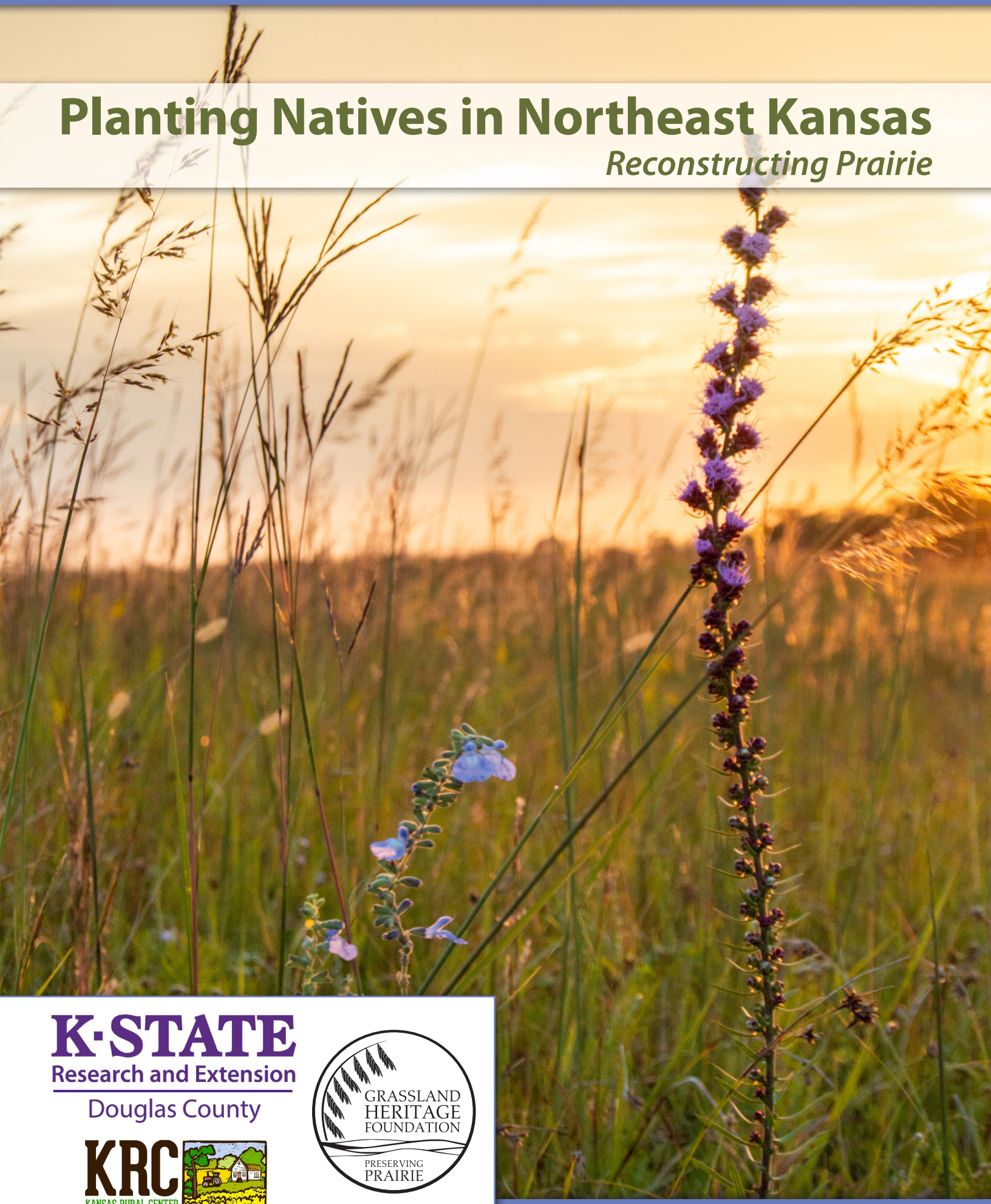
Planting Natives in Northeast Kansas

Reconstructing Prairie



K·STATE Research and Extension
Douglas County

KRC KANSAS RURAL CENTER

GRASSLAND HERITAGE FOUNDATION
PRESERVING PRAIRIE

PLANTING NATIVES IN NORTHEAST KANSAS

RECONSTRUCTING PRAIRIE

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Visit The Companion Website – Native Kansas

A companion website includes a link to this document as well as pictures, interviews with property owners, plant lists, and many other resources to help you with your native planting project. Go to: plantnativeks.org

Acknowledgements

This project/program has been funded by a grant from the Douglas County Heritage Conservation Council. However, the content is solely the responsibility of the authors and does not necessarily represent the official views of the Douglas County Heritage Conservation Council.

The authors also thank Brad Rueschoff who reviewed and commented on drafts of this publication.

Design and printing: Minuteman Press, Lawrence, Kansas

Photographs
Cover by Jennifer Moody

Recommended Citation
Ashworth, S., K. Bellemere, and J. Will. 2020. "Reconstructing Prairie" in *Planting Natives in Northeast Kansas*. 20 pp. Lawrence, KS.

Additional Copies
A copy of this guide may be downloaded free of charge at: plantnativeks.org

FOREWORD

Planting Natives in Northeast Kansas is a unique collaborative effort between K-State Research and Extension - Douglas County (KSRE), the Grassland Heritage Foundation (GHF), and the Kansas Rural Center (KRC) to pull together information on and resources for integrating native plants into your landscape, whether it be in your backyard or back 40 acres. Interest in native plants is growing. Evidence for this appeal includes an increased number of native plant sales and selection of natives at garden centers, a flourishing industry of native plant nurseries and seed suppliers, and a swelling demand for information from the public. In recent years, calls to our respective organizations for help and advice on planting native plants, creating pollinator habitats, or restoring prairie have multiplied. This publication is specifically designed for those in the northeast corner of Kansas who wish to plant natives but do not know where or how to start. While the plants, timelines, and resources mentioned in this guide are specific to northeast Kansas, the general principles and methods for planting natives apply not only to the entire state of Kansas but to the whole of the grassland biome in the United States.

For more than a century, KSRE has brought horticultural and agricultural science to landowners. Increasingly, backyard gardeners call or visit the County Extension office for information on native plants, particularly those that attract pollinators. Larger property owners seek advice on converting extensive lawns into pretty meadows or turning old pastures and cropland into prairie habitat. GHF works to preserve tallgrass prairie in eastern Kansas through education, stewardship, and land protection. Founded in the 1980s in an effort to preserve prairie in Johnson County KS, today the organization owns and manages multiple prairie properties and has educated thousands of Kansans about the prairie ecosystem. KRC has long been an advocate for sustainable farming and responsible land use. Founded in 1979, KRC works to promote a farm and food system that is ecologically sound, economically viable, and socially just.

This guide for planting native plants compliments many existing resources, including prairie restoration guides available from other mid-western states such as the *Tallgrass Prairie Center's Guide to Prairie Restoration (Iowa), Reconstructing a Tallgrass Prairie: A Seeding Guide for Missouri, and A Guide to Prairie and Wetland Restoration in Eastern Nebraska*. In Kansas, publications on planting natives are available from Kansas State University, the Kansas Department of Wildlife, Parks and Tourism's Habitat First program, and the Kansas Biological Survey. The Xerces Society's publication *Pollinator Meadows from Seed* is also an excellent resource.

The number and variety of resources available are such that landowners may feel overwhelmed by the process of converting their gardens, lawns, and fields to a landscape filled with natives. In this guide, landowners will find plant recommendations and resources specifically for northeast Kansas. The guide is designed to put necessary information all in one place – instructions, plant lists, plant and seed providers, available financial and planning assistance, reference gardens and prairies, and tips and advice from local landowners who have experience. There is also a companion website with pictures and up-to-date information.

No matter your goal, no matter the size of your property, there is a section of this guide designed for you, including:

- ✓ backyard gardeners
- ✓ property owners wanting to convert old pastures and cropland to prairie vegetation
- ✓ do it yourself landscapers
- ✓ professional landscapers
- ✓ landscape architects desiring to enhance the sustainability and diversity of corporate landscapes
- ✓ suburban property owners wishing to convert traditional lawns
- ✓ schools wishing to install native gardens for education and beauty
- ✓ farmers wanting to enhance crop production and water retention

Choose from one of five publications specific to your goals.

