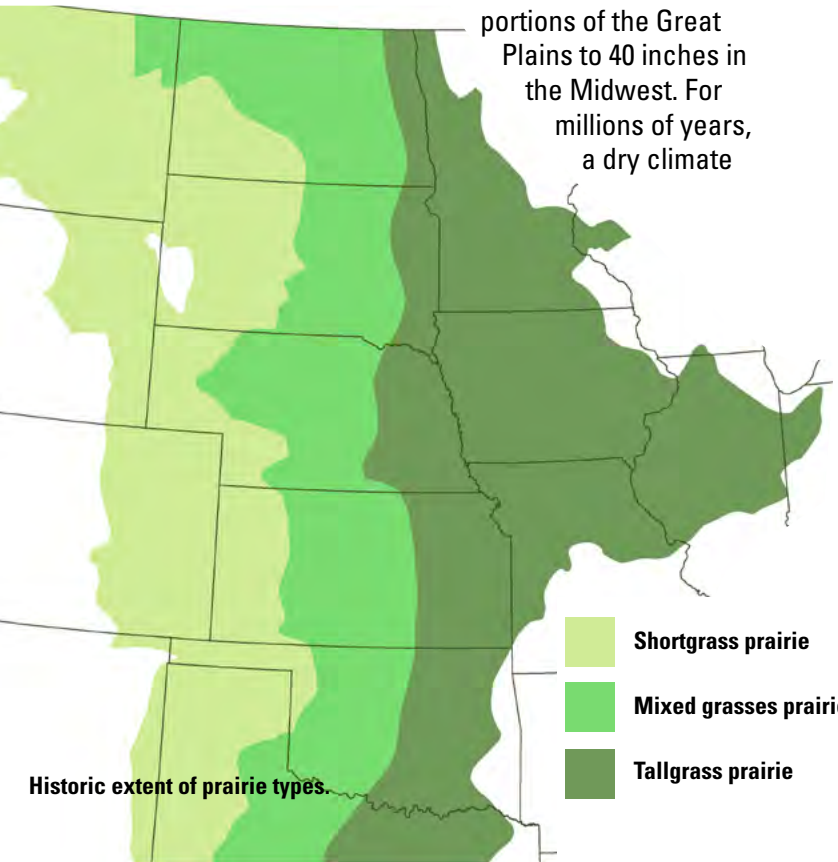
PRAIRIES

McFarland Park, Story County

Iowa, more than any other state in the country, is defined by its tallgrass prairies. No other state can claim this single ecosystem as dominant from border to border. It created soils that are the backbone of our economy and hosts the life that defines our experience in nature.

Climate, mountain formation, and large herbivores contributed to the development of central North America's grasslands, the ancestral ecosystem to our present-day prairies. The rise of the Rocky Mountains, which ended 40 million years ago, created a rain shadow from the mountains east toward Iowa. Dry air on the east side of the mountains caused a gradient in annual precipitation from ten inches in the western portions of the Great Plains to 40 inches in the Midwest. For millions of years, a dry climate combined with warm temperatures, frequent fire set by indigenous people, and grazing by large herbivores, directed the evolution of grassland plants and animals.

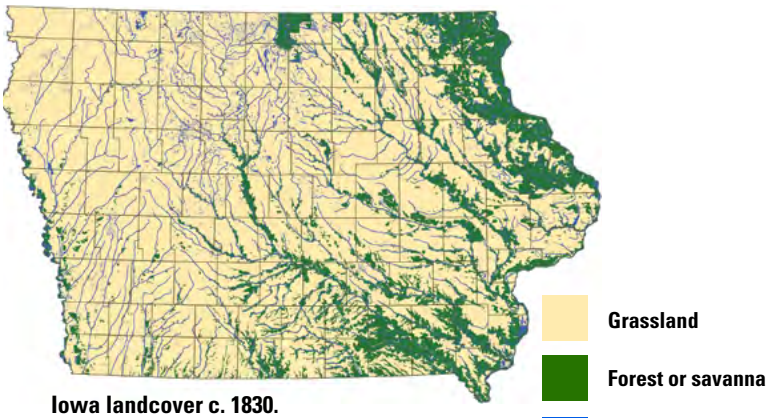


Historic extent of prairie types.

In the last one million years, at least ten glaciations have occurred, each time causing southward plant and animal migrations. Each of these glaciations were followed by northward migrations during the interglacials, or time between glaciers. The Iowa prairie that we are familiar with today developed over the last 12,000 years as the result of the current interglacial and the migration of plants and animals.

