites and requires the highest pH soil of all the legumes. It will last six or seven years when annually mowed.

## Planting Rates

The kind of habitat you wish to establish will also determine what kind of cool season grasses and legumes you should plant and how much of each. For example, if your goal is to provide one acre of meadow for nesting pheasants, a commonly used mixture is 7 lbs. of medium red clover, 2 lbs. of alfalfa, 3 lbs. of timothy grass, and 3 lbs. of redbud grass.

Cool season grasses are popular with farmers because they estab-

lish quickly and respond to heavy fertilization, which can be reduced when mixed with legumes. They do better in high pH soils (5.8-7.0), which are maintained through the use of agricultural lime. The grasses typically outlive the legumes. Legumes should be inoculated with the proper bacteria before planting to increase germination. Seed three or more varieties of grass/legume mixtures at the rate of 8 to 12 lbs. per acre. For best results and highest benefit to wildlife, legumes should comprise 50 to 60 percent of the mix. Sow with conventional tillage (plow/disc/drag/plant), conservation (no-till) methods, or frost seed. More information is available in the **Grass Planting** chapter.

## Stand Size

Pheasants, bobolinks, and meadowlarks are among many wildlife species that do best in habitats where the predominant landscape type is grass. Township-sized areas containing 25 percent grassland have the highest benefit to these species. Grasslands larger than 40 acres are usually more beneficial to wildlife than are smaller fields because they make it more difficult for predators to find nesting birds and other prey. One consideration, however, is that if your plan calls for making a large field from several smaller fields, the removal of fencerows may destroy travel corridors and food/shelter habitats for other kinds of wildlife. Also, cool season fields larger than 80 acres begin to have less favorable impact on edge-loving species such as deer.

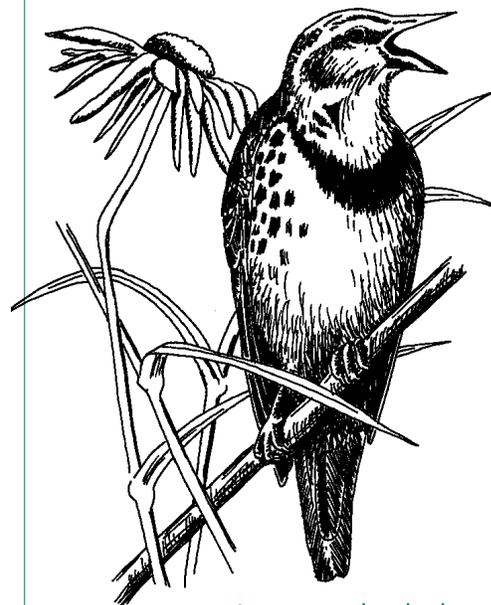
## Stand Management

The quality of cool season grasses usually peaks at two to four years after establishment. Subsequently, they become filled

with matted grasses and dead vegetation, reducing their vigor and offering less variety. In time, woody plants (shrubs, brush and small trees) move in and dominate. The grassland then becomes a brushland and habitat for other wildlife species.

To keep the stand in high-quality grasses and legumes, management tools such as burning, mowing, discing, fertilizing, and grazing may be needed. The controlled use of selective herbicides is another consideration. These tools stimulate regrowth and reduce the competition from dogwood, sumac, aspen, and other woody plants; increase stand vigor; and provide quality grassland habitat.

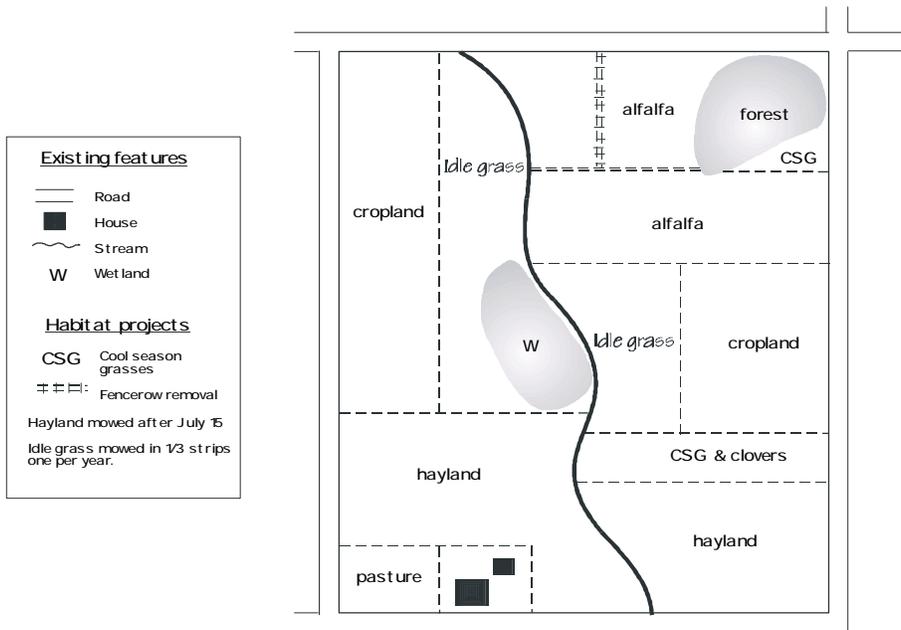
A **prescribed burn** is a planned fire, burning with a specific purpose. It is best done on a day with little or no wind, in early spring or late fall when vegetation is dry. Discuss your plans with local authorities, obtain the necessary burning permit, and observe all restrictions and safety procedures.



eastern meadowlark

# COOL SEASON GRASSES

40 Acres



low label directions and take care not to excessively damage non-targeted vegetation.

In summary, cool season grasses provide a variety of benefits to wildlife. They are easy to establish and less costly than other grass options. However, read the additional chapters within this section to determine if cool season grasses are the right choice for you.

This map is an example that demonstrates the many management options discussed throughout this chapter. The option(s) you choose should depend not only on your goals, but the location, condition, and present use of your land.

For more information see the **Prescribed Burning** chapter in this section.

If you plan on a **mechanical treatment**, you could--depending on your goals--mow or disc about one-third of the grassland each year. Mow in strips of 30 to 60 feet wide and leave undisturbed areas from 60 to 100 feet wide between the mowed areas. Mow between July 15 and August 31 to avoid destroying nest sites and give the grassland enough time for regrowth before winter. Mowing height should be four to six inches. Light discing has the added advantage of bringing back annual weeds, legume seeds, and grasses,

whose seeds have been lying dormant. However, these annuals may not be the preferred types. Like the mowing treatment, disc in strips 30 to 60 feet wide, but leave at least twice that width of undisturbed cover between strips.

**Grazing** will also help to set back succession but must be done carefully because overgrazed grass loses productivity. Do not graze during the wildlife nesting season, and do not reduce plant height below eight inches.

**Chemical treatment** is also an effective means of controlling woody invaders. However, correct application is critical. Carefully fol-

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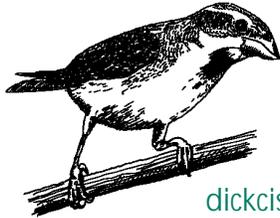
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## WARM SEASON GRASSES



dickcissel

Grasslands are areas often referred to as prairies or meadows, consisting primarily of grasses with associated wildflowers. These areas provide essential habitat for many species of wildlife. Presently, Michigan has only small remnant prairies scattered across the state. At the time of Michigan's settlement, there were approximately 2.35 million acres of prairies either occurring as tall grass prairies in southern Michigan, or as dry sand prairies in both the central northern Lower Michigan and parts of the Upper Peninsula. Historically ranging from several to thousands of acres, prairies have drastically declined because they have been converted to agricultural lands or lost because of fire suppression.

Within grasslands, a variety of wildlife such as pheasants, wild turkeys, songbirds, foxes, hawks, skunks, and sandhill cranes eat abundant insects, seeds, and small rodents that grasslands produce. Also, mice, voles, shrews, and woodchucks, and many kinds of ground-nesting birds raise their young there. The size of the grassland plays a role in attracting certain species of wildlife. Grasslands one to five acres in size are activity

zones for deer and rabbits. Other wildlife species, such as bobolinks and meadowlarks, may require 20 or more acres of grassland to survive.

There are two types of grasses: cool season and warm season. For more information about cool season grasses, please refer to the chapter on **Cool Season Grasses**. Warm season grasses are "bunch grasses" (grow in clumps) that develop most rapidly during summer when warm nights follow hot days. They include the native prairie species such as big bluestem, little bluestem, Indiangrass, and switchgrass. To increase diversity and provide additional food and cover, many warm season grasses are mixed with native wildflowers such as bergernot, leadplant, coreopsis, aster, blazing star, black-eyed susan, and other coneflowers.