Gardening with Native Plants
For those wishing to tuck some native plants into existing gardens or plant a small front yard or backyard native garden.

Landscaping with Native Plants
For those wishing to replace cool-season lawns, create large native gardens, or establish native wildflower meadows up to an acre in size.

Reconstructing Prairie
For those wishing to reconstruct prairie on old fields, pastures, or cropland.

Establishing Native Cropland Borders and Buffers
For those wishing to plant native forbs and grasses to border croplands in the agricultural landscape.

Restoring Prairie Remnants
For those wishing to restore or enhance degraded, remnant prairies.

Appendices: plant lists, assistance for landowners, places to see prairies and native plantings, and additional resources.

Adding native plants to your landscape, regardless of size, will enhance its beauty, its ability to support native wildlife, and its resiliency.

Thank you.

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RECONSTRUCTING PRAIRIE

INTRODUCTION

Not sure how to manage that old brome field on your property? Have you decided to retire that soybean field or pasture? Did you inherit country property and are unsure of what to do with it? Why not reconstruct a bit of tallgrass prairie, the historic landscape of Northeast Kansas. A planted prairie can only be a facsimile of an ecosystem that evolved over thousands of years, but there is tremendous value in returning native plants to our cultivated landscapes.

Some of the many reasons to reconstruct tallgrass prairie include:

✓ Native plants form the basis of the prairie food web, meaning that many animals depend on them directly for food or they eat the animals that eat the plants. Without native plants in the web, we lose the insects and wildlife that depend on them.

✓ Prairies are home to pollinators and other wildlife. Approximately 35% of the food we eat is created with the help of a pollinator — primarily bees but also butterflies, birds, beetles, and even bats and other mammals. However, most of our insect pollinators need to feed on more than just the things that feed us, they need native plant ecosystems for food, shelter, and nesting sites.

✓ A native plant landscape is a climate resilient landscape, its resiliency derived from a diversity of plants. As our climate shifts and changes different sets of plants will thrive while others may decline, but the prairie persists.

✓ Because so much of the native prairie is gone, it can be difficult for animals to migrate or move through our region. Restoring and reconstructing prairie ecosystems provide wildlife with additional food and shelter as they follow their migratory routes and gives them a place to go when food sources run low in other areas.

The terms reconstruction and restoration are sometimes confused or interchanged but for the purposes of this publication we make a distinction. Prairie reconstruction involves recreating a prairie "from scratch" on land that was once prairie but has been tilled and replanted with crops, cool-season grasses, or other vegetation. Prairie restoration entails bringing a degraded or impaired prairie that has never been plowed closer to its pre-disturbance condition. A degraded prairie may be overrun with invasive native or non-native herbaceous and woody species, or it may have simply lost most of its plant and animal diversity. Prairies become degraded for several reasons. Maybe a previous landowner grazed the property too heavily with livestock, so diversity has declined and invasive plants have moved in. If a property was never mowed, grazed, or burned, shrubs may have proliferated. The purpose of this chapter is to help you understand prairie reconstruction not prairie restoration. Reconstruction and restoration have some of the same goals, but the steps taken are different. If you think you might have a remnant prairie on your property see *Restoring Prairie Remnants* in *Planting Natives in Northeast Kansas*.

Planting a prairie can be daunting. However, you can choose to be involved in the details and labor of planning, preparation, and planting, or you can avail yourself of help offered by several agencies, businesses, and non-profits. A list of resources to help you is provided in Appendix A. Depending upon the size of your property and your goals, some of these same resources may provide financial assistance.

There is no single formula for successfully planting a prairie. Variability in site conditions, precipitation, seed availability, planting time, and seed quantity among many other factors can affect outcomes. What we recommend in the following section is intended to guide you to the best possible outcome — a diverse, native planting with few invasive species.

Prairies are home to pollinators and other wildlife. Approximately 35% of the food we eat is created with the help of a pollinator – primarily bees but also butterflies, birds, beetles and even bats and other mammals. (Photo: Jennifer Moody)

HOW TO PLANT A PRAIRIE

The following information will help guide you through the process of planting a prairie, but there are many resources available to help you at all stages. Refer to Appendix A for a list of organizations and agencies, some offering cost-share assistance, that can help. For inspiration, visit native plantings and prairies in your area (see Appendix B).

SITE EVALUATION: SUN, SOIL, WATER, SITE PLAN

A good site evaluation allows for proper purchasing and placement of native plantings, saving you money and hours of wasted labor. Start with a good map of your property. You can download an aerial view of your property from the internet, but you will need a good sense of distance and area. Note key features of your existing landscape including your house, trees, fences, and any water courses or ponds. On top of these features, you want to note sun exposure, soil type, and the slope of the land.

Sun

Most of our native plants in Kansas are adapted to full sun. Full sun equates to at least six hours of sun a day, preferably eight. Native plants that can grow in a bit of shade adapted to the moister, forested areas along our rivers and streams. There are fewer plants, however, adapted for dry, shady areas. Don't despair if you've got portions of your property in shade, we provide some recommendations and borrow a few suggestions from our more wooded neighbor, Missouri. If you have a significant slope to your property, a south facing slope will be hotter and drier than a north facing slope. Afternoon sun will be more intense than morning sun.

Soil

If you are curious about the official soil type for your area, you can find it by using the Natural Resource Conservation Service (NRCS) Web Soil Survey. The soil survey will tell you the name of the soil type in your area and the structure of the soil. Soil structure is the relative quantity of sand, silt, and clay particles that make up soil. The amount of each constituent, plus the amount of organic matter in your soil, will determine how well it holds water and nutrients. A sandy soil will drain water and dry out quickly while a clay soil will remain wet for a longer period of time.

While the NRCS soil survey will give you the soil type for your area, it is best to examine the soil you have under your feet. If your property varies topographically, you should identify areas that tend to hold water (e.g. swales) or that may be susceptible to quick drying (e.g. south facing slopes). You can customize a seed mix for such conditions.

While testing soil for nutrient availability is critical for successful vegetable, fruit, and cut flower gardening (and lawns), it is not as critical for native plants. One of the many benefits of native plants is that they do not require fertilizers. Native plants are adapted to native soil nutrient levels and adding nutrients will only give non-native plants a competitive edge. Do not add any fertilizers, especially nitrogen. Nitrogen will only help the weeds.

Water

Your prairie landscape will change from year to year depending upon the amount of precipitation received, but you will not need to water your prairie.

If you have a low spot on your property that collects water or where water drains slowly mark that area on your map and consider seeding that area with plants that are a bit more tolerant of damp conditions such as prairie cordgrass, switchgrass, ironweed, and boneset.

Site Plan

Map out sun and shade, water courses, places that hold water, any anomalous soil types, and any steep slopes. You will want to make sure your seed mix includes species for all types of conditions found on your property. Many seed purchases and recommended seeding rates are calculated based on pounds per acre so calculate the size of each distinct area of your property. An acre of land is equal to 43,560 square feet. Try visualizing about three-quarters of a football field or soccer field. You can also use the "measure distance" option in Google Maps.

Testing Soil Drainage

Dig a hole six inches wide and one foot deep. Fill the hole with water and let it drain. When the water has drained completely, fill the hole with water again and this time keep track of how long it takes for the water to drain from the hole.

If the water drains completely within three hours or less, your soil drains rapidly. Rapid drainage is often the result of a high sand content in the soil. If water is still standing in the hole after eight hours, your soil is draining slowly. Slow drainage is often the result of a high clay content in the soil. If the water drains within four to six hours your soil moisture retention is optimal for most plants.

SITE PREPARATION — REMOVING EXISTING VEGETATION

There are two critical goals to site preparation—reducing weed competition and ensuring the native seeds you plant have good contact with the soil. Achieving these goals will involve a lot of work and time up front, but you will thank yourself in the long run when you are enjoying wildflowers rather than fighting weeds. Weeds compete with native plants for water, sunlight and nutrients.

In this section we give instructions dependent upon the starting condition of your land—old field or former pasture, fields invaded by trees and shrubs, or cropland.

We recommend dormant season (winter) seeding to allow for better germination of native prairie forbs (wildflowers). This means preparing your site during the summer and fall prior to a late winter seeding. Of course, things don't always go as planned and it is possible to begin your prairie planting in the spring.