TYPES OF PRAIRIES IN IOWA

Three distinct prairie ecosystems fill the mostly treeless landscape in the Great Plains and Midwest. This area is part of the central North American grassland biome created by the Rocky Mountain rain shadow. A biome is a region with similar climate, animals, and plants. Shortgrass prairie occurs in the western Great Plains, mid-grass prairie in central North America, and tallgrass prairie in the eastern Great Plains. This pattern is created by the increasing precipitation that occurs from west to east. Since Iowa is located in the eastern margins of the Great Plains biome, Iowa is in a tallgrass prairie climate. Tallgrass prairie is easily distinguished from its western counterparts due to the greater height and density of plants and the dominance of tall grasses like big bluestem, Indiangrass, switchgrass and prairie cordgrass. Some of these plants can grow up to ten feet tall. However, not all tallgrass prairie is the same. Finer divisions of prairie



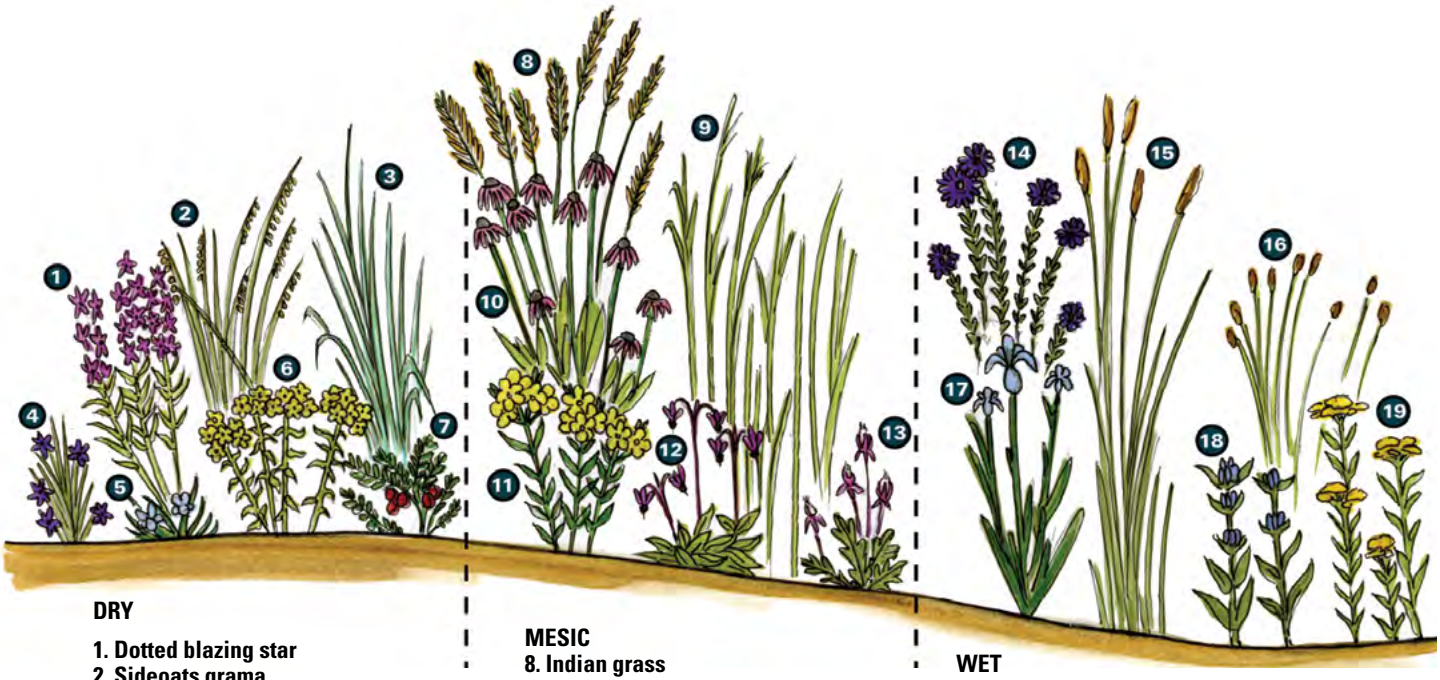
Iowa landcover c. 1830.

Iowa landcover today.

communities can be recognized due to three factors: soil moisture and fertility, environmental disturbance, and plant species distribution.

The most prominent of these three factors is soil moisture and fertility. Soil fertility changes with position on the landscape. Higher soil fertility and moisture are found in low-lying areas while lower soil fertility and moisture are found on hills and south or west-facing slopes. Three types of tallgrass prairie are associated with this gradient from dry to wet – dry tallgrass, mesic tallgrass, and wet tallgrass prairie. Dry tallgrass prairie is found on the upper portions of south and west-facing slopes and in gravelly or sandy soils. The most common and widespread tallgrass prairie across Iowa is mesic, which has medium moisture and is damp but well-drained. Wet tallgrass prairie is often next to wetlands, such as pothole marshes common in north central Iowa.

In addition to these three common types of tallgrass prairie, there are some unique prairie ecosystems found in Iowa where soils, topography, or the timing of disturbances allows them to grow. These three unique prairies are goat or hill prairies, sand prairies, and savannas.