Most wildlife managers in Michigan prefer that warm season grasses and cool season grasses be incorporated into most wildlife plans that have grasslands because they provide excellent wildlife habitat. In fact, Michigan landowners have planted a portion of their land that is set-aside in the federal Conservation Reserve Program (CRP) to warm season grasses. These grasses have stiffer stems that stand up to snow and provide more substantial winter cover than cool season grasses. Also, bunch grasses allow young wildlife to move easily through vegetation,

are drought tolerant, native to Michigan, and have a longer life than cool season types. Furthermore, bunch grasses, which possess deep root systems, promote better soil infiltration of water that then percolates into groundwater supplies. Besides making better use of water, they are efficient at removing nutrients--nitrogen, phosphorus and potassium--from the soil. Thus, warm season grasses are useful as buffer strips around wetlands as well as in areas where erosion is a problem. Unfortunately, warm season grass seed is usually more expensive. Also, they normally take three to five years to establish compared to one year for cool season types, and may require more maintenance during the early years of establishment, which would include mowing and burning.

### Stand Composition

Soil type will determine what kinds of warm season grasses to plant. The Natural Resource Conservation Service office can supply, free of charge, a soil survey of your property. The survey will identify what types of soil you have



and where it might be located. The soil may be wet, moist, or dry; and composed of sandy, loam, or clay. Before planting, your soil should be tested for pH and fertility. The test should determine if lime or fertilizers need to be applied to the soil for the particular type of grass you choose to plant. Nitrogen should not be applied to warm season grass plantings. Soil test boxes are available from your county Michigan State University Extension office. A small fee will be charged for this service.

The kind of habitat you wish to establish will also determine what kind of warm season grasses and forbs you should plant. For example, if your goal is to provide one acre of grasses for nesting waterfowl, a commonly used mixture is 2 lbs. of big bluestem, 1 lb. of little bluestem, 2 lbs. of Indian grass, 0.5 to 1 lb. of switchgrass and 0.5 lb. of wildflowers. Use native Michigan seed whenever possible. For more information on soil testing, soil surveys, and seed mixtures, see the chapter on **Grassland Plantings** in this section.



**Big bluestem** is a three to six foot tall perennial whose seed matures in September or October when the normally blue-green grass turns straw color with darker purple tones. Palatable to livestock when pastured during the growing season, big blue is often referred to as the "prairie king"

because of its importance in native grasslands. Big bluestem responds best on well-drained upland sites containing loamy sands, sandy

loams, and loams but will also grow on poorly drained soils and wet areas

**Indiangrass** is a three to five foot tall native grass with similar soil requirements as big bluestem, especially in lowland prairies where the two grow together. It is also common along rivers and sandy hill areas. Its blue-green leaves are similar in color to cabbage leaves, and the six to 10-inch long flower heads are yellow or bright bronze. Fully bloomed--usually in September--the plump heads add beauty to the prairie and are easily identified. It produces excellent quality hay when harvested early and is relished by livestock.



At four to eight feet tall, **switchgrass** is one of the tallest of all native prairie grasses and stands up better to snow than the others. It is also the best adapted to a wide range of soil conditions



on both uplands and lowlands and has strong tolerance to pre-emergent herbicides such as atrazine. Thus it can be planted with corn or in the year following corn without herbicide carry-over fears. It grows well in valleys and swales where it receives runoff water. Triangular in outline with one seed at the end of each branch, switchgrass seedheads

mature in September when the entire plant turns a yellow-orange color. Its smooth hard seed and strong seeding vigor make it easier to plant and establish than the other warm season grasses. However, unless you include it as a minor addition to a mix of warm season types, it will easily dominate the stand. Sometimes pure stands of switchgrass two to 10 acres in size are planted to promote outstanding winter cover for wildlife. It produces abundant good-quality hay and pasture.

**Little blue-stem** grows from two to three feet tall and is red-brown color in fall with white-tufted seed heads. Widely tolerant to drought, little blue is a reliable producer of native hay and forage as well as an outstanding check against erosion on steep slopes. On meadows and well-managed pastures, it often forms pure stands that maintain themselves against invasion by other species. On drier sites such as gravel slopes and well-drained overflow areas, it occurs in clumps.



## Stand Size

Grasslands from less than an acre in size to fields of a 1,000 acres in size will be used to one extent or another by many wildlife species, from insects to deer. Some wildlife species need a large grassland for their survival while other wildlife need small areas or may use only a portion of the grassland for their habitat requirements. Pheasants, bobolinks, and meadowlarks are among many wildlife species that do best in habi-

# WARM SEASON GRASSES

pheasant chicks



tats where the predominant landscape type is grass. Township-sized areas containing 25 percent grassland have the highest benefit to these species. Grasslands from 20 to 40 acres are usually more beneficial to nesting wildlife than are smaller fields because they make it more difficult for predators to locate nests. One consideration, however, is that if your plan calls for making a large field from several smaller fields, the removal of fencerows may destroy travel corridors and habitats for other kinds of wildlife. Also, warm season grass fields larger than 150 acres begin to have less favorable impact on many species because of the loss of edge. On the other hand, dickcissels and vesper, grasshopper, and henslow's sparrows respond best to large grasslands, up to 1,000 acres in size.

## Stand Planting

Warm season grasses take about three to five years to reach maximum height, and so landowners should not judge their efforts too early. Seedbed preparation is critically important. Because the seeds of warm season grasses are tiny and fluffy (except for switchgrass), they are difficult to run through typical planters and broadcasters. Planting alternatives include no-till grain drills specifically designed to plant the fluffy native grass seed, hand seeding, or purchasing more expensive debarbed grass seed (seed that has had the fluffy material

removed) which then can be planted more easily with a conventional planter. Plant at the total rate of 4 to 6 lbs./acre of pure live seed (PLS) for a mixture of two or three grasses. PLS takes into account that a quantity of seed will contain seed hulls, inert materials, and seed that will not germinate. A 10 lb. bag of seed may contain only 7 lbs. of PLS. Add wildflowers at the rate of 0.5 lbs. to 1 lb. per acre.

## Stand Management

The quality of a warm season grass stand usually peaks at five to seven years after establishment. Subsequently, they become dominated with matted grasses and dead vegetation, which reduce their vigor and offer less variety. In time, woody plants (trees and shrubs) become established. The grassland then becomes a brushland and becomes habitat for other wildlife species such as deer, rabbits, and songbirds who prefer brushy habitats.

Watch your native grass stands for signs of deterioration, such as poor reproduction. To keep the stand productive for years, management tools such as burning, mowing, and grazing may be needed. The careful use of selective herbicides is another consideration. These tools stimulate regrowth and reduce the competition from woody plants, increase stand vigor, and promote quality grassland habitat.

A **prescribed burn** is a planned fire, burning with a specific purpose. It is best done on a day with light wind, relatively low humidity, in early spring when vegetation is dry. Discuss your plans with local authorities, obtain the necessary burning permit, and observe all restrictions and safety

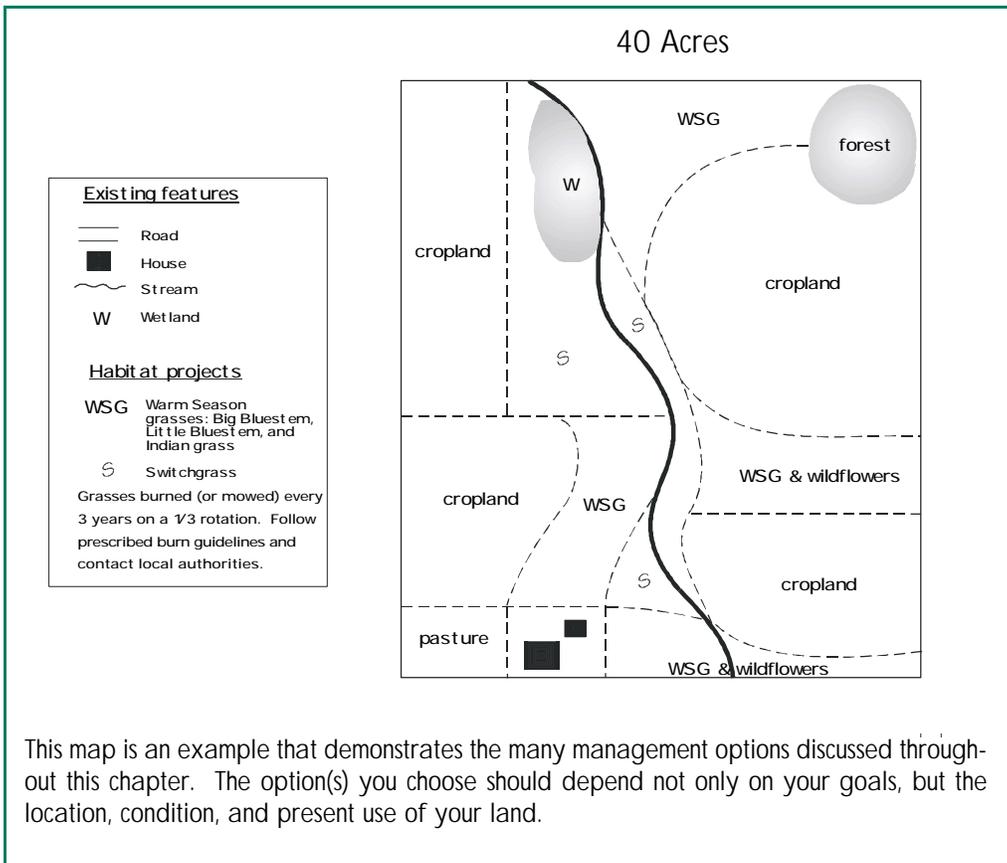
procedures. Trained individuals using appropriate equipment should conduct burns. For more information see the **Prescribed Burning chapter**.