A list of contractors for hire and services that offer rental equipment is provided in Appendix A (please see website for the most recent listings). Please note that state agencies and cost share programs may have certain requirements and specifications for site preparation and seeding. A summary of federal and state agencies that may offer assistance is provided in Appendix A.

Note: if you or a previous landowner have used any pre-emergent herbicides on your landscape prior to beginning your project, check the label for the time required between application and seeding. Some herbicides, such as atrazine or trifluralin, remain in the soil for months after application and will negatively affect any seed germination.

Starting with an Old Field or Pasture

Removing existing vegetation is not a one-step process and there are several sequential steps you can choose from depending upon your situation. If you've got the time and patience, you might consider site preparation as a two-year process, controlling weeds for two growing seasons and then planting prairie natives at the end of year two. Read through each of the methods described below to decide what is best for your situation. Using a combination of methods to prepare your property for planting is often more effective and thorough.

Burning or Haying

Burning or haying removes the existing top growth of vegetation and leaves little residue. Burns can be conducted in the spring or fall. However, carrying out an effective burn requires enough vegetation to fuel the fire and the necessary skill to do it safely. Landowners should not conduct a burn without the proper training. In Appendix A you can find a variety of services that may be available to help conduct a burn on your property.

Burning to remove existing vegetation and thatch. (Photo: K. Bellemere)

After burning or haying you will still need to get rid of the roots of the existing vegetation and prepare a seedbed. You can kill existing vegetation and prepare a smooth seed bed by roto-tilling, plowing, discing, or cultivating your field (see below). Any turning of the soil will bring up a host of new weeds. You can control the new weed growth before planting by continued mechanical means or herbicides.

Roto-tilling/Plowing, Discing or Cultivating

If your field or pasture is mostly low growing brome or fescue you might choose to till the ground using a roto-tiller or a chisel plow. In this case, the tiller or plow will turn under the existing living vegetation. You can also roto-till or plow under herbicide-killed vegetation.

Tilling the soil can mean roto-tilling, discing, or cultivating. Roto-tilling, or plowing, cuts into the soil approximately six inches and turns it over. Discing uses vertical blades to cut or slice into the soil, disturbing the soil to a lesser extent than roto-tilling or plowing, but will not cut through existing vegetation as effectively. A cultivator also cuts into the soil at a shallower depth than a roto-tiller or plow. A roto-tiller or chisel plow is easier and more effective when breaking new ground, whereas the disc and cultivator are better suited to mixing or stirring up already loosened soil and controlling the secondary growth of weeds.

Tilling up your existing field or pasture, especially if it harbored weeds in addition to fescue and brome, will kill existing plants but also bring a host of weed seeds to the surface. You will need to follow up with another tilling, discing or cultivating once the new crop of weeds germinates. If not using herbicides, you'll likely need to disturb the soil several times throughout the growing season at regular intervals to kill newly emerging weeds and prevent them from going to seed.

Note: repeated roto-tilling of the soil is not recommended for slopes where soil erosion can be an issue. Frequent roto-tilling can destroy soil structure and create a hardpan at the depth of your tiller. Rather than tilling multiple times you can follow up an initial tilling with a disc, cultivator, or herbicide to control secondary weed growth.

Roto-tilling (above), or plowing (below), cuts into the soil approximately six inches and turns it over. (Photos: Tom Buller)

Discing uses vertical blades to cut or slice into the soil, disturbing the soil to a lesser extent than roto-tilling or plowing. (Photo: Pixabay)

Herbicides

Kill existing vegetation by using a non-selective herbicide such as glyphosate. Herbicides can be a first step in getting rid of existing vegetation or you may choose to use herbicides following burning, mowing, or tilling to kill subsequent weed germination. If the existing vegetation is tall, hay or burn first before spraying. Allow weeds to re-grow 4-6 inches and spray again (glyphosate is more effective when vegetation is actively growing). If spraying in the fall, follow up with another spray in the spring if you do not intend to complete a dormant seeding over the winter. More than one application is often necessary if you treat during the growing season — spray, allow weed seeds to sprout, and then apply another round of glyphosate, or use a disc or cultivator, before the weeds set seed. Repeat at 2 to 6-week intervals during the growing season if necessary. If you can't see the soil surface under the dead vegetation, remove the dead vegetation before preparing the soil unless you are planning on using a no-till drill. Allow at least one to two weeks between glyphosate application and seeding. Recommendations vary depending upon the formulation of the herbicide so always read the label before application.

If you remove the existing vegetation over the course of the summer or in the fall and are not able to or do not wish to plant natives until spring, you could consider planting the site

Herbicides can be a first step in getting rid of existing vegetation or you may choose to use herbicides following burning, mowing, or tilling to kill subsequent weed germination. (Photo courtesy of the Ohio Pollinator Habitat Initiative)

with a cover crop of oats or tiller radishes. Both oats and tiller radishes (also called daikon radish for culinary purposes) will die over the winter and produce minimal residue. Annual rye may also be used as a cover crop, but it may not winter kill. Surviving rye must be killed (mow and remove or apply herbicides and remove) in the spring before it goes to seed.

Another option is to plant a crop and harvest for a year or two while reducing the weed pressure on the field. Recommended crops include grain sorghum and soybeans. Plant native seed during the dormant season after the final harvest. Summary steps to prepare a brome field for planting are provided in the highlighted box.

Recommended Steps for Replacing a Brome Field with a Prairie Planting

Using Herbicides

Spring (mid-May)

Hay at this time to optimize quantity and quality of brome if you intend to use or sell. Follow haying with an application of herbicide.

Summer into Fall

Continue to spray your field throughout the growing season as new growth reaches approximately 4 inches to prevent brome and weeds from going to seed.

Winter (Nov. 20 through the end of February)

Seed at least 2 weeks after final herbicide application with a no-till drill set for planting no deeper than ¼ inch. If broadcast seeding, make sure you can see soil through any dead, residual vegetation. If you cannot see bare soil through the residual vegetation, rake or burn to clear the field of litter. Roll (cultipack) the field after seeding to ensure seed contact with the soil.

No Herbicides, Relatively Level Land

Fall

Mow or hay your brome field, then turn under the vegetation with a chisel plow (plowing in fall is recommended as it is often more difficult to work wet spring soils).

Spring

Disc your field as new growth appears.

Summer into Fall

Continue to disc your field throughout the growing season to prevent weeds from going to seed. Prepare a smooth seed bed.

Winter (Nov. 20 through the end of February)

Seed with a no-till drill set for planting no deeper than ¼ inch. If broadcast seeding, cultipack or roll the field to firm soil, plant seed, then roll or cultipack again.

Starting with a Field Invaded by Trees and Shrubs

Unless your property has been actively mowed, burned, or grazed it is likely that woody shrubs have invaded. This is a very common situation in eastern Kansas. If your property is large and the invasion of woody plants substantial, you might wish to tackle your project in phases. It is best to cut and control woody plants before you begin herbaceous vegetation control (see site preparation steps above) because you will likely have additional weeds spring up once you remove the shade cast by shrubs and small trees.

Shrub removal and control is a perennial commitment. There will always be a bird flying overhead or a mammal scurrying over your property to drop a seed. However, shrub control can become a manageable task through regular burning and/or mowing (see under Maintenance below). This section will address the initial removal of woody vegetation.

Unless your property has been actively mowed, burned or grazed it is likely that woody shrubs have encroached. (Photo: J. Will)

Mechanical Removal
If you have a large area covered with numerous shrubs, use a brush hog attached to a tractor as a time-saver. If you have a manageable number of shrubs and small trees, a hand-held brush cutter is a good tool to use.

Many of the shrubs and trees that invade old fields and pastures in Kansas will re-sprout after cutting. In sprouting species, new shoots arise from dormant buds at or below the ground, often resulting in a multi-stemmed clump. Common trees in Kansas that re-sprout include cottonwood, elm, oaks, Osage orange (hedge), black and honey locust, and Russian olive. Re-sprouting shrubs include smooth sumac, buckbrush, and rough-leaf dogwood.