DRY

1. Dotted blazing star
2. Sideoats grama
3. Little bluestem
4. Blue-eyed grass
5. Birdfoot violet
6. Hairy puccoon
7. Ground plum

MESIC

8. Indian grass
9. Porcupine grass
10. Pale purple coneflower
11. Hoary puccoon
12. Shooting star
13. Prairie smoke

WET

14. New England aster
15. Prairie cordgrass
16. Running sedge
17. Blue flag iris
18. Closed gentian
19. Riddell's goldenrod

Goat and Hill Prairies

Although Iowa has a climate where tallgrass prairie dominates, there are places where mid-grass prairie thrives. Mid-grass prairies can be found in very gravelly and sandy soils, or on steep south or west-facing slopes. They occur on the higher slopes of the Loess Hills in western Iowa and on the rock-studded, thin soils associated with steep hillsides in northeast Iowa. These prairies are often called goat or hill prairies and share the dominant grasses of mid-grass prairie: side-oats grama, little bluestem, and rough dropseed. The tallest of these grasses is little bluestem, which can grow up to four feet tall, but many of the other plant species are vastly different due to their location. Loess Hills prairies have a distinctly western flavor due to its proximity to the Great Plains, while northeast Iowa goat prairies are populated by short-statured plant species found throughout the upper Mississippi Valley and Great Lakes region.

Goat Prairie near Bluffton, Winneshiek County.

Sand Prairies

Perhaps the most unique prairie community in Iowa is sand prairie. These occur in the eastern half of the state in association with large river valleys. They are the result of dunes formed by strong winds blowing sand out of the river valleys and on to the adjacent uplands. They support flora and fauna much different from typical "black soil" Iowa prairie. Loosely aggregated sand particles create what soil-scientists call a soil with high porosity. This means that water quickly passes through the soil and makes sand prairies susceptible to drought. Low clay and organic matter content of the soil also makes sand prairies relatively infertile compared to their black soil counterparts. The result is a prairie community characterized by uncommon flora and fauna that are adapted to a stressful environment, such as prickly pear cactus.

Sand prairie detail.

Ornate box turtle with prickly pear cactus in Wapello County.

Prairie Skippers

Skippers are a unique family of butterflies common in prairies, but often overlooked because of their small size. A subset of the skippers are known as grass skippers because their caterpillars only eat grass. Frequently the grasses they eat, such as sideoats grama or little bluestem, are only found on prairies. The caterpillars not only eat the grass, but also weave together blades of grass to form a shelter, only emerging at night to snip off a blade of grass for nourishment. Many of the species in this group are declining. One example of a grass skipper is Leonard's Skipper, which as a caterpillar that eats primarily sideoats grama and little bluestem. It is only found on the dry, gravel-ridged prairies in the Loess Hills in western Iowa or the goat prairies of northeast Iowa.

Leonard's skipper on a blazing star species.

Cedar Bend Savanna

Savannas

Savannas are a unique fire-dependent ecosystem made up of plant species common to both woodlands and grasslands, or uniquely adapted to the intermediate sunlight conditions found only in savannas. The most common savanna tree is the bur oak. The bur oak's thick bark and extensive root system are well-adapted to surviving hot prairie fires. In a savanna, an oak tree doesn't have competition, so its lower limbs are able to spread out wide and become much larger than oaks in forests. These open-grown oaks are the best indication of a savanna. Another unique characteristic of a savanna is the amount of tree canopy. When looking up in a savanna, the leaves of the trees fill only 10-60% of the sky. In forests, the canopy of leaves can fill the sky completely. Savannas at the low end of this canopy percentage contain more sun-loving prairie plants. Shade-tolerant woodland plants make up the bulk of plant material at the high end of the canopy percentage. Because of their place between two ecosystems, savannas include a large diversity of plant and animal species. Bottlebrush grass, late horse gentian, and compass plant are a few unique plant species that can be found in savannas.

Bottlebrush seed head.

Bottlebrush grass (*Elymus hystrix*) is well-named. Its inflorescence, arrangement of flowers, resembles a sparsely-bristled bottle brush. The species' scientific name, hystrix, refers to the European porcupine or hedgehog, and is used to describe the quill-like spikelets and awns in its seed head. In the Midwest, bottlebrush grass appears to have been a savanna and open woodland species, although undisturbed examples of those habitats are rare. Populations now occur in forests that were formerly savannas or open woodlands but have been overtaken by shrubs and small trees that have closed in the canopy. Bottlebrush grass flowers during mid-summer and typically reaches 3–4 feet in height. Several insects feed on the foliage, including the larvae of the northern pearly eye butterfly, leaf-mining larvae of several species of moths, leaf mining larvae of a beetle and fly, aphids, and leafhoppers.

Late horse gentian.

Late horse gentian or wild coffee *(Triosteum perfoliatum)* is a perennial forb, or wildflower, that ranges from 2–4 feet in height. The genus Triosteum is Greek for "three bones" and refers to the three hard nutlets in each fruit. Habitat descriptions for late horse gentian range from open, grassy fields and meadows to oak savanna and woodland openings. It appears to prefer thin or rocky soils and dry-mesic sites, which suggests ecosystems like savannas and open woodlands. They are generally pollinated by long tongue bees such as bumblebees. Larvae of the rare and cryptic moth species Sympistis forbes (Forbes' sallow) is believed to be associated only with Triosteum. In some parts of its range, overgrazing by whitetail deer is thought to be threatening populations of late horse gentian. Native Americans used late horse gentian for several medical remedies, especially the root for treating fevers, colds, pneumonia, snakebite, and as a poultice (paste for wounds). Some early European colonizers dried and roasted the seeds and used them as a coffee substitute, hence its other name "wild coffee."