**Mowing or grazing** in a three to five year rotation will slow encroachment of woody plants. Depending on your goals, and the size of your grassland, you may wish to divide the field into three to five segments of equal size and treat one segment each year. Mow in strips 30 to 60 feet wide and leave unmowed areas of 60 to 100 feet wide between them, or mow blocks of grass on a three to five year rotation. Mowing, haying, or grazing the grass stands should occur between July 15 and August 31. This will give nesting birds an opportunity to hatch their eggs. Do not mow or graze warm season grasses below eight inches in height, damage to the plant could occur if cut below this level. When haying or grazing, fertilizers should be added every three to five years to return nutrients back to the soil.

**Chemical treatment** will also control woody plants, but correct application is critical. If you ignore label instructions, you may destroy non-target vegetation, which could have a negative impact on wildlife.

In summary, warm season grasslands were originally found throughout much of Michigan. They are an extremely important component of many wildlife species habitat needs. Efforts must continue to protect and enhance the grasslands that remain in Michigan and landowners can play a major role towards that objective.

# WARM SEASON GRASSES



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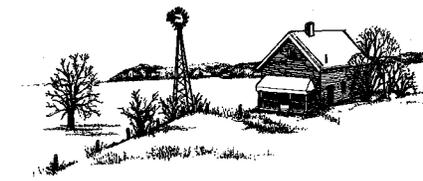
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## OLD FIELDS

Old fields are those which contain annual plants, perennial broadleaf plants, or a mixture of the two, as well as perennial grasses. Old fields, which include crop stubblefields allowed to lie fallow, are fairly abundant in Michigan, especially where agriculture has been practiced. These land types occur when land goes out of cultivation for a period of time. Some people quit farming, others let fields lie fallow for a year or two, and still others enroll idle acres in federal conservation programs. Old fields may appear to be wastelands but they actually are capable of supporting many kinds of birds and small mammals. For example, foxes, coyotes, hawks, and owls hunt in old fields, pheasants and songbirds live in them, and deer bed there.

Federal conservation programs pay landowners not to produce crops on those acres but to establish permanent vegetative cover to protect the soil from erosion; reduce water, air, and land pollution; and provide wildlife habitat. If your land qualifies, you can apply for cost-sharing programs that may help pay for seedbed preparation,



fencing, liming materials, fertilizer, seed, and seeding operation, and pesticides. For more information, contact your county Conservation District.

Land managers should decide whether to keep fields idle or convert them to grassland. This chapter explains the benefits to wildlife that occur when fields are left idle and natural succession is managed.

### The Role of Succession — A Land Aging Process

Old fields left idle are one of the early stages in the five steps of the natural cycle of succession that, over time, turns bare ground into a forest. Bare soil is the starting point. The first plants to establish themselves in bare soil are annual plants which live one growing season and then die, such as ragweed, pigweed, smartweed, lambsquar-

ter, foxtail, pokeweed, barnyard grass (wild millet), and mare's tail. These plants provide seasonal nesting and brood-rearing habitat for pheasants, quail, bluebirds, and other songbirds, and insects for food.

The next successional stage is biennials and perennials. Perennials are those non-woody plants that grow back year after year. These include goldenrod, asters, milkweed, daisy fleabane, other forbs, and many kinds of grasses and clovers bush, ladino, common white, alsike, and others. Biennials are those plants that grow one year and produce seed the next year. They include sweet clover, mullein, curly dock, wild mustard (yellow rocket), shepherd's purse, black mustard, foxglove, and the thistles. Small mammals such as mice, rabbits, and skunks now begin to use the habitat, along with foxes, hawks, and owls, an abundance of butterflies, meadowlarks, bobolinks, Savannah sparrows, and other songbirds.





opossum

After a few years, sumac, dogwood, blackberry, autumn olive, buckthorn, and other shrubby plants begin to invade the habitat. It now becomes more attractive to raccoons, opossums, deer, and songbirds such as cardinals, gray catbirds, and juncos.

As succession continues, red maple, cottonwood, birch, aspen, and chokecherry are tree species most likely to invade. During the early stage of this forest development, young seedlings provide browse for rabbits and deer. The increasing amount of vertical structure attracts thrushes, woodpeckers, blue jays, and orioles. As the forest grows over time, more shade-tolerant trees like sugar maple and beech invade. Squirrels, wild turkeys, deer, and wood ducks are examples of wildlife that eat the nuts produced by these trees, which also furnish den cavities for screech owls, squirrels, raccoons, woodpeckers, nuthatches, and chickadees.

## Managing Succession

You can manage your land for any stage of succession, or you can create as much diversity as possible by managing for several stages at once. How you manage your old field depends on three items:

- (1) the goals of your overall plan
- 2) the size, shape, and other conditions of your property
- (3) what "tools" you choose.

There are at least three "tools" to maintain idle fields.

**Prescribed burning** is the well-planned and controlled use of fire to speed up or set back natural succession. In forests, a very hot fire will set back succession, but a cool fire in a young forest can actually advance succession. To fully understand the results of burning habitat on your land, consult with a wildlife biologist or other professional. Also, be sure to check with the local fire department to see what regulations apply. Remember that prescribed burning can be dangerous and should be done with the help of a trained professional.

For more information see the **Prescribed Burning** chapter within this section.

**Chemicals** such as herbicides and fertilizers are often used to maintain openings in forests, to control the invasion of woody plants in the early stages of succession, or to promote the growth of desirable plant species by eliminating their competition. The use of herbicides, if applied properly, changes habitat but generally does not have a toxic effect on wildlife. The use of fertilizers tends to increase plant growth and nutrition.



ragweed



pigweed



barnyard grass



lambsquarter



quack grass

Chemicals such as 2-4-D will eliminate broadleaves for a season and reduce diversity in the stand. Herbicides such as glyphosate (Round-Up) will kill all plants. If you disk the field without using an herbicide, quack grass will quickly spread eliminating valuable annuals. Using a herbicide will reduce quack grass and allow the favored annuals to come back. Seeds of annual plants are larger than those of perennials and are more preferred by wildlife. Important ones are giant and common ragweed, smartweed, barnyard grass, lambsquarter, pigweed, and foxtail. Wildlife use this food year around, but it becomes most important in winter and early spring. Indiscriminate use of herbicides or fertilizers, however, can have more negative than positive effects. Seek the advice of a conservation professional before applying chemicals.

**Mechanical alterations,** which include mowing, manual cutting, discing, and plowing, are other methods for maintaining early successional stages and for removing unwanted vegetation. Soil type, depth, potential erosion, and the size and density of the target vegetation are all factors to consider. Also, the mowing of some woody species causes them to grow faster and spread more rapidly.

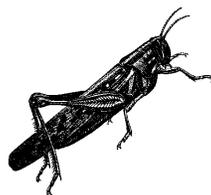
Fields left alone for eight to 10 years will produce primarily goldenrod and asters, which have

limited value to wildlife. Discing a portion of the idle field each year on a three- to five-year rotation will restore root vigor by reducing the effects of crowded root systems. Discing will also scatter the seed to better establish valuable annuals. For example, if your idle field is 25 acres, disc five acres (five one-acre blocks or strips) each year to get the complete range of early successional annuals, biennials, and perennials.

## Site Preparation and Stand Maintenance

Field preparation should create a bare-soil condition through plowing or repeated discing. Eliminate quack grass with Round-Up or a similar herbicide. After the last field tillage, the seeds of dormant annual plants will grow into the prepared site and provide first year food and cover. Augment, if you wish, with a cover crop of small grain. The best soil pH for weed growth and crop growth is 6.0 to 6.5. If soil pH is above 5.5, the dormant seeds of various clovers (which you can rotate with periodic discing) will naturally sprout and provide two or three years of food and cover. If pH is below 5.5, add lime.

