Managing Iowa Habitats:

Restoring Iowa Prairies

Introduction

"Praerie", a French word meaning meadow, best described the grassy landscape unfamiliar to early European explorers. Throughout central North America, prairie grasslands dominated the natural landscape for at least 5000 years.

Prior to Euro-American settlement, 30 million acres of prairie stretched across Iowa. These graceful grasslands rapidly diminished under the pressure of urban and agricultural development over the last 150 years. Today, less than 0.1% of the original Iowa prairie remains.

With increasing awareness of the valuable role prairies play in the natural world, prairie communities throughout the Midwest are being identified, protected, and restored. This publication is to assist landowners interested in prairie restoration.

What is a prairie?

Though grass is the base, grasslands are incredibly diverse and complex natural communities. They thrive in regions where tree growth is limited by annual rainfall. With over 90% of the total weight of annual plant growth in grasses, prairie is different from any other natural community.

Some animals, like the badger, have large claws for burrowing into the prairie sod, a cool refuge from summer's heat.

A prairie community includes a variety of interacting plants and animals adapted for life in the open. Scantily clad in trees (less than one tree per acre), the prairie offers little relief from environmental extremes such as direct sun and wind. As such, prairie plants and animals have distinctive physical and behavioral adaptations.

Many prairie plants have extensive root systems, some reaching down as much as

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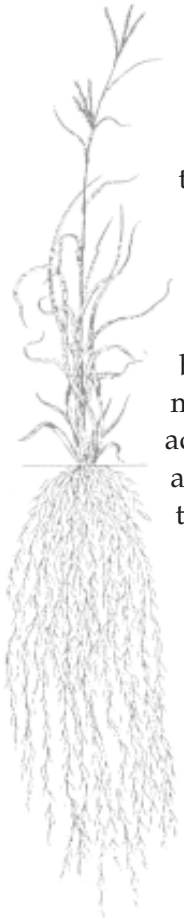
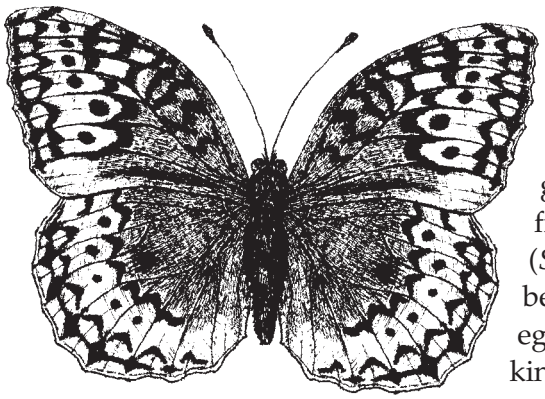
fourteen feet, accessing sources of nutrients and water. To minimize water loss through evaporation, prairie plant surface areas may be covered with specialized hairs, angled to reduce solar radiation, or formed to collect dew and absorb water directly into the stems.



Although there are some common adaptations shared by many prairie plants, there is variation between species. Individual species may have additional or different adaptations as a result of their association with a specific prairie type.

Some prairie plants, like big bluestem, are found in several kinds of prairies. Others, like the pasque-flower, are particular and grow in only one type of prairie. Within the prairie community, different species group together according to site conditions forming diverse clusters or "affinity groups".

In addition to plant affinity groups, there are noticeable patterns of plant and animal association. For example, the great spangled fritillary butterfly (*Speyeria cybele*) is believed to lay its eggs only on certain kinds of violets. Researchers studying this relationship suspect the decline in this butterfly's population is directly related to a loss of prairie habitat where rare violets, like the prairie violet, once thrived. Without a place to lay its eggs, the future of this elegant creature is uncertain.



The fritillary butterfly is an important member of the prairie community.

A variety of animals including butterflies, box turtles, bobolinks, and badgers play a significant role in the prairie community. The remainder of this publication focuses on restoring diverse prairie plant communities that will benefit both wildlife and people.

Types of Prairies

Throughout the Midwest, there are three clearly defined prairie communities: wet, mesic, and dry. Knowing the differences between these prairie communities is important when planning a prairie restoration. Understanding plant tolerances or "preferences" helps match the restoration site with plant species' characteristics. Successful prairie restorations mimic

Wet prairie is found where clay loam, silt or organic soils are predominant. They typically are found in low-lying areas but may be found on uplands where soils hold water.