Mechanically controlling each of these re-sprouting trees and shrubs will mean cutting every year. When combined with burning, many will eventually weaken but the effort will be time-consuming and costly for larger areas. Also, if you've had to remove a dense collection of shrubs, it might take two or more growing seasons to accumulate enough grass cover to carry a fire.

Red cedars cut close to ground level will not re-sprout. Burning and mowing in subsequent years will prevent new cedars from establishing. If the cedars are small (less than two feet) you can mow (brush hog), cut, or burn. Bigger trees can be removed with a chainsaw or a tree shear.

If you have a manageable number of shrubs and small trees a brush cutter or brush hog might do the trick. (Photo: J. Will)

Mechanical Plus Chemical Removal for Trees and Shrubs That Re-sprout
Cut the shrub or tree and treat the stumps with an herbicide labeled for such a purpose (certain formulations of glyphosate can be used). Stump treatment is not necessary for red cedar. Cutting and treating the stump with an herbicide is far more effective at controlling woody invaders than cutting alone — you won't have to battle re-sprouting shrubs each year. Cut and treat stumps in the late summer or fall. Treat stumps as soon as they are cut, before the surface of the stump dries. You can find publications that include a comprehensive list of chemicals for stump treatment and advice on treating particular species in the reference section below.

Once you have removed woody growth, proceed with site preparation as you would an old field or pasture as described previously.

Starting with Cropland

If you are unfamiliar with your property's agricultural history, test your soil for persistent chemicals such as atrazine or trifluralin. Such chemicals have lengthy residual effects and you may need to wait one year from the last application, depending upon the herbicide, before seeding any native vegetation.

If your land was in crop production in recent years, you likely will not need to till. In fact, tilling may bring more weed seeds to the surface. If your field does host abundant weeds in addition to crop residue you might disc, cultivate, or use herbicide to kill the weed cover as described above. If you do not intend to seed natives until the spring, you can plant a cover crop of oats, tiller radishes, or annual rye to reduce erosion and suppress weeds until seeding. Remove excess dead vegetation (greater than 50% residue cover) or tall (greater than one foot) crop stubble before preparing the seed bed.

If you do not need to disturb the soil for weed eradication, you can use a no-till seed drill to plant your seeds directly into the former crop, leaving the residue for erosion control. See *Options for Planting* on page 9.

Final Preparation of the Seedbed

Your goal is good contact between the seeds and the soil. No-till drills or slit seeders are good for larger sites and can be used to plant in mown, burned, or chemically-treated field residue if you can see bare soil through the residue (see *Options for Planting* on page 9). For cultivated areas, a clean, smooth soil surface is best. For just one or two acres use a drag mat or a section of chain link fence attached to a tractor or ATV.

SEED MIXES — WHAT AND HOW MUCH TO PLANT

There are a few things to think about when choosing your seed mix: first, the desired ratio of grasses to forbs, and second, your site conditions.

As for the ratio of grasses to forbs, it is partially a matter of preference. Larger areas will necessitate establishing a greater portion of grasses than forbs, not only to keep costs reasonable, but also for management goals and enhanced wildlife habitat. Grasses are generally easier to establish, and the seed is cheaper to buy.

Some key considerations for the unique conditions of your property include slope, wet areas, and shade. An erodible slope might merit planting a high percentage of grasses that will establish relatively quickly. Switch grass is recommended for wetter areas, along with certain wildflowers. Grasses are hard to establish in shade, so you might concentrate on tolerant wildflowers for these spaces. Custom planting a diverse property is easier to do by hand, but time consuming. If you've got a couple acres of diverse or varied environments, custom design buckets of seed and invite all your neighbors and friends to plant assigned sections of your property.

Many guides to prairie reconstruction and restoration recommend 10 to 15 pounds of seed per acre. If you are purchasing seed and planting with a drill, use the lower amount; if hand collecting and broadcasting you should aim for 15 pounds of seed per acre. Recommended ratios of grasses to forbs range from 5:1 to 10:1.

There are several things to consider when determining how much seed you will need: the time of year you are planting, the varying germination rates of your chosen seeds, the ratio of forbs to grasses you desire, your site conditions, and cost. If you plan to seed by hand during winter, you might spread more seed to compensate for seed lost to predation. Certain species will have lower germination rates so you might increase the percentage of those species in your mix. A seed mix heavy with forbs will be more expensive. Finally, you might plant more grasses if you have steep slopes or wish to manage your prairie with fire.

Again, if you are working with an agency that agency may have specifications or recommendations for a seed mix. Also, there are many pre-made mixes available from providers designed for specific site conditions (See Appendix C for seed providers).

Advice on Purchasing Seed from Kim Bellemere

1. Assess your goals. A high percentage of wildflowers will look pretty but cost more. The more species you want, the more expensive your planting will be. Rarer species also cost more.

2. Order your seed early in the fall before your dormant season planting (seeds generally arrive within a couple of weeks). If you wait until January or February some of your desired species will be unavailable. If you obtain seeds in late spring, keep them in a refrigerator over the summer to keep them cold and dry.

3. It can be overwhelming to design your own seed mix. It helps to talk with an expert.

4. If you purchase a pre-determined seed mix, you can always add desired species purchased separately or add new species in subsequent years.

5. Pre-determined seed mixes may contain a few species that are technically not native to NE Kansas and may not live in your meadow for very long. However, such species are often very successful in the first one or two years after planting and can provide valuable cover and a welcome pallet of color, or a "morale booster", while your meadow gets established. Examples include blanket flower (*Gaillardia pulchella*, native to western Kansas) and clasping coneflower (*Dracopis amplexicaulis*, native to SE Kansas).

Purchasing Seed

There are many native plant nurseries nationwide that can customize a seed mix for you based on desired species or the unique characteristics of your site. However, it is best to buy seed from a supplier that not only carries species native to northeast Kansas but also grows the plants in this general region. K-State recommends purchasing seed grown no more than 400 miles to the south (southern border of Oklahoma) or 150 miles to the north (Nebraska City). While a nursery in Oregon might have species native to Kansas, the plants grown in Oregon may not be adapted to the conditions found in Kansas. Regional plants are adapted to regional conditions. You can also purchase seed from the Conservation District and the Kansas Department of Wildlife, Parks, and Tourism (KDWPT). Sources for regionally grown native plant seeds are listed in Appendix C and on the companion website.

Collecting and Cleaning Seed

If you know someone with native plants in their landscape, you can ask to collect seeds for yourself. This is impractical for larger areas, but you might add collected forb seeds to a purchased mix, especially if desired species are hard to find or expensive. You might also ask permission of public parks, state lands, or nature centers to collect seed. Seed collecting and cleaning is done in the fall after the growing season has ended and plants are ready to release their seeds. The time to collect seed will vary from species to species and location to location. Try shaking out some seeds from the heads of desired species or grabbing grass seed heads to see if the seeds come off readily to gauge when you might collect. To maintain the integrity of the patch of native plants you are collecting from, do not collect from more than 1/3 of the plants. Note that the germination rate of seed collected "from the wild" is likely to be significantly less than that in a purchased seed mix.

You will have a much greater germination rate if you remove the chaff around the seed. The chaff is the collective term for the other parts of a flower that surround the seed – the dried bracts, petals, and seed hulls. A cheap but labor-intensive method for cleaning seed is to make or purchase a wire screen mounted on a wooden square. Mesh size should be coordinated with seed size. Varying mesh sizes between 1/8 inch and 1/2 inch will work for most native seeds. Once you have your screens, rub your collected seeds back and forth over the screen so the seeds, and some chaff, fall through the mesh. Save the seed hulls for mulch or compost. Keep the seeds in paper sacks in a cool, dry place until you are ready to plant. If you won't be planting in the fall and wish to stratify (keep in a cold, moist environment to break dormancy) your seeds before spring planting, refer to species-specific instructions from the Tallgrass Prairie Center.

A cheap but labor-intensive method for cleaning seed is to make or purchase a wire screen mounted on a wooden square. (Photo: K. Bellemere)

WHEN TO SEED

Many native seeds need a cold wet period of at least 30 days in order to break dormancy and germinate, a process called stratification. For that reason, seeding in the late spring or summer is not recommended. Dormant seeding is a common seeding practice in prairie restorations, and it is exactly what the name implies – seeding while the prairie is dormant. Dormant seeding generally occurs late fall through early spring, but December and January are the ideal times. Seeding during the winter helps stratify the seed, and the cycle of freeze and thaw will help incorporate the seed into the soil. If you plant seed earlier in the fall, you'll need to increase the amount of seed to make up for any lost to predation by birds and rodents. Planting too early in the fall can also result in early germination and seedling death over the winter.