The species' scientific name for compass plant *(Silphium laciniatum)* means divided or cut into narrow segments, which describes the deeply lobed leaves. Compass plant's native range in Iowa includes the entire state, and it is mostly associated with wet or moist to slightly dry soils. The common name refers to the compass orientation of the larger leaves whose broad surfaces face east and west to catch as much early-morning light as possible while also limiting water loss during the hotter mid-day hours. Compass plant is an icon of the tallgrass prairie. Compass plant flowers, which are spread out along a tall, stout stem that can reach ten feet tall, are usually pollinated by various bees. The tall plants are used for perches by birds. Herbivores relish the leaves despite their tough, leathery texture. Other plants in the *Silphium* genus that rise majestically above the prairie with their yellow flowers include rosinweed, prairie dock, and cup plant.

Compass plant.

NATURAL SUCCESSIONAL FORCES THAT ALTER PRAIRIE ECOSYSTEMS OVER TIME

Although prairie ecosystems can prevail on a certain piece of land for hundreds or even thousands of years, the dominance of the herbaceous plants like grasses and wildflowers that define prairie ecosystems are almost always threatened by the encroachment of woody vegetation through natural succession. Indeed, small quantities of woody plants like shrubs or even trees such as those found in savannahs, are important elements of many prairie ecosystems. But in the absence of disturbances like those caused historically by grazing animals and fires, what was once prairie could quickly transition into a forest or shrubland ecosystem as woody plants can colonize and shade out prairie plants, preventing them from growing. The threat of prairie invasion from woody plants is greatest in eastern and southern Iowa where annual precipitation is greater. Annual precipitation decreases across the western and northern parts of the state where climate makes competition from trees and shrubs more difficult. In addition to these successional pressures that might cause a prairie to transition into a forest or shrubland ecosystem, succession also occurs within prairie plant communities themselves, as some prairie plants are more uniquely adapted to frequent disturbances than others. Eroded stream or river banks, wind-blown sands or other sediments, or bare spots created by the wallowing or trampling of plants by bison or cattle creates a blank canvas on which the earliest invading annual plants of the prairie can establish. Through time this patch may transition to more of a dominance of perennial grasses and wildflowers, first favoring early successional perennials like Canada wild rye, that eventually give way to later-successional grasses like big bluestem and wildflowers like *Silphium*s, like compass plant and cup plant. Small scale succession in patches of disturbance can increase biodiversity within the prairie and be beneficial. Fire, grazing, or even mowing, allows prairie plant communities to dominate for a long time. With these disturbances that reduce encroachment of woody vegetation, prairie ecosystems can persist through periods of succession. Prairie communities across Iowa are changing ecosystems that are shaped by disturbance and natural succession.

LIFE IN THE PRAIRIE

From a distance, the simple uniform appearance of prairie grasses and wildflowers may mask the presence of the complex food web the prairie supports. It all starts with the producers, or plants, that absorb the sun's rays on the prairie to create food for themselves and others. More than 300 species of grasses, wildflowers, shrubs, and vines have been documented to occur in Iowa prairie ecosystems. Unlike the forests, where trees steal the show, or aquatic communities, where water attracts the eye, prairies have perhaps the most diverse cast of all.

In early spring, the eastern pasqueflower welcomes the sun back to the northern hemisphere, its white flower emerging immediately following the snowmelt. Soon after, the blooms of the golden alexander emerge and light the prairie as it begins a journey through the color wheel. The prairie rose, Iowa's state flower, follows, bringing humble shades of pink and white to the scene before the vibrant arrival of purple coneflowers and milkweeds. Next is the butterfly weed, displaying an orange unrivaled by any other plant in the state. The grasses join these plants with modest flowers and petals that fall like rain when disturbed by prairie explorers. The sequence of blooms continues to swell through the summer until July and August bring a bouquet of yellow flowers that seem to have absorbed a season's worth of sunlight, reaching tall for more. The yellows of late summer *Silphiums* and sunflowers eventually give way to the grand finale: the bold purples and whites of the asters and one last shot of gold from the goldenrod, as if to honor the springtime memory of the golden alexander who started the show.

Prairie, like no other ecosystem in the state, is characterized by its plant diversity and not by one dramatic species or group of species. These plants, or producers, are the base of the food web within the prairie and provide shelter for many animals that call the prairie home.

Regal fritillary on an aster.

The plant eaters, or primary consumers, have an abundance of choices between grasses and wildflowers when it comes to food. While the large primary consumers, such as elk or bison, have not been present for more than 150 years, many primary consumers remain to take advantage of the prairie's herbaceous bounty. Important primary consumers in the prairie include many insects. Dozens of grasshopper species exist on the prairie, which can go through periods of population explosion that changes the composition of prairie plants. Hundreds of butterfly and moth caterpillars feast on the grass and flowering plants with varying degrees of pickiness. Soaring above the prairie and visiting the flowers are the adults that transformed from the caterpillars. The regal fritillary is the grandest of the butterflies found in this ecosystem. Prairies are the only habitat where regal fritillary caterpillars' host plants, blue prairie violet or birdfoot violet, grow. Butterflies are joined by many species of bees that also drink nectar from prairie flowers and are crucial for successful pollination. Mice in the prairie, like the western harvest mouse, are typically primary consumers

Flowers of Iowa's tallgrass prairies.