Second-year growth will show more annuals, plus biennials and seedling perennials. Each successive year will show a greater percentage of perennial forbs and grasses. A once-over deep discing during the spring of the fourth year



grasshoppers are abundant in old fields.

will again create a mixed annual-perennial crop. A heavy discing two or three times over will set back the site even further. Continue to disc on a rotational basis or recycle the field by plowing if grasses and perennial forbs cover more than 70 percent of the ground surface.

## Planting Options

Because plantings assist the advancement of succession, they are usually done in combination with one or more of the other tools. The timing of discing or other treatments determines which annual weed varieties will dominate in an idled field. Fields treated from April 15 to June 1 will usually explode with lambsquarter, pigweed, and ragweed. The earlier the treatment, the more ragweed will appear in the stand. Stands prepared later in the summer will favor annual grasses and the establishment of biennials.



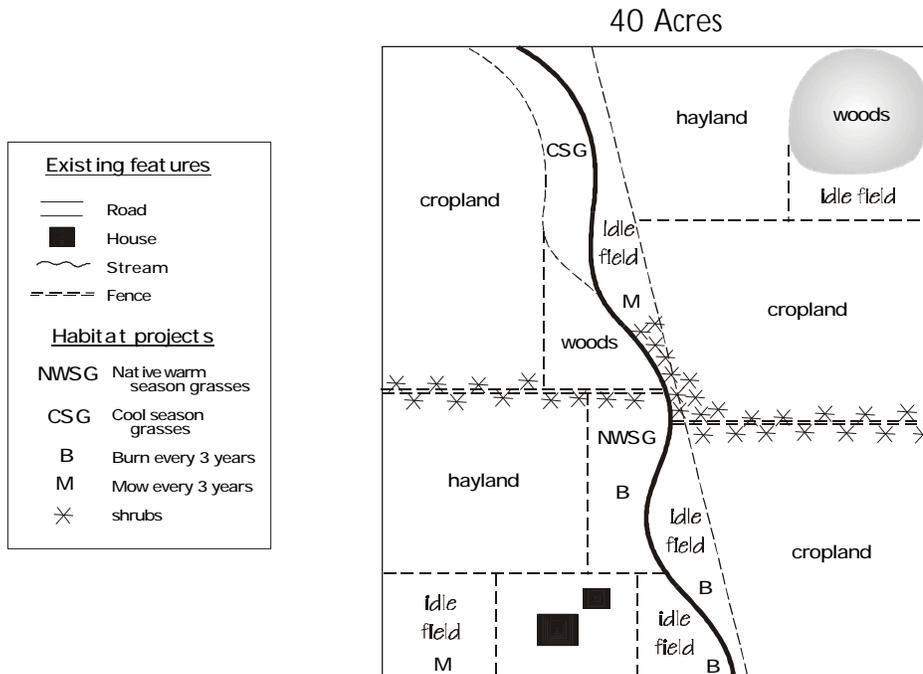
redtop

You can help provide additional wildlife food by planting a crop in the old field and not harvesting it. A field prepared in September and lightly seeded to winter wheat (one bushel per acre) will provide wheat seed, abundant insect life and a late crop of ragweed seed. The mixture of unharvested wheat and ragweed will furnish a food source and summer/fall roosting cover for pheasants, quail, and rabbits. Some of the wheat will provide a second-year crop through volunteer seeding. Likewise, a field planted in early spring (before May 1) to oats (one bushel per acre) will create a

# OLD FIELDS

sources of planting stock, and ground preparation are best answered by your Conservation District wildlife biologist, local extension agent, or NRCS staff. For more information, see the chapters on **Cool Season** and **Warm Season Grasses** in this section.

In summary, old fields provide not only a variety of benefits to wildlife but also help protect soil from erosion and reduce water, air, and land pollution. There are many management options that can assist you in maintaining your old field. Choose one that will help meet your wildlife goals.



This map is an example that demonstrates the many management options discussed throughout this chapter. The option(s) you choose should depend not only on your goals, but the location, condition, and present use of your land.

similar food/cover situation for one year. Not being winter hardy, the oats will offer a food source for only one year.

If you plan to manage idle fields for grassland habitat, consider planting cool season and warm season grasses. Cool season grasses are those species which grow most rapidly during spring and early summer and again at the end of summer and early fall when cool



Indiangrass

nights follow warm days. These include grasses such as orchard grass, timothy grass, June grass, and redtop, which are usually mixed with many kinds of clovers (white and red). Warm-season grasses grow most rapidly during the peak of summer when warm nights follow hot days. Growth slows in fall when soil temperatures drop. Native grasses to Michigan include Indiangrass, switchgrass, big bluestem, and little bluestem. Whenever possible, plant native species and follow natural patterns as dictated by the terrain and soil conditions of your property. Questions about suitable plants,

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# PRAIRIE RESTORATIONS



Restoring a prairie may occur in two ways: (1) rehabilitating a degraded site, or (2) reestablishing a site by planting a new prairie. Before any management techniques can begin, it is important to determine if the site was historically a prairie and to identify any prairie plants still growing. This chapter will guide you through the step-by-step process needed to restore your prairie.

## Landscape Perspective

Before settlement, Michigan grasslands were mainly barrrens, savannas, and wet prairies with a few dry prairies. Dry prairies, in particular, disappeared quickly because they often grew on rich soil and were easy to clear for farming. Researchers have identified at least 39 prairie areas that existed prior to European settlement. They ranged in size from 80 acres to 25 square miles. Estimates of the amount of prairies when Michigan was first settled is about 2.35 million acres, and they were mostly confined to portions of the Lower Peninsula, which were lightly timbered and contained large park-like openings called savannas, barrrens, or prairies.

Prairies were grasslands, which had few if any trees. Barrrens, on the other hand, may have had several trees scattered across each acre of their landscape. Savannas, which served as transition areas between grasslands and forests, had many trees per acre but not more than 50 percent canopy cover. Grassland specialists classify most savannas as either oak savannas or jack pine savannas. The most scenic of these were the oak savannas of southwest Lower Michigan, which extended as far north as Newaygo county. A large area of dry prairie existed along the Detroit River, and the state's largest wet prairie occurred for 16 miles along Saginaw Bay from Quanicassee to nearly Bay Port and was three miles wide at its widest point. Wet and dry prairies occurred in Wayne and Oakland counties. Presently, Detroit Metro-politan Airport is sitting upon a historical wet prairie where remnant prairie plant species still persist.

## The Importance of Prairies

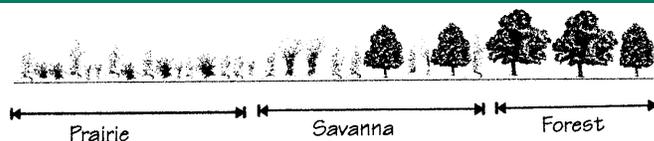
Prairies are an important part of any ecosystem where they occur. They provide key habitat for many



species of wildlife, serving as important breeding, feeding, nesting, and brood-rearing centers. Bobwhite quail, wild turkeys, bluebirds, meadowlarks, bobolinks, and other songbirds eat the abundant insects and seeds that prairies provide. Mice, voles, shrews, and woodchucks, along with many kinds of ground-nesting birds, raise their young there.

Prairie plants encourage infiltration of water into the soil because their root systems are deep. Better percolation increases recharge of ground water. Besides making better use of water, they are very efficient at removing nutrients such as nitrogen, phosphorus, and potassium from the soil. These long-lived plants can tolerate seasonal flooding, drought, and other severe environmental events.

Prairies often become established in areas where flooding, fire, or other disturbance limits competition from trees and shrubs. Wet prairies, for example, may be under water part of the year; dry prairies



Prairie-forest continuum: Boundaries are not clearly established, blending occurs between habitat types.

may grow in sandy soils too dry for trees and shrubs. Fires, whether occurring naturally or lit deliberately by Native Americans, played a dominant role in the ecosystem because they encouraged native grasses and forbs (wildflowers) to grow and discouraged the encroachment of trees and shrubs.

## Prairie Identification

One of the first steps to determine whether or not you have a remnant prairie is to check historical maps showing the presettlement vegetation for your county. Your local Conservation District office has these maps, which show the forests, prairies, and wetland types discovered by Michigan's original surveyors. However, the maps are representative only to a scale of 20 acres, and so smaller areas may have been overlooked. For this reason it is also important to look for remnant prairie plants on your site in areas that may have contained grasslands historically.