Mesic prairie is found in areas between wet and dry. Rainwater does no t collect as in wet prairie. Although there's drainage from the soil, it's not as rapid as in dry prairies.

Dry prairie is found on sandy, well-drained soils, high above the water table. They are usually located in areas with low annual procipitation (less than 10 inches) or areas where rainwater rapidly runs off or soaks in.

native plant affinities, creating diverse prairie patches, similar to naturally occurring communities.

General Guidelines for Prairie Restoration

People restore and maintain prairie for many reasons. In addition to wildlife habitat, prairies are valuable for weed management, reducing runoff, soil erosion control and aesthetic appeal.

Planning is essential for successful prairie restorations. The existing vegetation, size, soils, topography, previous and adjacent land use, and available resources will influence site selection, as well as how to proceed.

Defining Restoration

By definition, restoration is *a process of bringing back to an original condition or to reestablish*. Restoration includes rehabilitating a degraded remnant, creating a prairie from scratch (reconstruction), or a combination. It involves identifying a prairie remnant or other suitable restoration area, evaluating site quality, and developing an appropriate long-term management plan.

Reviving Remnants

The techniques used in rehabilitating a degraded remnant are site-specific. The type and quality (condition) of the prairie largely determine how to proceed. Sometimes it is as simple as removing woody vegetation or interseeding - that is, sowing prairie seed directly into the existing turf. Other rehabilitation work is more complicated involving a combination of burning, chemical application, and seeding. When working with a remnant, often it is best to contact a professional resource manager to assist with developing a custom-tailored restoration plan.

Starting from Scratch

Ideally, when creating a new prairie, select the site well before the planned planting season. Allowing a full year to prepare for the reconstruction is usually sufficient. This allows time to assess important site characteristics and assemble the required materials in advance.

Soils play an important role in determining the appropriate prairie community for the reconstruction site. Anything that influences soil, like slope, aspect, and exposure to sun and wind, is also important. The moisture requirement of a plant species needs to match the site soil. Soil descriptions and maps are in county soil surveys available through the local Natural Resource Conservation Service (NRCS).

Evaluating the plants existing on the selected site is important for several reasons. In addition to identifying existing prairie plants, evaluating the vegetation identifies potentially troublesome plants.

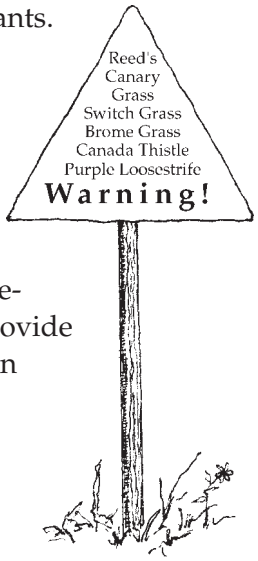
Shade from neighboring woodlands or pesticide drift from adjacent agricultural fields can interfer with a reconstruction effort.

Methods and Techniques

Site Preparation

The most labor-intensive phase of reconstruction is site preparation and may include chemical and/or mechanical techniques. The goal is to provide a firm seed bed with little competition from weedy vegetation.

If the reconstruction site has a perennial cover (e.g. lawn, pasture, or old field), application of a glyphosate herbicide may be necessary to destroy the existing vegetation before planting. Prior to chemical application, closely mow the site, rake the vegetation, and allow it regrow to 6-8 inches in height. Perennial weeds are susceptible to herbi-



Some plants are difficult to control

cides during autumn. Chemical application is most effective prior to the first frost. Follow the label directions for specific chemical application instructions. Any questions should be directed to a local weed control expert.

Temperature and humidity affect prairie seed viability. Store prairie seed in a cool, dry, pest-free environment.

Mechanical methods, such as plowing or discing, are the quickest means of preparing larger reconstruction sites if the farm equipment is accessible. Several shallow turnings (no deeper than 2 inches) of the earth are effective in eradicating surface weed seed banks. Deep tilling of previously farmed fields simply stirs up and exposes additional seeds. The frequency of the shallow tilling depends on the seed bank and the type of emergent weed seedlings.