Eastern pasqueflower

Wild rose

Butterfly milkweed

New England aster

White panicle aster

Monarch on showy goldenrod

as well, and also play an important role as seed dispersers. The plains pocket gopher, the prairie vole, and even white-tailed deer are other examples of primary consumers in the prairie.

An abundance of primary consumers increases food choices for secondary consumers, or smaller predators. Insects are favored by many secondary consumers like grassland birds, such as dickcissels and bobolinks, who gather these insects and feed them to their young hidden in nests built in the grasses and wildflowers. The grasshopper mouse is primarily carnivorous, eating invertebrates like grasshoppers, and also attacking small vertebrates like voles. Bullsnakes, Iowa's largest snakes, have pocket gophers and prairie voles among their menu items.

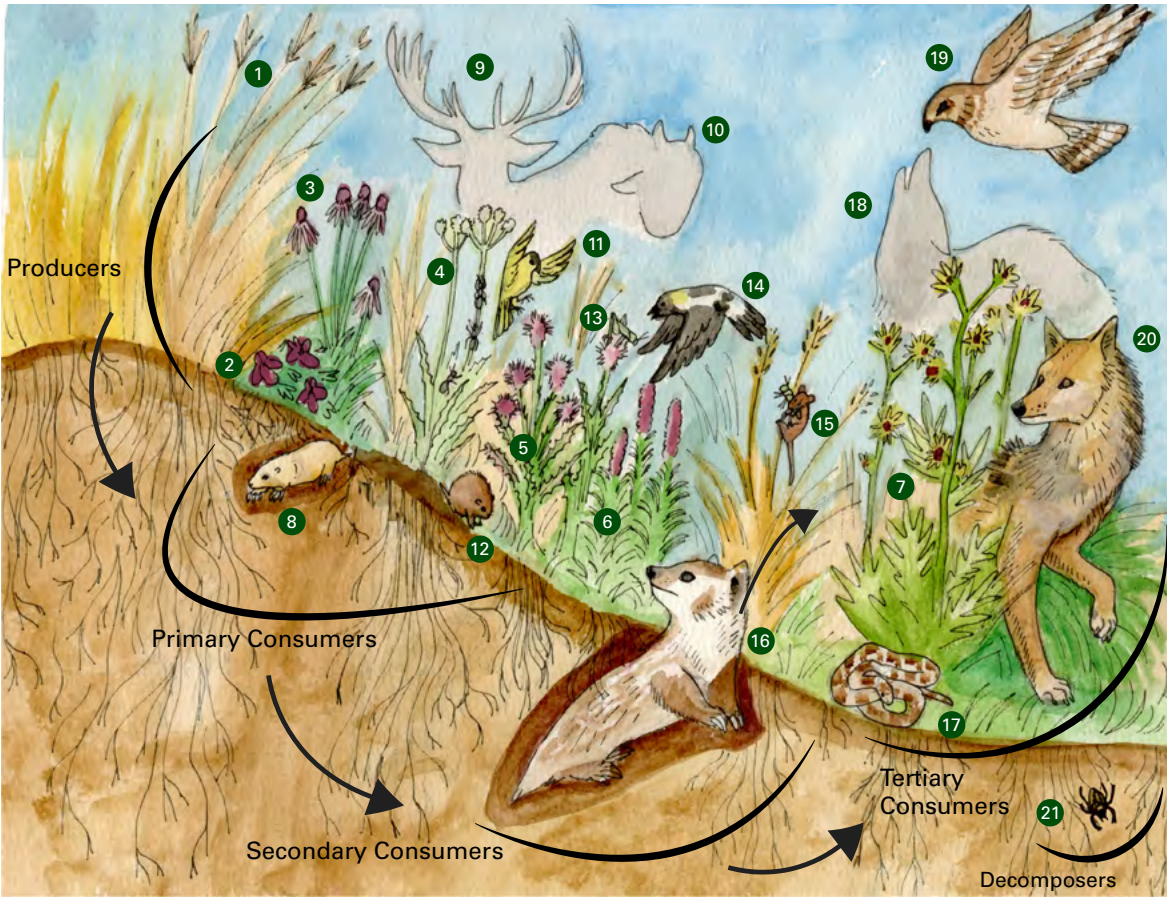
The prairie's secondary consumers support a thriving community of larger predators, or tertiary consumers. Two prairie-specific raptors, the northern harrier and short-eared owl, are also notable among predator birds for their habit of nesting on the ground rather than in trees. Coyotes are also members of this small group. It once included wolves, but they have not had a permanent presence in Iowa's prairies since the late 1800s.

Animals in the soil play important roles in the prairie ecosystem and food web as well. Many prairie invertebrates live underground and serve as important decomposers. Nematodes, worms, millipedes and sowbugs all help process dead vegetation the prairie produces. The dung beetle is also important for breaking down waste from other animals on the prairie. Many invertebrates like grubs eat plant roots, keeping some plants in check. Larger soil dwellers like the American badger or pocket gopher dig up and throw out soil, which helps encourage plant diversity. Pocket gophers are primarily herbivores, eating the roots and stems of the prairie plants, while the badger's preferred meal are the pocket gophers and ground squirrels it often traps underground. Other species, such as the plains spadefoot toad and prairie crayfish spend nearly all their time underground to avoid the harsher and drier conditions aboveground.