Spring seeding is also possible, depending on your goals and the types of seed you plant. If you choose to seed in the spring, seeding should occur one month before the average last frost date to three weeks after the last average frost date (the average last frost date is April 9th). Table 1 lists some of the advantages and disadvantages of different seeding plans.

Advantages and Disadvantages of Different Seeding Plans

Spring Planting

Opportunity to treat early sprouting weeds with light tilling or herbicides.

Higher seed germination for warm-season grasses, lower germination for forbs as compared to winter planting.

Surviving forb seeds may bloom in year two, after they have stratified over the following winter.

Weather is unpredictable and you will need to wait until the soil is dry enough to use any heavy equipment. Working wet soil, especially heavy clay soils, will compact the soil.

A wet spring followed by a dry summer will delay planting and then delay germination due to lack of moisture. If possible, water the planting if no rain has fallen within 10 days of seeding.

Dormant Season Planting

Planting forb seeds in winter (November through January) will allow seeds to stratify, increasing the chance of germination in spring.

Seeding in winter will not require watering.

No opportunity the following spring to treat early sprouting weeds with tilling or herbicides.

Lower germination rates for grasses but higher germination rates for forbs.

Seed predation might be higher over the winter if seed is hand broadcast.

OPTIONS FOR PLANTING

See Appendix A for a list of agencies that may have equipment for rent and a list of contractors for hire. If you use an agency with cost-sharing, that agency may have specifications for seeding. If you are working on slopes, cover the area with weed-free straw to help reduce erosion. Steep slopes might necessitate a biodegradable erosion control mesh (1/2-inch opening).

Broadcast Seeding by Hand or Seed Spreader

To help spread seeds evenly by hand, mix your seed with a carrier – sand, sawdust, and rice hulls are good options. You will need 2.5 cubic feet of carrier for 1,000 square feet of area to be planted. Dampen the carrier with water and then mix in your seeds. Divide your seed mixture in half. To ensure coverage of your whole planting area, spread one-half of your mixture walking in one direction and then cover it again with the second half while walking in a perpendicular direction. For example, walk west to east for the first pass and then north to south on the second pass. Try to cover the entire site with each half of the seed mixture. Remember to use a higher seeding rate if you hand broadcast, as predation by birds and rodents will likely be greater than would be if planting with a seed drill. If you've got just a few acres to plant, this might be a fine excuse for a gathering of friends to help.

It is the same procedure when using a broadcast seeder like those used to spread fertilizer or grass seed. Some seeders can be mounted to a tractor or ATV. If using a broadcast seeder, do a small test run to make sure small and large or fluffy seeds are not separating and that a good seed mix is distributed.

After seeding, cultipack the area to ensure seeds have good contact with the soil. If you don't have access to a cultipacker run your vehicle over the site as best you can.

Seeding with a No-till Drill

A no-till drill creates rows of shallow slits in the soil and plants the seeds. The seeds are placed in boxes that are calibrated to release seeds into the slits at a set rate and plant them at a set depth. The boxes and seeding rate options vary depending upon seed size. The advantage of using a no-till drill for seeding is better seed contact with the soil (no need to cultipack, although some drills will have packer wheels to firm the soil after planting) and reduced seed predation. The drill should be set so that seeds are planted no deeper than 1/4 inch.

Some seeders can be mounted to a tractor or ATV. (Photo: J. Will)

After seeding, cultipack (firm the soil by rolling) the area to ensure seeds have good contact with the soil. (Photo courtesy of American Meadows)

A small drill available from the Douglas County Conservation District.

MAINTAINING YOUR PRAIRIE LANDSCAPE

YEAR 1

Despite careful site preparation, the first year after planting will necessitate a battle with weeds. Don't despair that your new prairie looks nothing like the beautiful pictures you gawked at before you started. There will likely not be enough fuel to carry a fire this first spring following planting, so to reduce weed cover mow your prairie before the cool-season annuals flower. A flail mower will chop up the vegetation so that it will not smother the new prairie seedlings. When the vegetation reaches 8 to 12 inches you can mow to a height of approximately 6 inches (recommendations vary) for this first mow as prairie plants will be shorter and struggling in the shade of the non-native vegetation.

Recommendations vary on the number of times to mow this first year. For our area, recommendations for weed control call for at least one mowing in the spring. To battle heavy weed infestations, you can mow a second time when the vegetation again gets to a height of 12 inches (before "knee high") and continue this pattern for the first growing season. The key is to mow before the weeds set seed. Mowing continues to benefit warm-season natives as cool-season weeds will always be fighting for space and attempting to overrun your prairie.

YEARS 2 AND 3

Mow one time to a height of 12 inches or burn the standing vegetation in the early spring of the second year and again in year three. Don't wait until late in the spring when weeds are waist high (four feet or higher) because the mowed vegetation will form a dense mat, shading the native seedlings. Spot-treat concentrated areas of weeds with glyphosate (be careful as glyphosate will also kill desired prairie plants) or pull individual plants if practical. You can also continue to mow areas of concentrated weeds instead of spot-spraying with herbicides.

Prairie seeds may take two or three years to germinate. If you wish to add more forb seeds in subsequent years, mow or burn in late fall before putting down seed that winter.

You will have weeds. Keep watch, have patience.

YEAR 4 AND BEYOND

Maintaining a diverse and healthy prairie ecosystem requires a diverse management plan. There are a few key elements of a successful management plan to keep in mind: diversify your management technique — don't burn, hay, or rest the same portions of your property every year; alter the time of year you apply management techniques; and maintain a portion of your acreage as a refuge for prairie fauna.

Once you have established a good stand of native vegetation, it is not necessary to burn or mow every year. Burning or mowing once every three years will help control woody invaders and cool-season grasses. If you plan on managing your property with fire, it is beneficial to let the prairie rest for a year and build up more fuel for a good hot fire the following year.

Whether mowing or burning, change the time of year you mow or burn so that a limited group of plants do not establish dominance. However, mowing or burning between April 15th and July 15th is not recommended as grassland birds begin nesting in April and may be able to establish two broods by the end of July if undisturbed. To encourage warm-season grasses, burn or mow in the early spring – from late March to early April. To encourage native forbs, burn or mow in late summer, fall, or winter.

Prairie habitat is sparse in our region so once you have established some grassland on your property it is a good practice to keep a portion of that habitat standing each year rather than mowing or burning it. If possible, manage your prairie in patches, reserving approximately one-third as a refuge for insects and animals during those years when the rest of your property is mowed or burned.

Watch for invasive species such as bindweed, Johnson grass, sericea lespedeza, and trumpet vine. Take the time to dig these out or spot-spray with glyphosate or the next time you look there will be more of them.

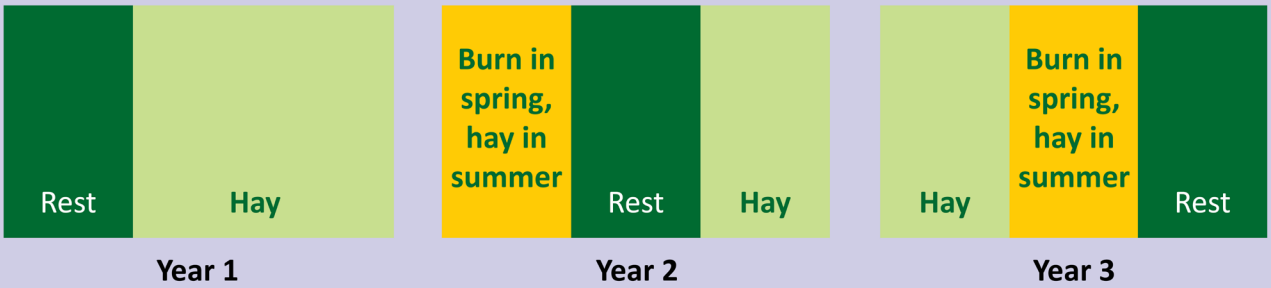
Spot-treat concentrated areas of weeds with glyphosate (be careful as glyphosate will kill desired prairie plants also) or pull individual plants if practical. (Photo: K. Bellemere)

Mixed management benefits biodiversity

The ideal managment plan for preserving biodiversity in a hay meadow is to divide it into sections and rotate the management each year. One portion should be rested to allow natural processes to continue. Ground-nesting birds can raise their young unimpeded, and native plants can go to seed.