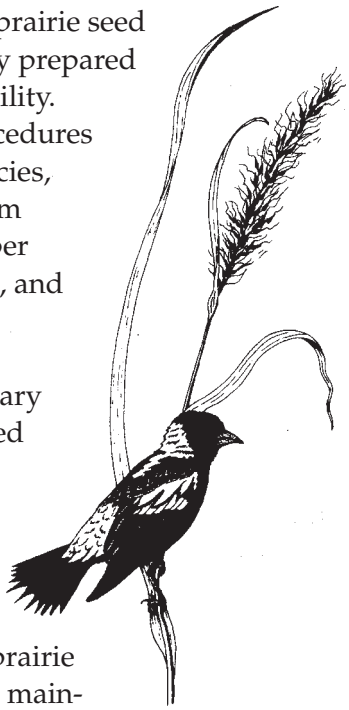
Before planting prairie seed, the freshly tilled soil must be packed. Because well-packed soil eliminates air passages, young seedlings are protected from drying out and death. Soil packing is believed to be a critical step in prairie reconstruction. A cultipacker is often used prior to and after planting.

Planting Methods and Options

Certain species of prairie plants are easily started from seed. Other species are readily transplanted as seedlings or root-stock. Proper propagation methods increase planting success rates. Another way to increase planting success is to use the appropriate ecotype - a native variety adapted to the local growing conditions.

Seeding

For large areas, seeding is most practical. Prairie seed is available for purchase from a variety of dealers or you may also hand-collect the seed yourself. There are advantages to both methods of acquiring seeds. Available resources (economic and human), as well as the project size, will likely determine whether the seed is purchased or hand-collected.



Hand-collected prairie seed must be properly prepared to maintain viability. Preparation procedures vary among species, but at a minimum involve the proper drying, cleaning, and storage of seeds.

It may be necessary to subject the seed to special treatments which mimic natural conditions or processes. For example, some prairie seeds need to be maintained in moist-cold conditions (similar to winter) for 3 months prior to planting. This can be achieved by

Treatment requirements of some prairie species

No Treatment Required	Moist-Cold Treatment	Scarification
thimbleweed	compass plant	leadplant
silky aster	prairie dock	false indigo
stiff tickseed	blazing star	New Jersey tea
most grasses	needle grass	purple prairie clover

placing seeds in an equal volume of moist (not wet) vermiculite (which can later be broadcast together) and storing them at a temperature between 34˚-38˚ F.

Another special treatment commonly applied to prairie seed is scarification, - a process which scratches tough seed coats making water and nutrient absorption possible. Scratching the seed coat by rotating seeds in a sandpaper-lined can or with a sanding block, mimics the roughening process of passing through the digestive tract of an animal.

If planning to hand-collect seed, contact and obtain permission from land owners before gathering seed from private or public lands. To protect the resource, practice conservative collecting. For common species like big bluestem or Indian grass, take no more than 1/5 - 1/3 of the seed crop in one season. From rare plants, collect only a few individual seeds.

Specialized native-seed drills and hand or mechanical broadcasters are two methods for planting prairie seed. Native-seed drills are expensive and sometimes produce a "row-like" appearance. Often they can be borrowed from a local County Conservation Board (CCB) or Pheasants Forever chapter.

Recommended Seeding Rate for Prairies

Grasses:	10- 14 lbs./acre
Forbs:	.5 - 2 lbs./acre

Economical seeding alternatives include mechanical or hand broadcasting. Mechanical broadcasters vary in size, shape and cost. Scattering the seed by hand from a bag is the cheapest method of seeding but, is impractical for large plots. After broadcast seeding, rolling or cultipacking is necessary to ensure good seed-soil contact.

Seed germination is 1-2 years in some species. A seed mix including 5-8 species of grass and 15-20 flowering species is a good beginning. In the early stages of reconstruction, expect a "weedy" appearance. It may take three years or more for some flowering prairie plants to bloom.

Transplanting

Although laborious, hand transplanting of seedlings is appropriate for some types of prairie reconstruction. It is sometimes used for small sites or to introduce a few specific plants to a degraded remnant.

Seedlings should have well-developed roots and 4-5 true leaves before transplanting. Transplanting requires intensive weed and water maintenance for 1-2 growing seasons or until the plants are established. Some species of prairie plants or rootstocks are available from local nurseries.

Maintenance Guidelines

For the first two growing seasons, the primary maintenance objective is competition control. Because prairie plants are often slow to start, the goal of competition control is to eliminate rapidly growing annual weeds.