Iowa's prairies are teeming with life, both plant and animal. They range from the humble dung beetle, which is an important decomposer, to the majestic northern harrier, a prominent tertiary consumer. All of these animals play a role in the prairie food web and shape the prairie community.

Big Bluestem

The genus name *Andropogon* is derived from the Greek words "Andros" meaning man and "pogon" meaning beard in reference to the hairs on the spikelets (group of small flowers) of some species in the genus. Big bluestem is the "king" of the tall grasses, a dominant species in many prairie communities that make up the tallgrass prairie ecosystem. It occupies savannas and all kinds of prairie, from dry gravelly or sandy sites to moist or wet black soil sites. Big bluestem provides tallgrass prairie herbivores with nutritious forage, prairie seed-eating birds with a source of food, and small mammals and birds with nesting and winter cover. It also protects soil from erosion and supplies fuel for supporting fire.



PRODUCERS
1. Big bluestem
2. Bird food violet
3. Purple coneflower
4. Rattlesnake master
5. Field thistle
6. Blazing star
7. Compass plant

PRIMARY CONSUMERS
8. Plains pocket gopher
9. Elk – extirpated
10. Bison – extirpated
11. American goldfinch
12. Prairie vole
13. Two-lined grasshopper

SECONDARY CONSUMERS
14. Bobolink
15. Grasshopper mouse
16. American badger
17. Bullsnake

TERTIARY CONSUMERS
18. Wolf– extirpated
19. Northern harrier
20. Coyote

DETRITIVORES/DECOMPOSERS
21. Earth boring dung beet

Birdfoot Violet *(Viola pedata)*

Viola is the classic Latin name for any sweet-scented flower. The species name, *pedata*, means foot-like, referring to the deeply lobed leaves that resemble the feet of birds. Birdfoot violet is seldom more than six inches tall, so it does best in habitats where the growth of other species is limited. In Iowa, it is associated with undisturbed or remnant sand prairie as opposed to a planted or reconstructed prairie. Its native range is the eastern two-thirds of the state. The flowers attract long-tongued bees, and especially small butterflies and skippers. Seed dispersal in violets is a two-step process. As the fruit matures, pressure builds inside to the point where it ruptures the fruit wall and seeds are forcibly ejected. Dispersal distance in some species is more than 20 inches. Then seeds are further dispersed by ants, who are attracted to a specialized structure called an elaiosome. These are fleshy, edible appendages derived from the seed coat that are rich in oils and also contain proteins and starch. Ants will carry the seeds back to their colony, remove the elaiosome, and discard the seed. Birdfoot violet is one of many violets that are critical host plants to the regal fritillary, a rare butterfly native to Iowa's prairies.

Birdfoot violet

Field Thistle (*Cirsium discolor*)

The species name "*discolor*" means with two colors, in reference to the top and bottom sides of the leaves. Field thistle is a biennial, meaning the plants live for two years, flower once in their second year, and then die. Occasionally some plants will live three or more years before they flower in their last year and die. Due to its relatively short lifespan and a one-time reproductive strategy, it is adapted to grow in areas that have been recently disturbed. This reproductive strategy is designed to build an energy reserve for two to several years, then allocate all of that energy to reproduction in its last year. This approach facilitates greater plant height and a huge number of flowers. Producing a large number of seeds and releasing them from as high as possible increases the number of seeds that disperse far away from the mother plant and the probability that seeds find a disturbance. Unlike non-native thistles, such as Canada thistle (*Cirsium arvense*), field thistle does not normally become invasive. Field thistle occurs throughout Iowa. It is very attractive to many pollinators including bees, butterflies, sphinx moths, and flies.

Field thistle flower and underside of leaf.

Pale Purple Coneflower *(Echinacea pallida)*

Echinacea comes from the Greek word echinos meaning hedgehog, in reference to the spiny center of the flower where fruits and seeds are produced. Pale purple coneflower is found across the state except for the extreme northeast corner. It is most common in fully sunlit prairies with moist to slightly dry soils. Stems and leaves are rough to the touch due to short, stiff hairs. The roots of all *Echinacea* are commercially important for medicinal purposes. Native Americans used the plant to treat a variety of ailments, including burns, bites, arthritis, toothache, and rheumatism.

RESTORATION AND MANAGEMENT OF PRAIRIES

Although the overall extent of prairie in the state has been reduced considerably, Iowans are finding creative ways, large and small, to reconnect with and reestablish prairie in our state. Remnant prairies, including those less than an acre to hundreds of acres in size, are being protected on both public and private lands. Remnant prairies have never had their plant community or soil structure altered by tillage or been directly altered through artificial drain projects. In urban areas, prairie plants are being planted in pollinator gardens and along roadsides, trails, and streams. In crop fields, some landowners are converting as little as 10% of a field to small strips and patches of prairie, which can reduce soil erosion and water pollution by 90%. Prairie pastures can replace ancient plant-bison relationships with cows. Today, around 11% of Iowa's land area is in some kind of grassland ecosystem, and hard work in these areas and strategically selected new areas can restore the ecological functions of prairies back into Iowa's landscape.