The portion that is rested can be burned early the following spring because it will have enough fuel to carry a fire that will kill any cool-season grasses or woody plants. The burned portion can by hayed in summer.

The diagram below shows a potential rotation dividing a prairie into thirds; it could as easily be divided into smaller parcels, meaning a longer roation, depending on the economic impact of resting a portion.



If possible, manage your prairie in patches, reserving approximately one-third as refugia for insects and animals during those years when the rest of your property is mown or burned. (Graphic reprinted with permission from Native prairie hay meadows: a landowner's management guide by K. Kindscher and L. Byczynski)

ADVICE FROM THOSE WHO HAVE DONE IT

KIM AND FRED BELLEMERE

Kim and Fred Bellemere are in the process of reconstructing a prairie on two acres of cool-season grasses in Leavenworth County. Having no grazing animals, the property was an open invitation to noxious weeds such as Johnson grass, crown vetch, and lespedeza. In Kim's words, the property was "of no benefit to anyone or anything, so why not replace the cool-season grasses with something more beneficial". By planting prairie vegetation, the Bellemeres hope to create wildlife and pollinator habitat. Kim also sees the process of rebuilding prairie benefitting her family; "It's been a way to connect with our property that we didn't really have before. It's been a way to learn more about what wildlife we could have on our property and just be more connected and be more a part of where we live instead of just being in our house."

To begin the reconstruction process, Kim talked with those who had experience in re-planting prairies and started reading about converting land dominated by cool-season grasses and invasive weeds to one dominated by native grasses and forbs. She attended workshops and educational events focused on native vegetation. To get an overview of the process and to sketch out a general plan, the Bellemeres consulted with Frank Norman of Norman Ecological Services.

Kim notes that when you work through a cost share program, the biologist you work with can be a tremendous help. In their case, the Bellemeres worked with the Kansas Department of Wildlife, Parks, and Tourism's Habitat First program. With Habitat First, the size of the property is not an issue as it might be with other cost-share programs that require a minimum acreage. The program is also flexible, offering a variety of services. Kim was able to work with Habitat First on a planting plan and seed list and receive cost share for a portion of the site preparation and seed expenditures.

After starting with a site visit to discuss services and equipment, a site plan was developed and a contract was signed for site preparation and the seed order. Habitat First put together the site plan (including a timeline of activities) and the seed list. A percentage of the cost was shared by Habitat First in the form of reimbursements for services provided by the landowners themselves or by third party providers. Kim subcontracted a service to spray glyphosate on the property, ordered seed from an approved list of providers, purchased additional seed from consultant Courtney Masterson (Native Lands, LLC), and had her friends and family help with the mowing, planting, and burning. Kim's family will do all the maintenance as the prairie is established.

The timeline outlined in the box was not ideal, but sometimes weather and schedules dictate alternative arrangements. Nevertheless, in the first year after planting (2019) the Bellemeres heard quail on their property for the first time in many years and took note of the warm-season grasses present – side oats gramma, Indian grass, switch grass, and big bluestem. Noted wildflowers included black-eyed Susan, upright coneflower, goldenrods, asters, various sunflower species, common milkweed, monarda, blanket flower, senna, and coreopsis.

Timeline of Activities on the Bellemere Property

- ❑ Contract with Habitat First signed in the early winter of 2017
- ❑ Burned in the spring of 2018
- ❑ Contractor paid to spray Round Up ™ (glyphosate) when the cool-season vegetation had reached a height of about four inches (spraying was delayed because of an unusually cool spring)
- ❑ Property seeded at the end of March 2018 (not optimal but delayed due to cool spring)
- ❑ "Knee high" vegetation mowed to a height of 8-10 inches (mowed with a brush hog)
- ❑ Mowed three times over the course of the first growing season, each time when the grass reached "knee-high"
- ❑ Planted milkweed in June 2018 (140 plants from Monarch Watch)
- ❑ Vegetation was not mowed in the spring of 2019 because vegetation was not very tall (Note: Habitat First restricts mowing during bird nesting season)
- ❑ Tackled weedy spots during the summer of 2019; mowed and hand dug areas with serecia lespedeza, spot sprayed and hand dug Johnson grass.

EILEEN AND STEW GROSSER

The Grossers live in rural Douglas County on 80 acres of former pastureland and actively farmed cropland. When the Grossers built their house the old brome pasture was dense with large red cedars. In 2000 they decided to plant eight acres of former pasture with a mix of grasses and forbs purchased from the Douglas County Conservation District. To prepare the old pasture for seeding, they hired a contractor to cut down the cedars and some hedge trees with a tree shear, and then seeded using a seed drill.

The first year's growth was disappointing. Eileen remembers thinking "is this what it's supposed to be?". In her mind's eye, Eileen was comparing her prairie to Aiken prairie. Aiken prairie, however, is a remnant prairie that has never been

plowed and is managed as a hayfield. The Grosser's prairie had numerous thistles, including musk thistle (a noxious weed), which Stew painstakingly dug out by hand. Stew still digs or cuts the thistles, but there are far fewer now.

The Grosser's started noticing flowers and sparse native grasses the second year after planting and it wasn't until the third growing season that they felt satisfied with the progress of their prairie. In January of 2015 they did a second burn and had planned a third for 2016, but wet weather prevented burning that year.

The Grosser's property was burned by the Eudora volunteer fire department as a training exercise. You might find that your local fire department is willing to burn your property for a mutually agreed upon donation.

Now in its tenth year (2020), the Grossers enjoy all the wildflowers they find blooming and are happy to be providing habitat for pollinators. To boost the value of the property for pollinators, the Grossers still plant extra milkweed for the monarchs.

PHYLLIS AND LOUIS COPT

Phyllis and Louis Copt live on fifteen acres of former pasture and fescue grass east of Lecompton. They began converting their initial ten acres to prairie grasses and forbs in 2003, soon after the house was built. Phyllis knew from the start that they would be reconstructing prairie on their property. Louis paints prairie fires and Phyllis' sister contributes to the reconstruction of prairies at Kill Creek Park in Johnson County. Having grown up in Emporia, Phyllis and her family often drove through the Flint Hills to a cabin on Lake Kahola and the annual burning of the prairies and pastures on ranches that surround Emporia were considered entertainment. For Phyllis, the prairie landscape is part of who she is, and planting prairie was "a way to be a better steward of the earth".

The Copt's strategy for prairie reconstruction began with seeding a wide strip of fescue along the road with a mix of prairie forbs and grasses in the spring of 2003. The Copts worked with the Douglas County Conservation District (DCCD) to plant a CRP (Conservation Reserve Program) seed mix with the DCCD seed drill. They have seen a variety of prairie plant species spread from the planted area into the fescue that remains between the prairie strip and their house. Illinois bundleflower is most common, but sunflowers, prairie clover, and gray-headed coneflower have also spread. The deer seem to favor the coneflower.

In 2010 they purchased five acres to the north of the house and began a prairie reconstruction on that parcel the very next year. Prior to their purchase, the land had been mowed every fall so there were few woody shrubs or cedars on the property. Again, they worked with the DCCD to burn and then seed the five acres with a CRP seed mix.

Advice About Undertaking a Project

- ❑ Establish realistic goals in line with your time and budget. Watch your property with your goals in mind.
- ❑ Keep a notebook. Record and keep the information provided to you by any agencies or private consultants. Keep a copy of any seed lists or seed mixes you purchase and from where you purchased them. Keep a record of your management strategies – when did you plant, when did you mow, when did you burn? Record your observations. This is the fun part as the mix of plants and animals you will observe changes every year. Observations are also very important for deciding how to manage your prairie (what do you want to encourage/discourage).
- ❑ Involve your neighbors. The Copts turn their additional plantings and burns into a neighborhood party.
- ❑ Your local fire department may be able to help you with prescribed burning. The Lecompton fire department has used a prescribed burn on the Copt's property for training purposes.
- ❑ Even out in the county there may be development covenants, so check with your local homeowner's association.
- ❑ Turkeys and deer spread the good and the bad [plants]. When the bad show up, you can always try goats.
- ❑ Helpful resources: Carl Kurtz's book (see under *References*) and the Extension Master Gardeners network for advice and plant sharing.