If the site is small, it is possible to control competition by selectively removing aggressive weeds by hand or mowing the weeds before seeds are set. On most large sites, mowing with a "flail type mower" at a height of 6-12 inches discourages taller weeds and does not harm young prairie plants growing below the weeds.

Once a prairie is established, prescribed burning is an effective management tool.

Having evolved under the influence of naturally occurring fires, prairies respond favorably to controlled fires. Training and/or experience is strongly recommended before private landowners implement *any* fire management regime. Contact a local CCB or fire department for assistance.

The Future of Iowa's Prairie

The growing interest in prairie restoration is important to the continuation of this unique natural community. Once plants are established, prairie wildlife may return. Private landowners have the opportunity to make small, but significant, contributions to returning the prairie to Iowa's landscape. The primary objective of this publication is to assist landowners in this process. Prairie restoration is a new science; the procedures involved are not always black-and-white. New information is continually being made available as the understanding of restoration processes grows.

Sources for Additional Information and Technical Support

Iowa Department of Natural Resources, Wallace Building, Des Moines, IA 50319 515/281-5145

County Conservation Boards – Listed under the "Government-County" section of your local phone book

Natural Resource Conservation Service—County offices listed under "Government—Federal, USDA" section of your local phone book.

Soil Conservation District—Listed under the "Government-County" section of your local phone book.

The Nature Conservancy, 108 3rd St., Suite 300, Des Moines, IA 50309, 515/244-5044

Pheasants Forever, 1205 Ilion Ave., Chariton, IA 50049, 515/774-2238

Iowa State University Extension Service—County offices listed under the "Government-County" section of your local phone book.

Other Iowa State University Extension Publications Useful in Prairie Restoration

IAN-203	Iowa Prairies
IAN-301	Iowa's Spring Wildflowers
IAN-302	Iowa's Summer and Fall Wildflowers
IAN-405	Iowa Food Webs and Other Interrelationships
IAN-407	Iowa Biodiversity
IAN-501	Changing Land Use and Values
Pm-1302a	Managing Iowa Wildlife: Pocket Gophers
NCR-338	Shelves, Houses and Feeders for Birds and Mammals

Selected Wet, Mesic, and Dry Prairie Plant Species

Wet Prairie Species

Common Name	Scientific Name
common horsetail	*Equisetum arvense*
blue joint grass	*Calamagrostis canadensis*
cord grass	*Spartina pectinata*
bristly sedge	*Carex comosa*
fox sedge	*Carex vulpinoidea*
yellow stargrass	*Hypoxis hirsuta*
blueflag iris	*Iris shrevei*
small white ladyís slipper	*Cypripedium candidum*
purple meadow rue	*Thalictrum dasycarpum*
Canada anemone	*Anemone canadensis*
bottle gentian	*Gentiana andrewsii*
swamp milkweed	*Asclepias incarnata*
Culverís root	*Veronicastrum virginicum*
cup plant	*Silphium perfoliatum*
New England aster	*Aster novae-angliae*

Mesic Prairie Species

Common Name	Scientific Name
Canada wild rye	*Elymus canadensis*
big bluestem	*Andropogon gerardii*
thimbleweed	*Anemone cylindrica*
prairie smoke	*Geum triflorum*
white false indigo	*Baptisia bracteata*
leadplant	*Amorpha canescens*
New Jersey tea	*Ceanothus americanus*
rattlesnake master	*Eryngium yuccifolium*
downy gentian	*Gentiana puberulenta*
butterfly milkweed	*Asclepias tuberosa*
Maximillianís sunflower	*Helianthus maximiliani*
pale purple coneflower	*Echinacea pallida*
smooth blue aster	*Aster laevis*

Dry Prairie Species

Common Name	Scientific Name
prairie dropseed	*Sporobolus heterolepis*
needle grass	*Stipa spartea*
side-oats grama	*Bouteloua curtipendula*
little bluestem	*Schizachyrium scoparium*
big bluestem	*Andropogon gerardii*
pasque-flower	*Anemone patens*
purple prairie clover	*Dalea purpurea*
leadplant	*Amorpha canescens*
prairie violet	*Viola pedatifida*
hoary puccoon	*Lithospermum canescens*
tickseed	*Coreopsis palmata*
aromatic aster	*Aster oblongifolius*
blazing star	*Liatris aspera*

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