Prairie Reconstruction

Prairie reconstruction involves planting the seeds of native prairie plants in crop fields, pastures, or urban areas to establish a new prairie. Whereas remnants can be generally maintained for a relatively low cost through thoughtful applications of prescribed burning, grazing, haying, and other forms of brush and invasive weed control, prairie reconstruction requires more expertise, resources, and patience to establish and manage. Researchers and prairie managers and enthusiasts have been learning the tricks to prairie reconstruction in Iowa for decades and are becoming more and more proficient at creating diverse communities of native prairie plants and the animals that depend on them through careful management and planning. The largest-scale example of successful prairie reconstruction in Iowa can be found near Prairie City, where the Neal Smith National Wildlife Refuge has created thousands of acres of tallgrass prairie with a rich diversity of native plants and wildlife, even including elk and bison, on land that was once farmed.

Prairie Management

There are four main ways a prairie is managed. The first of these is fire. Prairie is a fire-dependent ecological community. These fires were once set by lightning or through the activities of indigenous people managing the land actively or accidentally setting fires. Today, most fire used in prairie management is called prescribed fire because it is set and planned with the careful oversight of prairie managers seeking to manage prairie vegetation and minimize risk to neighboring farms or property. Fire can remove woody invasive species, such as eastern red cedar. It can also burn off years of built-up plant material, creating a more open environment to allow new species to grow.

Planting prairie seed with a seed drill.

One-year-old prairie.

Mature prairie planted from seed.

A suite of practices known collectively as mechanical control is the second prairie vegetation management practice. Mechanical control includes digging up trees, cutting, and mowing. Mowing can be used in prairies where fire is not a feasible option. If done in the spring, mowing can help control cool-season invasive plants, such as smooth brome, that grow well in the spring's lower temperatures before native warm-season prairie plants start to grow after temperatures increase later in the season. Targeted removal of some problematic plants, especially woody plants, with saws or even hand tools can also be an effective method to keep prairie vegetation diverse and intact.

The third common method of prairie management is called biological control. In contrast to mechanical control, which uses people and their mechanical tools, biological control uses the "natural enemies" of a plant to control it. Possible controls include the introduction of an insect to feed on certain plants, or using goats or cattle to graze on an area to knock all of the vegetation back. Grazing animals have always been a critical component of vegetation communities in prairies, and today managers and landowners are using domestic grazing animals to mimic those historical plant-animal relationships.

The final tool for prairie management is chemical control. This management tool uses herbicides to control invasive or aggressive species. It is often used in conjunction with other management options.

Invasive Plants

Many of the challenges in prairie reconstruction and management come from invasive species. Some, such as eastern red cedar or a diversity of annual plants, are native, but without active management can become invasive and take over a prairie. Many invasive species that are problematic in prairies were introduced as people became more mobile and plants and animals from faraway places moved with them. Exotic species pose management challenges in prairies because they can thrive in the altered state of prairies where native plants struggle to adapt. One major prairie management challenge is reed canary grass that can form a dense stand that limits diversity of other plant species in wet areas where there is little disturbance like grazing. Applying the prairie management tools discussed above to these sites can help increase native plant diversity and make these grassland environments more functional for the plants, animals, and people that use them.

Prescribed fire burn at Chippewa Prairie.

Mowing a first year prairie planting in Story County.

Goats used for management at Robison Wildlife Acres, Story County.

INVASIVE SPECIES IN THE PRAIRIE

There are dozens of problematic invasive species in Iowa's prairies. Here are three common challenging invasive species:

Yellow Sweet Clover

Yellow sweet clover was introduced to North America in the 1600s from Eurasia. It was most likely spread by beekeepers and livestock owners as forage. Sweet clover degrades prairies by shading out native plants and reducing diversity. The seeds stay viable for many years in the soil, making this a hard plant to control and eradicate.

Yellow sweet clover.

Smooth Brome

Smooth brome is a cool-season grass introduced for forage from Eurasia around 1880. It is aggressive and its habit of forming dense colonies outcompetes native plants. Many prairie plants do not grow well until warmer weather. This adaptation allows smooth brome to get established before native prairie plants begin to grow. This reduces the diversity of a prairie. Smooth brome spreads through seeds and rhizomes, or horizontal stems growing below the soil surface, making it a challenge to control.

Smooth brome with characteristic 'M' on leaf.

Eastern Red Cedar

Eastern red cedars are a native tree, but can be an aggressive and harmful plant in a prairie. They cannot tolerate fire, and historically, the fires that benefitted and revived prairies kept them at bay. With the lack of proper management practices in our prairies and grazing pastures, red cedars can quickly take over.

Eastern red cedar grove.

HUMANS AND PRAIRIES

Until the 1850s, prairies had been used by Native Americans for food through hunting or foraging, and the rich prairie soils were fertile grounds for small-scale agriculture. Some cultures actively managed prairie with fire to improve conditions for hunting bison or in conflicting interactions with neighboring tribes. Native cultures also collected prairie plants for medicinal and spiritual purposes and had complex emotional, tangible, and spiritual connections to the tallgrass prairie ecosystem.