The Copts manage both parcels by rotating years in which they burn, hay, and rest. The burns are done in the spring, haying in late June or early August (before the sericea lespedeza has bloomed). They continue to add diversity to the original seeding by planting transplants and seeds of native forbs along the edge of both CRP parcels. Wind and wildlife carry some of the seeds from these plantings deeper into the CRP mix. Of course, wind and wildlife tend not to discriminate between desirable and undesirable plants. The Copts are currently battling a small population of sericea lespedeza that has popped up in the northern five acres. The property to the south harbors not only sericea lespedeza, but crown vetch and poverty grass. As Phyllis likes to say, "reconstructing prairie takes persistence, patience, and eternal vigilance!"

As Phyllis and others in this guide can attest, reconstructing or restoring prairie is also incredibly rewarding. Phyllis finds that property owners can be hesitant to begin because the task does seem overwhelming, especially if they have limited resources, and limited property. Phyllis has a few key pieces of advice listed above for those thinking about undertaking a prairie reconstruction project.

GLOSSARY

COOL-SEASON PLANT
A plant that thrives in the spring and fall, going dormant during the summer heat. Cool-season plants green-up in the spring earlier than warm-season plants.

FORB
A broad-leaved, flowering plant. Not a grass or sedge.

INVASIVE PLANT
A plant that is both non-native and able to establish itself on many sites, grow quickly, and spread to the point of disrupting plant communities or ecosystems. Examples in northeast Kansas include bush honeysuckle (*Lonicera maackii*) and crown vetch (*Securigera varia*).

NATIVARS (CULTIVARS)
A cultivar is a named variety of plant, like the distinction among apples. All apples are the same species but include varieties such as gala, cortland, red delicious, granny smith, and many, many others. Cultivars have been selectively bred for certain characteristics like color, height, or disease resistance.

A native plant that has been manipulated by selective breeding or crossbreeding to highlight a desirable trait is called a nativar. One example is the white "purple" coneflower, ¬a selectively bred *Echinacea purpurea* that has a white flower head. You can also get red, yellow, and orange "purple" coneflowers. Nativars will have a varietal name in addition to the species name. For example, *Echinacea purpurea* 'Avalanche' is one variety of white coneflower. Look for the variety name to distinguish between natives and nativars.

NATIVE PLANT
Common examples of plants native to northeast Kansas include pale purple coneflower (*Echinacea pallida*), prairie blazing star (Liatris pycnostachya), and stiff goldenrod (*Oligoneuron rigidum*).

A plant that is a part of the balance of nature that has developed over hundreds or thousands of years in a particular region or ecosystem. Note: The word native should always be used with a geographic qualifier (that is, native to New England [for example]). Only plants found in this country before European settlement are considered to be native to the United States. —*Natural Resources Conservation Service*

NATURALIZED PLANT
A non-native plant that does not need human help to reproduce and maintain itself over time. Yellow foxtail (*Setaria pumila*) and dandelion (*Taraxacum officinale*) are examples.

NON-NATIVE PLANT
A plant introduced with human help (intentionally or accidentally) to a new place or new type of habitat where it was not previously found. Examples of plants commonly found in our region that are not native to northeast Kansas include butterfly bush (*Buddleia* spp.), lilac (*Syringa* spp.) and cosmos (*Cosmos sulphureus*). Purple coneflower (*Echinacea purpurea*) is native to Kansas but not the northeastern part of Kansas. Not all non-native plants are invasive or otherwise problematic.

NOXIOUS WEED
The term "noxious weed" is a legal term and plants declared noxious weeds vary from state to state. In Kansas, noxious weeds include Sericea lespedeza (*Lespedeza cuneata*) and field bindweed (*Convolvulus arvensis*). For more information refer to the USDA noxious weed list for Kansas.

WARM-SEASON PLANT
A plant that thrives during the warmest parts of the growing season. Warm-season plants green-up in late spring after cool-season plants have already started growing. Most of our native grasses and forbs are warm-season plants.

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APPENDIX A

AGENCIES AND ORGANIZATIONS OFFERING ASSISTANCE

Listed below are several organizations that can assist landowners. They include state and federal agencies, non-profits, and private consultants. Much of the assistance falls into three different categories:

1. Development of a restoration plan and budget. Private consultants or contractors provide great information and advice, but many government organizations and some nonprofits can help with plan development as well.

2. Cost-share assistance. Federal and state funds are available to help landowners pay for different conservation practices. Some of the practices include brush clearing in grasslands, streambank stabilization, and prairie restoration. Most programs require that landowners sign a contract agreeing to complete their conservation practice within a specific time period and provide receipts or other proof that they've completed the outlined tasks. There are a number of programs, all with different requirements, so it's best to call the organizations below and talk with a representative to find out which fits your needs. The representatives from those organizations will work with you to develop your plan and connect you with contractors who can help with parts of the process. Some even have equipment you can rent. Private consultants can also help with cost-share application processes and connecting with contractors.

3. Conservation easements. Conservation easements are legal agreements between landowners and land trust organizations that prescribe the type of land use allowed and provide guidance for how the land can be developed or used in the future. Landowners retain ownership of the property and may receive some federal income tax benefit.

All these programs have different advantages, so it's important to talk to each organization and see which program works best for you. All the organizations that provide cost-share programs will help you put together a restoration plan with a budget and timeline.

COST SHARE AND FINANCIAL INCENTIVE PROGRAMS

Cost share and financial incentive programs provide financial assistance for habitat improvements on agricultural and rural land. Depending on the improvement practice, programs may pay up to 75% of the project cost or provide rental payments for removing agricultural land from production. Contact your state or local office for more information. Agencies providing incentive programs include:

County Conservation Districts
Conservation district offices provide cost-share opportunities for several habitat improvement practices. Some offices cover several counties so check out the website below to find your county's representative. Depending on the county, a conservation district may also oversee the State Water Resources Program and Non-Point Source Pollution Program.
http://agriculture.ks.gov/divisions-programs/division-of-conservation/conservation-districts

Farm Service Agency (FSA)
The FSA funds the Conservation Reserve Program, the Grassland Conservation Program and others. www.fsa.usda.gov/programs-and-services/conservation-programs/index

Natural Resource Conservation Service (NRCS)
NRCS oversees several grants and incentive programs including the Environmental Quality Incentives Program, Conservation Stewardship Program, and Conservation Innovation grants. NRCS can also work with landowners to create conservation easements on their property. FSA, NRCS, and county conservation districts have related funding streams and oversight so they often work together. To learn more about the NRCS specifically visit www.nrcs.usda.gov/wps/portal/nrcs/main/ks/programs/financial/.

KS. Dept. of Wildlife Parks, and Tourism (KDWPT)
KDWPT private land biologists provide technical and cost-share assistance to private landowners in Kansas through the Habitat First Program. Biologists conduct site visits, write management plans, and provide cost share assistance on eligible practices. The program assists landowners with acreages as small as one acre up to several thousands of acres. Information on Habitat First along with the local biologist for your county can be found at http://ksoutdoors.com/Services/Private-Landowner-Assistance.

BURN MANAGEMENT INFORMATION

Prescribed fires are an important grassland management tool. Proper management is crucial, however, and fire should not be used without training. Listed below are organizations that can provide guidance, training, or assistance in planning a prescribed burn. Also check with your county NRCS office to see if they conduct trainings or provide other burn-related resources.

Eastern Kansas Prescribed Burn Association
Membership group which provides education, tools, and other resources for conducting prescribed burns. www.facebook.com/EKPBA/

KSU Dept. of Agronomy Prescribed Fire Workshops
Conducts prescribed fire workshops in collaboration with state organizations. Check their website for a list of upcoming trainings. www.agronomy.k-state.edu/extension/range-and-forage/prescribed-burning.html

Local Fire Departments
Some local fire departments will conduct a burn on private property for training purposes. Contact your local fire department to inquire.