The best way to identify prairie grasses and wildflowers is to carry a field guide containing color photos or drawings. Major grasses to look for include big bluestem, little bluestem, Indiangrass, and switchgrass. Key wildflowers are rough blazing star, gray-headed coneflower, common evening primrose, butterflyweed, black-eyed Susan, moth mullein, swamp milkweed, cardinal flower, Joe-pye-weed, hoary puccoon, aster, coreopsis, tick clover, bee balm, prickly pear cactus, horse-mint, and round-headed bush clover. You may find these plants



black-eyed  
Susan

as scattered clumps across a grassland or opening, or you may discover them as bunches in several smaller areas. Living treasures, these remnant prairies are a snapshot to past native systems, and every attempt should be made to restore them.

For species descriptions, refer to the chapter on **Warm Season Grasses** in this section and to the **Wildflowers** chapter in the Backyard Management section.

Prairies may be stable grassland systems where the invasion of trees and shrubs does not occur. However, more commonly, there is encroachment of oak, pin cherry, spirea, sumac, aspen, autumn olive, june berry, sassafras, and white and jack pine.

## Evaluating the Restoration Process

The **Wetland** section covers restoration and management of wet meadows, fens, and wet prairies. This chapter focuses on the restoration of dry prairies, barrens, and savannas. The three key methods of restoring them include the following:

- (1) tree and shrub reduction or removal
- (2) prescribed burning, which may be followed with interseeding of prairie plants
- (3) the new planting of the site

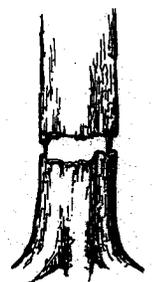
For best results, choose the method that produces the greatest benefit with the least amount of disturbance to the ecosystem. Remember that in most prairie restorations, you are dealing with a sick patient. The way to health is to nurture the patient over time.

The way to do that is to first identify your goal. If you want to restore an oak savanna or barren, for example, then allowing limited tree growth on the site is acceptable. But if the goal is to restore a tallgrass prairie, then trees must be eliminated and kept out. If remnant prairie plants simply do not exist, you may have to start over completely.

## Tree and Shrub Removal

Sumac, aspen, black locust, autumn olive, hawthorn, honeysuckle, buckthorn, and raspberry are aggressive species that often take over Michigan's native prairies. If any of these aggressive species exist on your restoration site, remove them by cutting them between July through September and immediately applying a glyphosate herbicide such as Roundup to the stump. Be sure to follow all label directions.

On sites with high densities of oak, hickory, or black walnut, you will need to remove or greatly reduce their numbers. Left unchecked, such species increase to the point where they shade the ground and will not let grasses and wildflowers grow. Use a chainsaw on larger trees or a limblopper on those that are sapling size. Another method to kill them is to cut a two-inch deep band around the trunk at two feet above the ground and another two inches higher. To complete this "girdling" treatment, use an ax or hatchet to remove the bark between the two cuts.



"girdling"

# PRAIRIE RESTORATIONS

## Prescribed Burning and Interseeding

On sites where many prairie plants currently exist and there is limited competition from trees and shrubs, a prescribed burn is in order. Fire increases prairie plant growth, flowering, and reproduction and lengthens their growing season, while reducing the growing season for weeds. Further, fire helps control invasion by killing woody plants and returning important nutrients to the soil.

A prescribed burn is a planned fire that is burning for a specific purpose. First, create a burn plan, which includes discussion with local authorities, obtaining any required permits, and observing all restrictions and safety procedures. These include carrying out the burn on a day with light wind and relatively low humidity in early spring or late fall when vegetation is dry. For more information, see the chapter on **Prescribed Burning** within this section.

For remnant prairies that have low plant densities or lack a variety of prairie plants, consider interseeding after the prescribed burn.

Interseeding is the process of sowing seed into the existing soil. Hand broadcasting, machine broadcasting, or drilling with a no-till planter are interseeding methods. When broadcasting by hand or machine, prepare a mixture of 50 percent seed and 50 percent perlite, vermiculite, or cracked oats. The material will help carry the light, small seeds and enable you to spread them at recommended rates. Divide the site into sections to ensure that you will have enough seed to cover it uniformly.

Try to match the seed mix to the soil type, using plants that like moist conditions or sites in low-lying areas and plants that prefer dry soils on upland sites. For best results, secure local seeds, collecting from on site or as close to the site as possible. You should always check with landowners for permission. After broadcasting the seed, incorporate it into the soil by shallow (less than 1/2 inch) hand-raking, dragging, disking, or by the pressure of a cultipacker. For sites larger than three acres, a no-till drill is the best way to get the seeds into the ground.

## Planting

In highly degraded areas, such as former agriculture fields, where very limited or no prairie plants exist, burning will not be enough to ensure a quality restoration.

Planting a new prairie may be the best management practice. Consider two methods:

- (1) The use of conventional farm tillage to prepare the site by killing or removing all former vegetation before planting.
- (2) the use of chemicals to eliminate all present vegetation, and a no-till drill to incorporate the seed into the soil.

With either method, plant during the period May 1 to June 15. Native grasses and wildflowers need only be planted 1/4 inch to 1/2 inch below the soil. However, it is not uncommon to see seed sitting on top of the surface after planting. For more information, see the chapter on **Grass Planting** in this section.

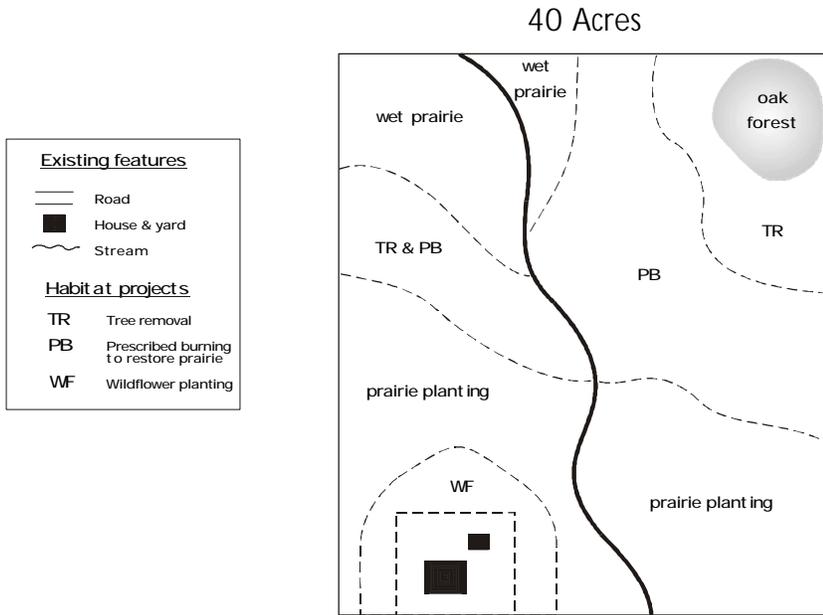
## Post-Planting Maintenance

The amount of weed seed present in the planting site is usually the most variable and unpredictable factor in prairie restoration. There is no way to predict with certainty the amount of weed competition that will be present during the first few years of restoration. Landowners can do four things to reduce the weed problem:

- (1) plant as late as possible in spring,
- (2) mow or hand weed to reduce shading
- (3) burn at prescribed times
- (4) spot apply herbicides
- (5) have lots of patience

Give the site at least three full years because the clump-growing native grasses require that long to establish themselves. After the first growing season, it is not uncommon to have only one plant per square yard. The grass may only be six to eight inches tall during its first year of growth and dif-

# PRAIRIE RESTORATIONS

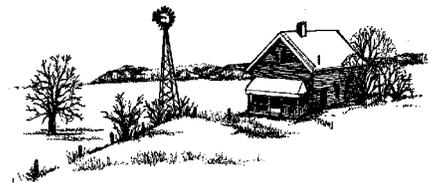


This map is an example that demonstrates the many management options discussed throughout this chapter. The option(s) you choose should depend not only on your goals, but the location, condition, and present use of your land.

difficult to recognize until it grows a seed head in late summer of year two. After the second growing season, each plant may be one to two feet tall and occupy a square foot or so. By the end of the third growing season, you should have an established stand of native grass three feet or taller, depending on the species planted.

In summary, restoring a prairie is exacting, time-consuming labor that requires patience. Once established, however, prairies will need only periodic maintenance. Not only are they a key type of habitat for many birds and small mammals, but they offer pleasing diversity to the landscape. Native prairies with their ever-changing kaleidoscope of wildflower color are

a delight to observe. In winter, the copper color of standing bluestem provides beauty to a stark landscape while affording protective cover for many kinds of wildlife.