With the arrival of European colonizers, primarily during the 1800s, life on Iowa's prairie drastically changed for the people who lived there as the prairie ecosystem was disrupted. Colonizers marveled at the vast expanse of prairie that they had never seen on such a large scale before. They built homes out of the deep, thick sod and took advantage of the rich prairie soils by plowing it up for agriculture or pasturing livestock on it. The displacement of Native communities with immigrants armed with a relatively new invention – the steel plow – led to widespread conversion of prairie ecosystems to row-crop agriculture. The steel plow was lighter and easier to use than previous plows. It also cut through the thick prairie soil and roots cleanly, opening up land for the agriculture that is prominent today. Subsequent drainage projects, aimed at making additional acreage available for agriculture, eliminated prairie-wetland complexes. Starting in the 1850s, Iowa lost nearly 2% of its 25 million acres of native prairie a year, until less than 30,000 acres (0.1%) remained after 80 years.

Traveling through Iowa today, you cannot escape the state's prairie heritage. It is in our place names, along our roadways, at our parks, and in artwork adorning advertisements and informational brochures. The dark soils turned over today by steel plows unimaginable in size and power to the former inhabitants of this place, still reveal the impact of the complex prairie ecosystems that gave rise to the richest soils in the world. Although considerably reduced in their size, distribution, and complexity, prairies today still provide critical services to humans.

Prairies today, where they are found, still protect the soil and annually enrich it with deep-growing roots breathing life-sustaining carbon deep into the soil profile. These firmly positioned soils and ecosystems keep nutrients, contaminants, and sediments out of our waterways and can ensure clean-flowing rivers, lakes, and streams. As they hold tight to soil, nutrients, and waters, prairies also reduce the impacts of extreme weather, absorbing heavy rains or melting snow like a sponge and protecting down-stream communities from rapid flood pulses. Also bound up in those deep roots is carbon and other greenhouse gases that prairies can sequester from the atmosphere and serve as a vital tool in fighting climate change.

Early John Deere steel plow.

Today's prairies can provide food for people, wildlife, and domestic animals alike. Humans retreat to the prairies annually to participate in hunting seasons for northern bobwhites, ring-necked pheasants, white-tailed deer, and other prairie wildlife that can provide important protein sources for families across the state. Some shrubs of the prairie like American plum and elderberry, provide fruit for jams or jellies and wine. And wildflowers provide ideal season-long nectar sources for bee-keeper's hives that annually produce rich, prairie-borne honeys. Prairies and their soils also provide food for a rich cadre of wild plants and animals. And in some areas, cattle and bison are used for both management of the prairie and for profit among farmers. Practicing rotational grazing with these ruminants in pastures with prairie plants mimics the natural processes that sustained prairies and the humans and wildlife that have lived on them for thousands of years.

Human visitors to prairies can remark at the aesthetic beauty of the place, taking in the sights of the plants in bloom, or watching the birds migrate, breed, or overwinter. Recreation among prairies is popular in rural communities and cities alike. Prairies in cities are further used for tangible purposes, like small plantings in landscapes that provide aesthetic beauty and ecological function such as rain water treatment or erosion prevention. Prairie managed right in parks, yards, or roadsides can reduce maintenance costs of managed turf areas and improve aesthetics and wildlife habitat in human spaces. In visiting Iowa's prairies to admire the beauty of their plants, watch wildlife, hike, hunt, and bike, we are reminded of an important part of Iowa's history and future. These are places where we can enjoy the beauty of Iowa's native plants and wildlife and remember the deep ties our state has to its prairie origins.

SUMMING IT UP

Prairie ecosystems are important to both people and wildlife. Historically, people have depended on prairie plants and wildlife for food, medicines, and materials. Prairie plants are responsible for the fertile soil that has become the basis of

Iowa's economy. And prairies provide important habitat for rare grassland-adapted wildlife, thereby helping maintain diversity of life.

From the Loess Hills in the west to the sand prairies in the east, Iowa is home to many unique prairie ecosystems. Some of these can only be found in a handful of places around the world. Prairie is an Iowa icon that will not soon go away, as it shouldn't. It is our history, as well as our future.

ACKNOWLEDGEMENTS

This article was produced through a collaborative project led by members of the Iowa Association of Naturalists (IAN) and Iowa State University Extension and Outreach. Funding for the project was provided by a Resource Enhancement and Protection (REAP) Conservation Education Program grant.

Portions of the text and illustrations were adapted from or originated in the booklet titled Iowa Prairies published by IAN. That booklet, along with others originally produced as part of a larger series by IAN are digitally archived at lib.dr.iastate.edu/extension_ian.

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Larry Reis—goat hill prairie; eastern pasqueflower; wild rose; New England aster; white panicle aster; monarch on showy goldenrod; birdfoot violet; mature prairie; prescribed fire; eastern red cedar

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Illustrations

Original graphics for this publication were created by Irah Dhaseleer and Madeline Schill, Iowa State University biological and pre-medical illustration students. All original graphics presented in the article are available to download at high resolution for noncommercial use in educational materials at naturalresources.extension.iastate.edu/Iowas-Nature.

WL17d March 2021

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