OTHER ORGANIZATIONS AND PROGRAMS

A few Kansas non-profit organizations provide technical assistance and some funding support for habitat restoration and assistance with preservation efforts.

Monarch Watch
Monarch Watch at the University of Kansas provides information on monarch habitat and funds a free milkweed program for habitat restoration projects. www.monarchwatch.org

Kansas Land Trust (KLT)
KLT works to preserve both agricultural and natural landscapes, across the state of Kansas through the creation of conservation easements. www.klt.org

Kansas Grazing Lands Coalition (KGC)
KGC hosts numerous workshops, tours, and educational events for landowners aimed at improving management techniques or preserving key grassland areas. They also interact with many local grazing associations and fund the Kansas Prescribed Fire Council. www.kglc.org/

Kansas Pheasants Forever and Quail Forever
Promotes the conservation of pheasants, quail, and other wildlife through education and the conservation of high-quality habitat. State biologists can help with the development of seed mixes and provide guidance on habitat improvement strategies. www.kansaspfqf.org

Ranchland Trust of Kansas (RTK)
RTK works with landowners to create conservation easements on ranchland and other working landscapes. www.ranchlandtrustofkansas.org

Tallgrass Prairie Center
The Tallgrass Prairie Center at the University of Northern Iowa conducts research into prairie restoration techniques. Their website (www.tallgrassprairiecenter.org) has a prairie seed calculator, a seminar series, prairie reconstruction how-to videos and technical guides.

PRIVATE CONTRACTORS

Most NRCS offices, county conservation districts, and the KDWPT maintain a list of contractors who can assist with seeding, site prep, and other tasks. Private contractors/consultants can also help with plan development.

Custom Forestry Applications ..... https://www.facebook.com/CFA.kansas/
Native Lands LLC ..... https://www.facebook.com/ForThePrairie/
Norman Ecological Consulting ..... http://normanecological.com/
Terra Technologies ..... http://www.terratechnologies.com/index.html
Nickels Farms & Old School Guide Service..... https://oldschoolguideservice.com/farm-management-services-2/

You can find an updated list of contractors on our website.

APPENDIX B

PLACES TO SEE PRAIRIES AND NATIVE PLANTINGS IN NE KANSAS

County and Name	Location	Size
ANDERSON COUNTY		
Leadplant Prairie		17 acres
DOUGLAS COUNTY		
Prairie Acre	726 Sunnyside Ave., Lawrence	< 1 acre
Prairie Park Nature Center	2730 Harper St Lawrence	1 - 3 acres
Clinton Lake - Sanders Mound	872 N 1402 Rd Lawrence (office)	7 acres
Clinton Lake - Coblenz Marsh Road Prairie	872 N 1402 Rd Lawrence (office)	54 acres
Clinton Lake - Elk Creek Prairie East	872 N 1402 Rd Lawrence (office)	35 acres
Clinton Lake State Park Prairie	872 N 1402 Rd Lawrence (office)	5 acres
Baker Wetlands	1365 N 1250 Rd Lawrence	927 acres
Black Jack Battlefield and Nature Park	163 E 2000 Rd Wellsville	NA
Akin Prairie	N. 1150 Rd Lawrence	16 acres
Ivan L. Boyd Prairie Preserve	2011 North 200 Rd Wellsville	15 acres
Pioneer Cemetery Prairie	300-398 N 200 Rd Baldwin City	13 acres
JEFFERSON COUNTY		
Rockefeller Prairie	Wild Horse Rd Lawrence	9 acres
JACKSON COUNTY		
Rachel Snyder Prairie	Mayetta; contact GHF*	140 acres
JOHNSON COUNTY		
The Prairie Center	26325 W 135th St Olathe	45 acres
Kill Creek Park	11670 Homestead Lane Olathe	varies
Ernie Miller Nature Center	909 North KS-7 Olathe	varies
Ogg Road Prairie	79th St. and Ogg Rd Shawnee Mission Park	4 acres
Wilderness Science Center	5001 W. 163rd Terrace, Stilwell	< 1 acre
Overland Park Arboretum and Botanical Gardens	8909 W 179th St Overland Park	180 acres
Big Bull Creek Park	20425 Sunflower Rd, Edgerton	NA
OSAGE COUNTY		
Osage State Fishing Lake	3 miles S, 1/2 mile E of Carbondale	366 acres
POTTAWATOMIE COUNTY		
Jeffrey Energy Center - Oregon Trail Nature Park	US 24, between Belvue and St. Marys	< 5 acres
RILEY COUNTY		
Konza Prairie Biological Research Station	100 Konza Prairie Ln Manhattan	8817 acres
SHAWNEE COUNTY		
Kansas Museum of History	6425 SW 6th Ave Topeka	< 5 acres
Shawnee State Fishing Lake	NW Humphrey Rd Menoken	400 acres
Grant Bradbury Park	6600 SW Westview Rd Topeka	80 acres
MacLennan Park (Cedar Crest)	Governor's Lake Rd and SW 6th Ave Topeka	NA
Kansas Children's Discovery Center	4400 SW 10th Ave Topeka	< 1 acre
WAUBAUNSEE COUNTY		
Mt. Mitchell Heritage Prairie Preserve	29377 Mitchell Prairie Ln Wamego	50 acres
Bolton Wildlife Area	Mulberry Creek Rd Paxico	600 acres

APPENDIX C

SOURCES FOR REGIONALLY GROWN NATIVE PLANTS AND SEEDS

Retail Source	Location	Phone	Website
KANSAS SEEDS			
De Lange Seed, Inc.	Girard, KS	620-724-6223	www.delangeseed.com
Douglas County Conservation District	Lawrence, KS	785-843-4260	http://www.douglasccd.com/
Feyh Farm Seed	Alma, KS	866-765-3415	http://www.feyhfarmseed.com/
Happy Apple's Farm	Tonganoxie, KS	816-260-6417	https://happyapplesfarm.com/
Leavenworth County Conservation District	Leavenworth, KS	785-338-9946	http://www.sccdistrict.com/
Sharp Bros. Seed Co.	Healy, KS	800-462-8483	www.sharpseed.com
Star Seed	Osborne, KS	800-782-7311	https://www.gostarseed.com/
Tri Star Seed Company	Springhill, KS	800-874-3308	http://www.tri-starseed.com/index.cfm
KANSAS PLANTS			
Grimm's Gardens	Hiawatha, KS	888-459-2586	www.grimmsgardens.com/hiawatha/
Happy Apple's Farm	Tonganoxie, KS	816-260-6417	https://happyapplesfarm.com/
Kansas Forest Service	Manhattan, KS	785-532-3300	www.kansasforests.org
Sunflower Farms	Cherryvale, KS	620-336-2066	
Vinland Valley Nursery	Baldwin City, KS	785-594-2966	www.vinlandvalleynursery.com
REGIONAL SEEDS			
Hamilton Native Outpost	Elk Creek, MO	417-967-2190	www.hamiltonnativeoutpost.com
Missouri Wildlflowers Nursery	Jefferson City, MO	573-496-3492	http://mowildflowers.net/
Stock Seed Farm	Mudock, NE	800-759-1520	http://www.stockseed.com/
Heartland Seed of Missouri, LLC	Eolia, MO	866-476-7333	www.heartlandseed.com
REGIONAL PLANTS			
Bluebird Nursery, Inc.	Clarkson, NE	800-356-9164	http://www.bluebirdnursery.com/
Critsite: Prairie and Wetland Center Retail Store	Belton, MO	816-331-9738	http://www.critsite.com/index.cfm/fuseaction/pwc.retail/index.htm
Missouri Wildlflowers Nursery	Jefferson City, MO	573-496-3492	http://mowildflowers.net/
Sow Wild Natives	Kansas City, MO	816-974-6201	http://sowwildnatives.com/
Great Plains Nursery	Weston, NE	402-540-4801	greatplainsnursery.com
Down to Earth Services	Kansas City, MO	816-207-7960	DTEKC.com
Easy Living Native Wildflower Perennials	Willow Springs, MO	417-469-2611	https://easywildflowers.com/

* Listing does not imply endorsement of products or services. Sources listed advertise a large selection of native plants.

NOTES AND DOODLES