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# GRASS PLANTING



Grasses and/or grass legume mixtures can provide outstanding habitat for nesting, brood rearing, and winter survival of pheasants, quail, and many songbirds. Besides producing food for insects, which, in turn, become food for birds and other animals, the grasses produce seeds, another source of high-energy food. Rabbits, deer, and wild turkeys eat the green browse. Planted in the right location around your property, these habitats also provide an attractive landscape.

**Cool season grasses** grow most rapidly during spring and early summer when cool nights follow warm days. They include native Canada wildrye, redtop, June grass, and introduced species such



as timothy, orchard grass, and brome grass. Cool season plants also include legumes such as birds-foot trefoil, alfalfa, and several kinds of clover. Many landowners mix legumes with cool season grasses because the legumes contribute to soil fertility and create food and cover for wildlife.

**Warm season grasses** grow most rapidly during summer when warm nights follow hot days. They include the native or prairie species such as big blue-stem, little bluestem, Indiangrass, and switchgrass. Some landowners mix a half-pound of perennial native wildflower

seeds (forbs) per acre to warm season grass plantings to create even more food and cover diversity and to add beauty. Many wildlife managers in Michigan prefer warm season grasses because they stand up better in snow than do cool season types, last longer, and are native to the state. Plantings of warm and cool season grasses next to each other will provide excellent variety and are the most valuable to wildlife.



fore planting include potential weed problems, drainage, erosion potential, and soil type, depth, texture, and fertility. Some grasses and legumes do better on dry sites, and others grow well on wet areas. Certain grass species have very narrow preferences, and others seem to do fine on most sites. Timothy grass, for example, grows well on sandy-loam soils that are fairly well drained. Switchgrass, on the other hand, performs on a variety of soil types. Certain clovers do better in wet areas whereas alfalfa responds best in well-drained soils of sandy loam.

## Site Conditions

Site conditions to consider be-

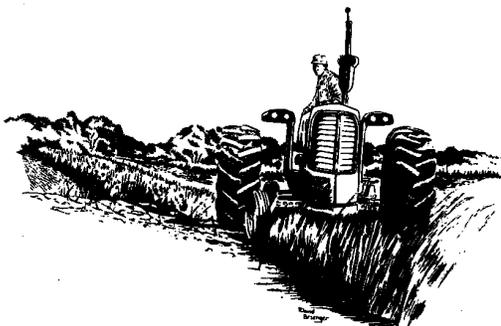
The panel below lists preferred soil type, moisture content, and tol-

<u>SPECIES</u>	<u>SOIL</u>	<u>MOISTURE</u>	<u>SUN-SHADE</u>
<b>Grasses</b>			
Big Bluestem	S-L	D-M	S
Little Bluestem	S-L	D-M	S
Indian Grass	S-L	D-M	S
Switchgrass	S-L-C	D-W	S
Canada Wildrye	S-L	D-M	S,Sh
Timothy	S-C	D-M-W	S
June Grass	L-M	D-M-W	S, Sh
Redtop	L-M	M-W	S
Orchard	C	D-M	S
<b>Legumes</b>			
Ladino	S-L-C	D-M	S
Alsike	L-M	D-M-W	S
Medium Red	S-L-C	D-M-W	S
White Dutch	L-C-M	D-M-W	S,Sh Sh
Sweet Clover	S-L-C	D	S
Alfalfa	S-L	D	S
	S- Sand	D- Dry	S- Sunny
	L- Loam	M- Moist	S, Sh- Some
	C- Clay	W- Wet	Shade
	M- Muck		Sh- Shade

erance for sun or shade for many types of grasses and legumes. Your Natural Resource Conservation Service office will have a county soil survey map, which should include your property. The map may help you decide what type of grass to plant and where. Also, refer to the chapters on **Warm and Cool season Grasses** and **Prairie Restoration** in this section.

Proper soil pH and fertility are necessary for the intended crop. A soil test will determine needs and recommend rates of nutrient application. Your county Michigan State University Extension office has soil test kits available for a small fee and can analyze samples for you. Before planting cool season grasses and legumes, the soil pH should be between 5.5 and 7.0. If lime is needed to raise the pH level, apply it at least three to six months before planting or the fall before your planting season. The level of pH for warm season grasses is not that critical; lime is not required, for example, on sites with a pH above 5.5.

Follow the soil-test recommendations for adding nitrogen, phosphorus, and potash. The recommendations will vary, depending on what you intend to plant. For example, for cool season grass mixes containing legumes, 200 to 300 lbs. per acre of a starter fertilizer (such as 6-24-24 or 8-32-16) low in nitrogen and high in phosphorus is often rec-



ommended. Once the stand is established, the legumes will provide the necessary nitrogen.

## Site Preparation and Planting Rates

There are two ways to plant grasses. Conventional tillage uses plowing and disking (and sometimes herbicides) to prepare the seed bed to ensure proper seed to soil contact and depth. The key is to get a firm surface before planting, and the way to do that is to follow the plow and disk with a cultipacker or roller. A site has been properly prepared when a footprint barely shows. No-till planting uses special equipment called a no-till drill that cuts a narrow trench through the sod and soil, drops seed into the trench at the correct depth and distance apart, and presses the soil back in place. No-till planting reduces the amount of work to prepare the site and also reduces the potential for erosion. The method relies on herbicides to control weed competition.

If planting into an area with tall grasses or sod, success demands that you kill unwanted vegetation the fall before. If no-till is your chosen planting method, then mow the area before the first frost or in mid-September. Two weeks later, spray a relatively safe, broad-spectrum herbicide such as Roundup, which will kill all emergent vegetation. Be sure to read and follow label directions. You can plant grass and grass mixtures with a no-till planter early in the spring before greenup occurs. If you are late with planting, you may have to kill weeds and other regrowth with another application of herbicide.

If you choose to use conventional tillage, you must eliminate all unwanted vegetation by plowing

and disking, which you should do in the fall. The following spring, plow and disk once more if regrowth has occurred (or spray with herbicide). For smaller sites, a roto-tiller may do the job of cultivation.

A key reason that no-till is growing in popularity is that it does not disturb the soil, which may allow dormant weed seeds to germinate. No-till also reduces compaction because fewer trips across the field are needed. In addition, fuel and time are saved, and erosion potential minimized. Warm season and cool season grasses, as well as legumes, need only be planted 1/4 inch to 1/2 inch below the surface and require only 1/8 to 1/4 inch of soil as a cover. It is not uncommon to see seed sitting on top of the surface after planting.

Cool season grasses are usually planted as mixes of several plant types at a rate of 8 to 12 lbs. per acre. Legumes used in mixes should constitute 50 to 60 percent of the mix. Warm season grasses can also be mixed and are usually planted at rates of 4 to 6 lbs. per acre of Pure Live Seed. If using switchgrass in the mix, however, add only 0.5 lbs. to 1 lb. because switchgrass is aggressive and may take over the stand.

Warm season grass seeds tend to be fluffy and bulky. Pure Live Seed (PLS) takes into consideration that a pound of warm season grass includes seed hulls, inert materials, and seeds that will not germinate. To determine PLS producers multiply the percent of Pure Seed times the percent of Total Germination and list this information on a tag that comes with each bag of seed. Most warm season grasses will range from 50 to 95 percent PLS per bulk pound, and there will likely be a difference

# GRASS PLANTING

Cool Season Mix	Pounds Per Acre	Cool Season Mix Wet Sites	Pounds Per Acre
Orchard Grass	2	Bluegrass	3
Timothy	2	Red top	3
Medium Red Clover	2	Med. Red Clover	2
Sweet Clover	2	White Dutch Clover	2
Cool Season Browse	Pounds Per Acre	Warm Season Mix Wet Sites	Pounds Per Acre
Orchard	2	Big Bluestem	4
Ladino Clover	3	Switchgrass	4
Alsike	2	Warm Season Mix Winter/Nesting Cover	Pounds Per Acre
Medium Red Clover	2	Little Bluestem	2
Warm Season Grass Winter Cover	Pounds Per Acre	Big Bluestem	2
Switchgrass	6	Indiangrass	2
		Wildflowers	0.5

The above panel lists a variety of mixes that can be planted to benefit wildlife.

between each bag of seed or each grass type.

Grass and grass mixtures can be planted with a no-till drill, one of several mechanical spreaders, or broadcast by hand. Warm season grasses are more difficult to plant because of the fluffy nature of the seed. When run through typical broadcasters and no-till planters, the seed tends to bridge over the top of the mixing unit and will not flow properly. When broadcast planting, planting rates should be increased 25 percent above normal rates. Special no-till planters are now available that overcome this problem. Another option is to buy debarbed seed, which has the fluff removed, although it will cost more and may be hard to find. Switchgrass seed is the only warm season grass type that is smooth and therefore will run through conventional planting equipment.

Plant during the period April 15 to June 15. If soil moisture and temperatures allow it, early seeding is preferred. You can also plant cool

season grasses during August; however, spring plantings are more successful. In areas with little fall vegetation, such as a recently harvested bean field, frost seeding in late winter/early spring is an alternative. Broadcast seed over the site and the alternating thawing and freezing action will work the seed into the ground where it will germinate. Frost seeding is an especially good method to use on wet sites that equipment cannot reach during peak planting time.

Be sure to inoculate all legume seed before planting. The inoculant is a graphite-like bacteria that, when mixed with water and then applied to the seed, allows the plant to use nitrogen from the air. If frost seeding, double the rate of inoculant.

## Post Planting Maintenance

Cool season grasses and legumes are usually evident in the first month after planting, and attractive, solid stands are often the

norm by the end of the following spring. Because warm season grasses grow more slowly and in clumps, they require three to five years to establish themselves. After the first growing season, it is not uncommon to have only one plant per square yard. The grass may only be six to eight inches tall and difficult to recognize until it grows a seed head in late summer of its second year. After the second growing season, each plant may be one to two feet tall and occupy a square foot or so. By the end of the third growing season, you should have an established stand of native grass three feet tall or taller, depending on the species planted. Patience is the key to growing warm season grasses. Give them a full three years before deciding if your planting is a success.

To ensure success of any grass planting, you must control unwanted vegetation. If using a herbicide, choose a selective type like 2-4-D, which will kill broadleaf plants (including clover, other legumes, and forbs), and be sure to read and follow all label directions. Your county Michigan State University Extension office can also help identify the problem and will suggest an appropriate herbicide. Mowing before annual broadleaf weeds go to seed may be a better option. After planting warm season grasses in the spring, mow for the first time between July 15 and August 31. If weeds continue to be a problem the next year, mow again before April 1. The best time to mow cool season grasses is July 15 to August 31. This avoids the nesting season of most birds. Always mow warm season grasses at a height of eight inches or more to avoid injuring plants. Cool season grasses and legumes should be mowed at four to six inches to stimulate late-season growth.

# GRASS PLANTING

You can allow livestock to graze warm season grasses in late July and August. If you do not require winter cover for wildlife but want spring nesting cover, you can allow livestock to graze cool season grasses until October. Do not allow livestock to graze any type of grass below eight inches.

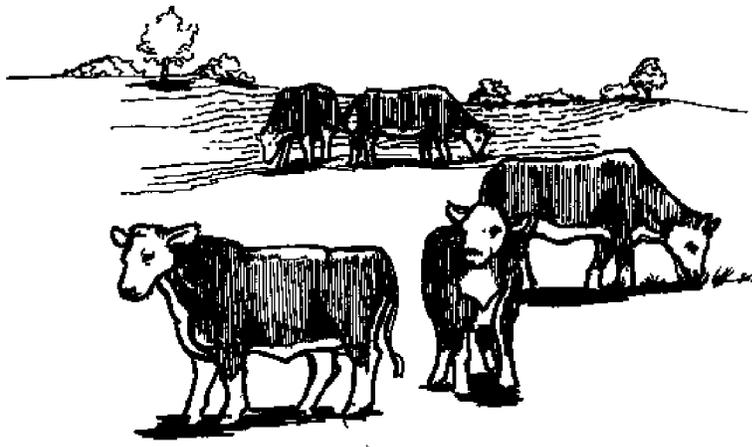
Grasses and legumes that are hayed or grazed (including heavy browsing by deer) should be "top dressed" with fertilizer or manure after each seasons' hay harvest or on a three-year rotation. Top dress with 100 to 200 lbs. of 6-24-24 fertilizer in a mixed grass legume stand or 19-19-19 fertilizer in pure grass or grass dominated stands.

Proper mowing or grazing and top dressing will help keep the stand in vigorous, high-quality grasses and legumes for many years. Disking is another method to stimulate regrowth and reduce competition from dogwood, sumac, aspen, and other invasive woody plants. If you

plan a annual treatment, consider mowing or lightly disking about one-third of the grassland each year. Try to mow strips from 30 to 60 feet wide and leave undisturbed areas of 60 to 100 feet wide between them.

Burning is also a key management tool every three years or so for warm season grasses and wildflowers. If possible, burn one-third of the grassland each year. Carry it out in early spring when vegetation is dry and do it on a day with light wind. Discuss your plans with local authorities, obtain the necessary burning permit, and observe all restrictions and safety procedures. For more information see the **Prescribed Burning** chapter.

In summary, depending on your goals and current field conditions, there are a variety of grasses or combinations of grasses you can plant to meet your needs. There are, as well, several planting methods available to get a successful grass stand established.



**FOR ADDITIONAL CHAPTERS CONTACT:**

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**Private Land Partnerships:** This partnership was formed between both private and public organizations in order to address private lands wildlife issues. Individuals share resources, information, and expertise. This landowner's guide has been a combined effort between these groups working towards one goal: Natural Resources Education. We hope this manual provides you with the knowledge and the motivation to make positive changes for our environment.

FOR ADDITIONAL ASSISTANCE: CONTACT YOUR LOCAL CONSERVATION DISTRICT

# PRESCRIBED BURNING



**P**rescribed burning is a very important management tool for maintaining and enhancing grasslands. Fire was an important natural part in the development and maintenance of grasslands, forests, and wetlands, throughout history. To many of us, fire is a feared enemy that destroys everything in its path. Because of this, the use of controlled fires, such as prescribed burning, is underutilized as a management tool for improving and maintaining habitats.

For thousands of years, tall grass prairies and open brushlands were kept free of trees by the occasional wildfires that cleared the landscape every two to 50 years. These fires were caused by lightning, or set intentionally by Native Americans. They had discovered that fire killed woody plants, but encouraged fruit bearing shrubs, and forage producing grasslands.

Present day research and experience have shown that prescribed burning can be an effective management tool. Prescribed burns are used most frequently to maintain and restore native grasslands. Prescribed burning can recycle nutrients tied up in old plant growth, control many woody plants and herbaceous weeds, improve poor quality forage, increase plant growth, reduce the risk of large wildfires, and improve certain

wildlife habitat. To achieve the above benefits, fire must be used under very specific conditions, using very specific techniques.

Brushlands can be invigorated and maintained with fire to benefit species such as bluebirds and sharp-tailed grouse. Burning old fields controls saplings and woody vegetation, and improves grasslands for use by nesting wildlife and grazing livestock. Forest openings can be manipulated with burns to benefit more than 150 wildlife species. Upland nesting cover used by pheasants, waterfowl, and songbirds will remain productive if periodically burned. Cattails and sedges are returned to vigor by an occasional burn. Lastly, if you want more oaks in a hardwood stand, a fire will kill off less tolerant species such as maple, and basswood, allowing the oak to compete more successfully. Burning is also more cost-effective than other treatments like bulldozing, cutting, or chemicals.

## Objective

Every prescribed burn should have a clear objective. This objective is necessary to evaluate the success of the burn. To show the success, or lack thereof, of a prescribed burn, a photograph can be taken before, directly after, and one year following the burn. Objectives for a prescribed burn often include one or more of the following:

- Kill woody plants
- Remove grass and wildflower dead vegetative build-up (duff)
- Promote regrowth of warm season plants
- Promote regrowth of cool season plants
- Reduce or set back noxious weeds
- Increase populations of wild flowers
- Reduce cattail mono-cultures
- Reduce wildfire fuel build-up
- Promote growth of fire dependent trees such as Jack pine
- Increase populations of threatened and endangered species.

Burn objectives should be identified in the burn plan. The objectives help determine the weather conditions for the burn, the timing of the burn, and how hot the burn should be.

## Notification

For both safety and legal reasons, certain groups should be notified before a burn to prevent unnecessary concerns and danger.



Notifying neighbors, fire departments, and local law enforcement officials should be part of the prescribed burning process. Working with the local fire department is crucial because a burn permit may be necessary, and there may be a burning ordinance in your area. A copy of the burn plan should be given to the local fire department. The National Weather Service should have a telephone number listed in your area. They will be able to keep you up to date with changing weather conditions.

## Considerations

There are many things to consider when planning for a prescribed burn. **Burns need to be conducted by individuals who are experienced and trained in the use of fire.** However, as a landowner, it is important to understand prescribed burning and its use. For instance fire moves faster uphill than on a level surface, so slope of the burn area must be taken into account.

When using fire it is important to plan for firebreaks. A firebreak is an area that will contain a fire within its boundaries. A plowed or disked strip, reaching down to mineral soil, is the most common method of establishing a firebreak. Sometimes, a mowed path, or a walking trail, can be used as a fire break. Firebreaks can also be planted to grasses and clovers so they can provide key food and cover to wildlife. For example, if an area is burned every five to seven years, the firebreak is disked up the fall before the burn. Then, after the spring burn, the firebreak is planted to grasses and clovers. Firebreaks should be at least 20 feet wide.

## Equipment

Basically three kinds of equipment are needed for prescribed burning:

1. tools to ignite the fire
2. tools to control the fire
3. safety equipment

A drip torch, a can of liquid fuel with a long spout, burning lightly at the end, may be used to start and spread the fire. It will drop a three to one fuel oil-gas mixture on the grass at a steady rate. This allows for a continuous fire line, and quicker, more efficient fire application than a fire rake.

To control (mop up) your fire properly, fire swatters, 12 inch X 18 inch pieces of reinforced rubber attached to a handle, or fire brooms, are great to smother small grass fires. A backpack water pump can be teamed up with a swatter for maximum efficiency. The pump operator would lead knocking down larger flames (using a spray for cooler fires and a stream for hotter ones) while the swatter can follow up making sure the fire is put out. To aid in the extinction of the fire, one quart of dishwashing detergent can be added to 50 gallons of water (one tablespoon of detergent to one gallon). This mix helps the water to "cling" to the grass fuel. Low-pressure, field crop sprayers with handgun nozzles can work for small burn areas that have safe boundaries, as well as backpack and herbicide sprayers. An all-terrain vehicle can also be helpful for carrying extra tools or tanks of water to your site. If high-pressure pumps are used, then water should be rationed to prevent it from running

out partway through the burn. If a wetland, pond, stream, or other water source is near the burn site, then pumps and sprayers will be easy to refill.

Safety equipment is also very important. Make sure that a first aid kit and plenty of drinking water are always nearby. Poorly managed burns or ignorance of safety measures can lead to property damage, and even injury or death. Even in well-managed burns accidents can occur. **Before, during, and after every burn, safety should be the major consideration.** Proper clothing can also add a measure of safety. Fireproof Nomex pants and shirts are essential. Leather boots and gloves, along with eye protection, should be worn at all times. Never wear synthetic fibers like nylon, which can melt and stick to skin. A long sleeve shirt, a hard hat, and long pants, will keep you safe from radiant heat and flare-ups. The more skilled the burn crew is the more likely the fire will be controlled and thus beneficial. Generally, three or four people are needed on each fireline (more if safety may be challenged). One will ignite the fire and be in charge of operations (the fire boss), one or two should keep the fire on its correct path, and any others should help mop-up (extinguish flare ups or escaped flames).

## Timing

The timing of a burn determines the plants which will be benefited and controlled, the impact on wildlife species, and safety. Most burns are conducted mid to late spring, or in the fall. Burning to favor desired grasses should take place just as they are starting to green up, and the soil surface is damp. Generally, a late spring burn

# PRESCRIBED BURNING

will control woody vegetation and cool season grasses better than an early spring burn but are not as beneficial for wildflowers. This burn will also provide warm season grasses with nutrients they need to grow.

Before burning, nesting times of grassland species should always be checked to prevent the destruction of nests and their inhabitants. The best time for spring fires is late March into April; generally in the morning or evening, when the relative humidity and temperature are not changing as rapidly as during daylight hours. The drier the area the earlier the burn should be to avoid damaging the earliest blooming wildflowers. Though fall burns are possible and can be beneficial, they are often avoided, due to the cooler temperatures, drier ground, and destruction to winter wildlife habitat they may cause.

## Weather Conditions



Weather has an overriding effect on a prescribed burn. A burn plan will outline the weather conditions, which must be met before the burn is conducted. It is very important to have the latest and most updated weather conditions available before starting the burn. Relative humidity is an important factor to consider when planning a controlled burn. If the relative humidity is below 50%, the dryness of the grass is prone to causing very hot fires. If the relative humidity is above 70% the fire will have a hard time catching at all. Therefore a relative humidity between 50% and 70% works best.

Temperature is also important when laying out a burn plan because of its relation to relative humidity. Below 32 degrees Fahrenheit grass mats will rarely burn, and above 80 degrees Fahrenheit burning is hazardous. Between 40 degree Fahrenheit and 60 degrees Fahrenheit is ideal.

Wind direction and speed should both be taken into account as well. The wind speed should be between three and seven mph, and the wind direction should remain steady. If either varies greatly, the fire can shift with gusts of wind, and may burn too quickly with an increase in wind speed. Both of these variables can severely hinder safety precautions if not watched closely. In general, wind is calmer in the morning and the evening. Smoke management is crucial. Always warn your neighbors of your burn, and prevent smoke from hindering any roadways by planning your burn when the wind direction is going away from the road.

Of all the weather parameters the wind speed and direction are most critical. Unless professionals are included in the burn crew a burn at over seven mph is not recommended. Faster burns are less effective. They may not remove all the litter and unwanted species. In addition, safety comes first. Often the safest time to burn is in the evening between 7 pm and 10 pm. This is when humidity is on the rise, temperature decreases, and wind speed dies down, creating the setting for a slower (and safer) fire. However, burning after dark can be dangerous. Areas still smoldering can be missed.

## Burn Techniques

There are 4 basic burn techniques used in the prescribed burning of grasslands. These four techniques include:

1. back fire
2. parallel (flank) fire
3. perimeter (ring) fire
4. strip head fire

Each method has strengths and weaknesses depending on the weather conditions, size of the area, and expertise of the individuals conducting the fire. Special considerations when conducting the burn include power lines, telephone lines, and oil or gas lines.

A **backfire** is used downwind of the burn site. This is most often the coolest and safest fire. However, it is slower burning and therefore takes longer to finish. The fire is ignited on the downwind side of the fuel and slowly burns into the field against the wind, expanding the firebreak. This burn technique is often used in conjunction with other burn methods.

A **parallel or flank fire** burns hotter and faster than a strip fire or backfire. It works well on square or circular parcels. A fire is ignited on the sides of the burn site parallel to the wind direction at the same time or soon after a backfire is lit. The people igniting the fires on either side should keep continuously in touch by 2 way radio.

A **perimeter fire** is not only one of the quickest burn methods, but also creates a hotter fire than those listed above. Since this type of burn technique develops a hotter and faster moving fire, which can be harder to control, it must be handled carefully. This method

# PRESCRIBED BURNING

## PRESCRIBED BURN PLAN

(attach aerial photo)

Landowner: \_\_\_\_\_

Address: \_\_\_\_\_

Location of Burn: County \_\_\_\_\_ Township \_\_\_\_\_ Range \_\_\_\_\_  
Section \_\_\_\_\_ Field # \_\_\_\_\_

Burn Objective: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Burn target date(s): \_\_\_\_\_

Desired Burn Conditions: Wind Speed \_\_\_\_\_ Wind Direction \_\_\_\_\_  
Relative Humidity \_\_\_\_\_ Soil Moisture \_\_\_\_\_

### Parties to Notify

Local Fire Dept. \_\_\_\_\_ Sheriff's Dept. \_\_\_\_\_  
Resource Agency \_\_\_\_\_ Neighbors \_\_\_\_\_

**Fire Plan:** indicate on aerial photo the wind direction, fire lanes, location and type, back-up fire lanes, firing sequence and hazards such as roads, buildings, power lines, etc.

**Suppression in Event of Escape Plan:** Discontinue firing sequence. Leave sufficient personnel with the prescribed burn to prevent further escape. Remainder of crew suppress escaped fire. Notify local department if necessary.

**Equipment Needs** Rake \_\_\_\_\_ Swatters \_\_\_\_\_ Drip torches \_\_\_\_\_  
Backpack Sprayers \_\_\_\_\_ Water Wagons \_\_\_\_\_  
Other \_\_\_\_\_

### Burn Crew:

Fire Boss \_\_\_\_\_ L-Flank fire \_\_\_\_\_  
Backfire \_\_\_\_\_ Water Wagon \_\_\_\_\_  
R-flank fire \_\_\_\_\_ Mop-up \_\_\_\_\_

maintain native grassland communities. An objective is established and a burn plan is developed which meets the burn objective. Experienced and trained individuals conduct the burn under the guidance of a burn plan. Neighbors, local law enforcement agencies, and local fire departments should be notified. Safety is always the top priority for the burn.

starts with a backfire, followed by lighting the flanks, and finished by lighting the upwind side of the burn site called the head of the site. This headfire will move rapidly towards the flanks and backfire.

A **strip head fire** burns slightly faster than a backfire, is relatively safe, and works well for burning rectangular or odd shaped parcels. It is also cost-effective. A series of strips are lit, starting at

the downwind side of the site, burning only one at a time. Ideal when burning with a limited number of personnel. Remember when choosing a burn technique, your level of experience with burning, and that of your burn crew, should be a major factor in your choice.

## Summary

Prescribed burning is an important management tool to

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